GROUPED REFORESTATION PROJECT BY CROPZONE AGRO FORESTRY PRIVATE LIMITED

Document Prepared by EKI Energy Services Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Project

CropZone Agro Forestry Private Limited is proposing a grouped Afforestation, Reforestation and Revegetation (ARR) in Andhra Pradesh, Telangana, Karnataka, and the Maharashtra state of India. CZAFL is the Project Proponent (PP) whereas EKI Energy Services Limited (Enking International) is providing carbon credit advisory services to the PP. CropZone Agro Forest Private Limited has mobilized the farmers in the selected states of India to plant various tree species on their lands. These tree species range from fruit-bearing trees like Indian blackberry (*syzygium cumini*), Guava (*Psidium guajava*), Mango (*Magnifera indica*) to commercial species like Teak (*Tectona grandis*), Mahogany (*Swietenia macrophylla*), and Sandal (Sandalwood; *Santalum album*). Simple tree cultivation techniques involving planting saplings in the pits with minimum disturbance to the lands have been employed in the project activity. The land selected for the project activity is fallow agriculture land. The prior condition to the project activity was lands with barren/fallow designated agricultural lands owned by the participating farmers/land owners. The PP has made a contract with the farmers/landowners where they will be given tree saplings and technical support. In return, the PP will reap the benefit through the sale of carbon credits. Initially, 501.47 hectares of land has been selected for the first project activity instance. Through carbon sequestration by the planted trees, the project is expected to generate annual average GHG emission reductions or removals of 10, 673 tCO_2e.

1.2 Sectoral Scope and Project Type

The project is a grouped project and the project activity implemented by the Project corresponds to the VCS scope 14:" under sectoral scope applicable to the project: Agriculture, Forestry and Other Land Uses (AFOLU).

AFOLU Project Type: Afforestation, Reforestation, and Revegetation (ARR)

1.3 Project Eligibility

According to Appendix 1 of VCS Standard v4.3[1], the eligibility for ARR activities is described in the table below.

Sl. No.	Eligibility conditions	Explanation

[1] https://verra.org/wp-content/uploads/2022/06/VCS-Standard_v4.3.pdf

1	That increase carbon sequestration and/or reduce GHG emissions by establishing, increasing, or restoring vegetative cover (forest or non-forest) through the planting, sowing, or human-assisted natural regeneration of woody vegetation	The present project activity proposed planting woody perennials on barren and fallow lands and therefore aims to increase the vegetation cover. This will increase the carbon sequestration under the project scenario.
2.	Eligible ARR projects may include timber harvesting in their management plan.	Under the project activity, harvesting and replanting are part of the project management plan. The future harvesting will target selective harvesting of Mahogany (*Swietenia macrophylla*) and Teak (*Tectona grandis*) only. The harvesting will be followed by replanting.
3.	The project area shall not be cleared of native ecosystems within the 10-year period prior to the project start date	According to the analysis of satellite imageries of the project locations sites, none of the sites had any forest or vegetation cover. Therefore, there was no clearing of native ecosystems.
4.	Activities that drain native ecosystems or degrade hydrological functions to generate GHG credits are not eligible under the VCS Program. Evidence shall be provided in the project description that any AFOLU project area was not drained or converted to create GHG	The project activity does not drain the native ecosystem or degrade hydrological functions to generate GHG credits. The project activity has been implemented on the fallow agricultural lands. There are and there were no water bodies within the

	credits. Such proof is not required where such draining or conversion took place prior to 1 January 2008. The onus is upon the project proponent to demonstrate this, failing which the project shall not be eligible.	boundary of each land parcels as well as within 10-years of the start date of the project activity. The PP has provided current land use assessment of land parcels as well as 10 years prior to the project activity.

1.4 Project Design

The project has been designed as a grouped project. It will later include multiple instances depending on the eligibility criteria.

Eligibility Criteria

The group project activity uses the UNFCCC Afforestation/Reforestation CDM methodology – AR-ACM0003 Ver. 2 – "Methodology for Afforestation and reforestation of land except wetlands" under sectoral scope 14 – Agriculture, Forestry and Other Land Uses (AFOLU). Participation in the grouped project should fulfil the following eligibility criteria of the AR-ACM0003 methodology. The conditions are as follows:

(a) The land subject to the project activity does not fall in the wetland category;

(b) Soil disturbance attributable to the project activity does not cover more than 10 percent of the area in each of the following types of lands when these lands are included within the project boundary.

(i) Lands containing organic soils;

(ii) Lands which, in the baseline, are subjected to land-use and management practices and receive inputs listed in appendices 1 and 2 to this methodology.

Additional eligibility criteria for the inclusion of new instances:

(i) It should be located in the Indian state of Andhra Pradesh, Telangana, Karnataka, and Maharashtra.

(ii) The pre-project land use include barren, fallow, cropland, and /or grasslands.

1.5 Project Proponent

Organization name	CropZone Agro Forestry Private Limited

Contact person	Mr. Saibaba Abburi
Title	Managing Director
Address	Cropzone Agro Forestry Private Limited, #8-3-222/1/2, Ahmed House, Madhura Nagar, Hyderabad, Telangana-500070, India
Telephone	+91-9849602999
Email	saibaba@cropzone.in

1.6 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the project	Project documentation, support in validation/verification, and carbon credit advisory services
Contact person	Mr. Manish Dabkara
Title	CEO & MD
Address	EnKing Embassy, Office No. 201, Plot 48, Scheme 78, Part 2, Vijay Nagar, Indore, Madhya Pradesh – 452010, India
Telephone	+91-9910771187
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1.7 Ownership

The PP is an aggregator or coordinator for all the participating farmers. The PP has entered into a contract with the participating farmers. The PP has full legal right over the carbon credits whereas farmers have legal rights over their lands. The PP has entered into a contractual agreement with farmer/landowner regarding tree plantation, ownerships, etc. In the future project activity instances, the PP will make contractual agreement with the landowners/farmers over the conditions of tree plantations. The project activity instance will be added only when it will fulfil the 'Eligibility Criteria' for the grouped project as described in section 1.4.

1.8 Project Start Date

According to the Section 3.7 of VCS Standard v4.3[2], the project start date of an AFOLU (Agriculture, Forestry and Other Land Uses) project is the date on which activities that led to the generation of GHG emission reductions or removals are implemented (e.g., preparing land for seeding, planting, changing agricultural or forestry practices, rewetting, restoring hydrological functions, or implementing management or protection plans). The start date of the project activity is 04-June-2017 when the first plantation activity took place at Dhule, Maharashtra covering three different species – *Swietenia macrophylla*, *Tectona grandis* and *Citrus limon*. Therefore, it is the date when activity/ies led to the generation of GHG emission removals.

1.9 Project Crediting Period

Indicate the project crediting period, specifying the day, month, and year for the start and end dates and the total number of years.

Project crediting period start date: 04-June-2017

Project crediting end date: 03-June-2037

Project crediting period: 04-June-2017 to 03-June-2037 (including both dates)

The total number of crediting years: 20 years (which will be renewed four times to the total crediting period of 100 years).

The project activity has a lifetime of more than 30-years. Although the crediting period of the project activity has crediting period of 20-years, but the Project Proponent aims at renewing the crediting period for four times to take the total crediting period of 100-years. The project activity is being proposed as a grouped project, in which multiple project activity instances will be included in the future. For effective implementation, the PP will sign a contractual agreement with each landowner/farmer for future project activity instance (section 1.7). In the first project activity instance as well, the PP has signed contractual agreement with the land owners to participate in the project activity. For implementation, the PP has described it in section 1.11 (Description of the project activity). The PP has monitoring plan (section 5.3) put in place for measure, monitor and report the carbon stocks for the first project activity instance as well as for the future instances as well.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	x

[2] https://verra.org/wp-content/uploads/2022/06/VCS-Standard_v4.3.pdf

Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
2017-2018	3916
2018-2019	7742
2019-2020	8238
2020-2021	10681
2021-2022	11431
2022-2023	11431
2023-2024	11431
2024-2025	11431
2025-2026	11431
2026-2027	11431
2027-2028	11431
2028-2029	11431
2029-2030	11431
2030-2031	11431
2031-2032	11431
2032-2033	11431
2033-2034	11431
2034-2035	11431
2035-2036	11431
2036-2037	11431
Total estimated ERs	**2,13,467**
Total number of crediting years	**20**
Average annual ERs	**10,673**

Long Term Average (LTA) Calculation

The Long-Term Average (LTA) has been calculated by following the VCS Guidelines of Section 3.2.21 of VCS Program Standard v4.3[3] and AFOLU Guidance: Example for Calculating the Long Term Average Carbon Stock for ARR Projects with Harvesting[4]. The ARR project activity has crediting period of 20 years which will be renewed four times making the total crediting period of 100 years. Only plantations under Mahogany (*Swietenia macrophylla*) and Teak (*Tectona grandis*) have been considered for the LTA calculation. This is because on these two species will be subjected to harvested.

1) Establish the period over which the long-term average GHG benefit shall be calculated – The harvesting of the species Mahogany (*Swietenia macrophylla*) and Teak (*Tectona grandis*) is expected on 21st year.

2) Determine the expected total GHG benefit of the project for each year of the established time period. For each year, the total GHG benefit is the to-date GHG emission reductions or removals from the project scenario minus baseline scenario.

3) Sum the total GHG benefit of each year over the established time period

4) Calculate the average GHG benefit of the project over the established time period.

The following equation to calculate the long-term average GHG benefit:

$$LA = \frac{\sum_{t=0}^{n} PE_t - BE_t}{n}$$

Where:

LA = The long-term average GHG benefit

PEt = The total to-date GHG emission reductions and removals generated in the project scenario (tCO_2e). Project scenario emission reductions and removals shall also consider project emissions of CO_2, N_2O, CH_4 and leakage.

BE_t = The total to-date GHG emission reductions and removals projected for the baseline scenario (tCO_2e)

t = Year

n = Total number of years in the established time period

Expected GHG benefit-to-date = 141,675,03 tCO_2e

Total number of years in the establishment period =100 years

[3] https://verra.org/wp-content/uploads/2022/06/VCS-Standard_v4.3.pdf

[4] https://verra.org/wp-content/uploads/2018/03/VCS-Guidance-Harvesting-Examples_0.pdf

So, the long-term average GHG benefit from the project = 141,675 tCO_2e

It is expected that the project will achieve its long-term average GHG benefit from the project by the 13th year.

1.11 Description of the Project Activity

The main aim of the grouped project activity is to make utilization of fallow croplands into productive lands through tree plantation activities. The participating farmers have been trained to cultivate and manage trees on their lands. The participation of the farmers is purely voluntary.

The project activity has clear guidelines on plantation and management. These guidelines include planning, selection of species, tree plantation and cultivation, nursery management, weed control, etc.

Capacity building and training: Capacity building and training are a significant part of the project activities. Activities like training farmers regarding planting material, cultivation and management, and skill development have been carried out under this.

Nursery Management

Nursery practices will produce saplings through a method based on saplings in seedbeds previously prepared in the soil. Once saplings become optimum age they will be distributed to respective project lands from concerned nurseries. This distribution is done in July. More preference is given to local species. Saplings are distributed to people who are responsible for each project area.

The seedlings are bought from various suppliers, commercial suppliers well known for their experience with the production and logistics of the tree seedlings, and community tree nurseries developed under technical guidance, following the proceedings of the project for tree seedlings production.

PP has small nurseries in various locations in India to maintain stock and distribute to our stakeholders in small vehicles. These nurseries are full of irrigation sources, storage of water, Energy sources, Nursery Tools and equipment, and Compost units. These small nurseries are established to avail good and healthy samplings for an entire year. Our nurseries are connected to road/rail networks to facilitate transport and established at selected places to protect from strong winds and dangerous flooding.

Land preparation

The lands are prepared simply with minimal disturbance to the soil. Before the plantation of saplings, pits of appropriate sizes are dug. After that saplings are planted. Fertilization is done using organic fertilizers like cattle manure when required.

Site selection and Preparation

Degraded land / fallow land/ barren land in the project district were selected as the sites for reforestation. Most of these vacant spaces and designated lands were underdeveloped. The Site was prepared with very little damage to the soil. Soil disturbance was minimum as near to

no-tillage was done. Organic manure was used as fertilizer Harmful pesticides were not used to protect the saplings. The whole process of site preparation and plantation was done considering sustainable health of the soil, employees working and community living nearby.

Management & Monitoring

The reforestation activity is monitored at regular intervals about plants' survival. The PP keeps the record of all plantations. There is a dedicated team to conduct monitoring and keeping all the records.

The project activity is not located within a jurisdiction covered by a jurisdictional REDD+ program.

1.12 Project Location

The project activity is located in India. This project instance activity is spread over different districts of four different states of India – (i) Andhra Pradesh; (ii) Karnataka; (iii)Maharashtra; and (iv) Telangana.

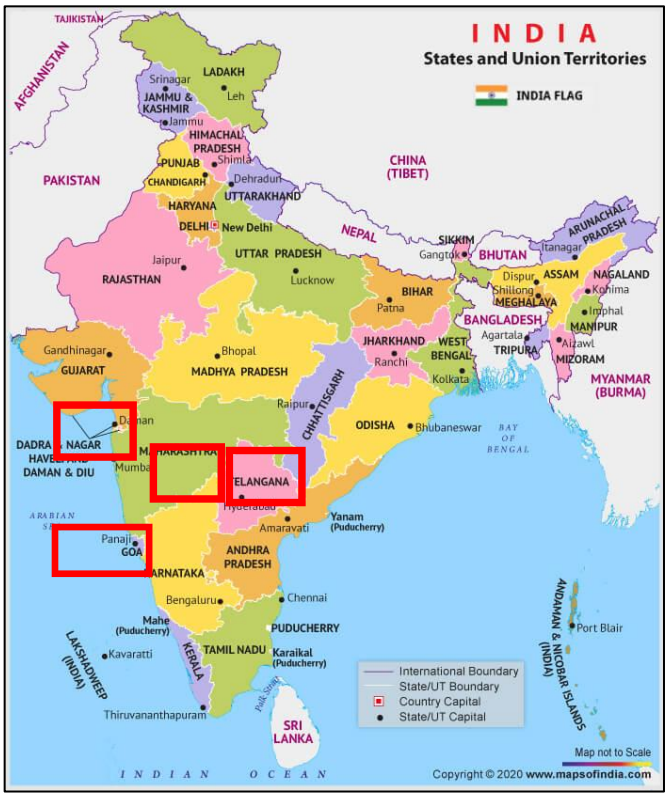


Figure 1 Map of India showing four different states where project activity is located (in red rectangle)[5]

Location of the project activity

[5] Source of map: www.mapsofindia.com

State	District	Mandal / Taluq	Village
Andhra Pradesh	Anathapur	Ananthapur	Govindawada
	Chittor	Ramasamudram	Chokkandlapalle
	Kurnool	Bommanahalli	Bommanahalli
		Kowthalam	Badinehal
		Tuggali	Ratana
	Nellore	Sangam	Peramana
	Visakhapatnam	Devarapalli	Timmiram,vakapally
Karnataka	Bagalkot	Jamkhandi	Budni
	Bellary	Bommanahalli	Joladarasi
		Gopannagudi	Thirumalanagar
			Ygodada
			Ykaggal
		Rupanagudi	Asundi
			Y koggal
		Shankarbanda	Chaolamamidi
		Siriguppa	Dasapura
			Godehal
	Kolar	Bangarpet	Kanamanahalli
		Kolar	Kurki
	Mandya	Pandavapura	Chandre
	Shimogga	Shikaripura	Hulaginakatte
	Tumkur	Pavagada	Gujjanadu
Maharashtra	Aurangabad	Gangapur	Dhamori bk
			Dhamoribudruk
			Gurudhanora
			Hanumanthgaon
			Murshidabad
			Mushidabad
			Pendapur
			Shendruwada
			Shendurwada
		Kannad	Badod
			Deulgaon
			Shelgaon
			Wankijadid
		Paitan	Imampur
			Shekta
		Paithan	Chitegaon
			Gadegaon
			Imampur
			Lohgaon k
			Shekta
		Phulambri	Talegoan
		Sillod	Ghatnandra
			Lohgaon
	Dhule	Dhule	Nawlane
		Shirpur	Savalde
	Jalana	Ambad	Bhivandibodakha
			Lalawadi
		Badanapur	Akola
			Ambadgoan

State	District	Mandal / Taluq	Village
			Chikhali
			Dagadwadi
			Dhamangoan
			Hivara
			Kandari
			Pirsangavi
			Tupewadi
			Ujjainpuri
			Valaha
		Bhokardan	Palaskhed
		Ghanasangavi	Chincholi
			Chincholi
			Dahalegaon
			Ghonsi
			Masegaon
		Ghansangavi	Borgaon
			Dhalegoan
			Gurupimpri
			Jamb samarth
			Limbi
			Masegoan
			Paradgoan
			Viregavan
		Jafrabad	Dahegoan
		Jalana	Dharkalyan
			Kadavanchi
			Nandapur
			Pahegaon
			Pirkalyan
			Kumhefal
			Waghrul
		Mantha	Akani
			Belora
			Kanfodi
			Kendali
		Partur	Brahmani
			Hatadi
			Kandari
			Likhitpimpri
			Shingona
	Jalgaon	Parchora	Nagardevla seem
	Parabhani	Jintur	Asola
	Solapur	Malshiras	Mahalung
		Uttar Solapur	Bibi darfal
Telangana	Jagityal	Jagityal	Potharam
		Medipally	Kacharam
	Nalgonda	Gurrampud	Chamled
		Marriguda	Erugandlapally
		Nalgonda	Gandhamvarigudem
			Kanchanapalle
	Rangareddy	Farukhnagar	Velijerla

Project boundary showing the land parcels are shown in the maps below. The project land parcels are shown in red bordered geodetic polygons. A separate KML has been provided as well.

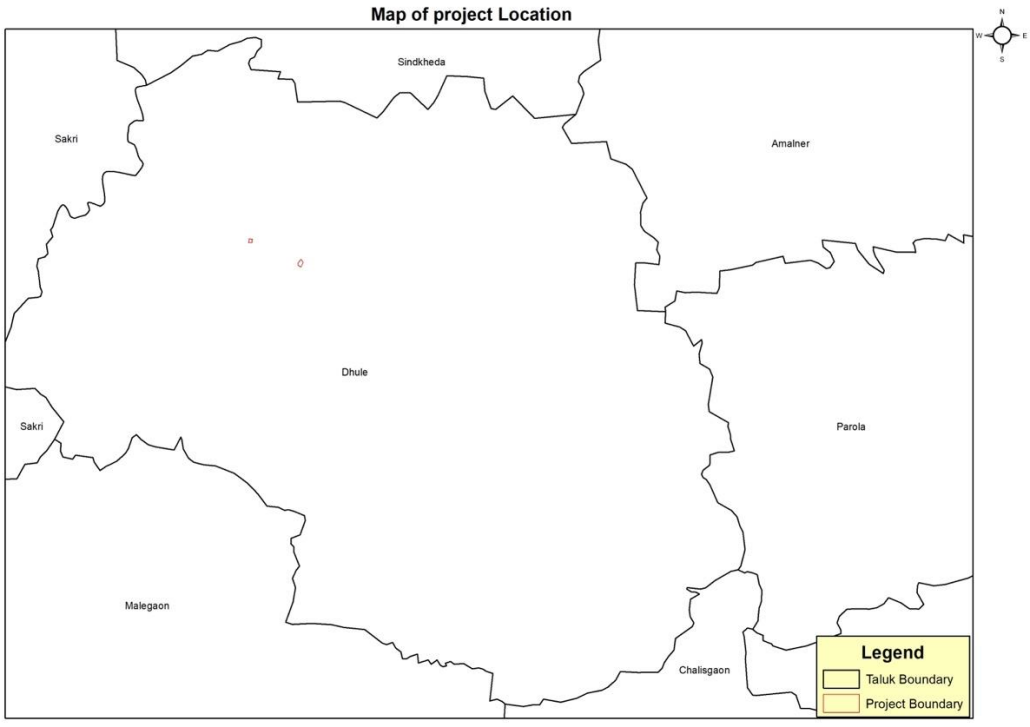


Fig. 1 Project boundary showing land parcels – Part 1

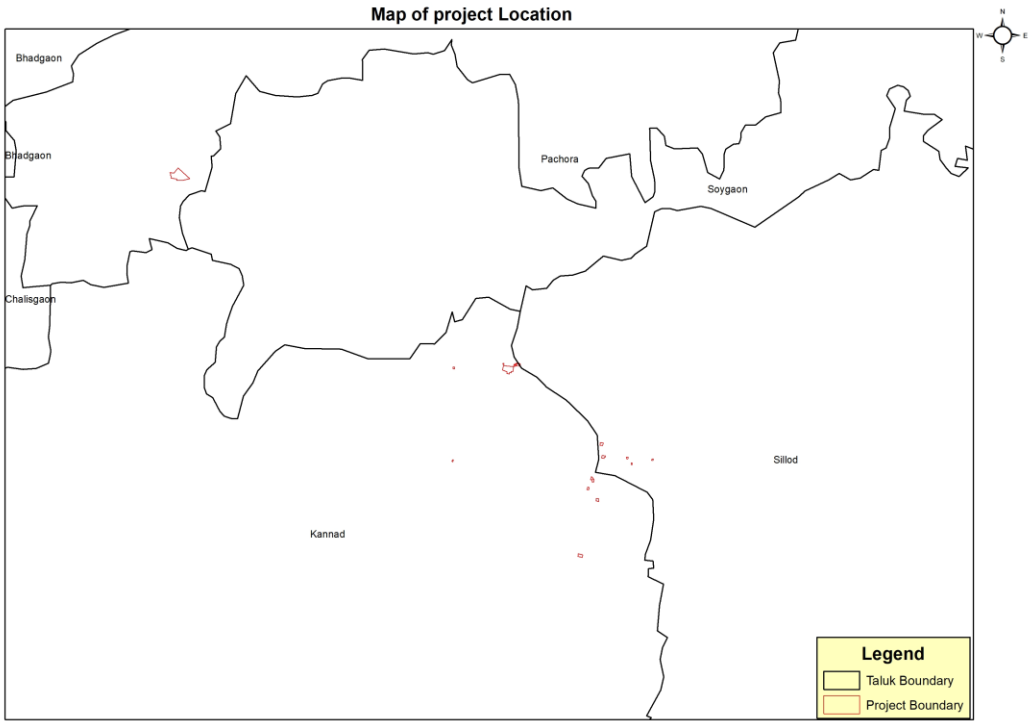


Fig. 2 Project boundary showing land parcels – Part 2

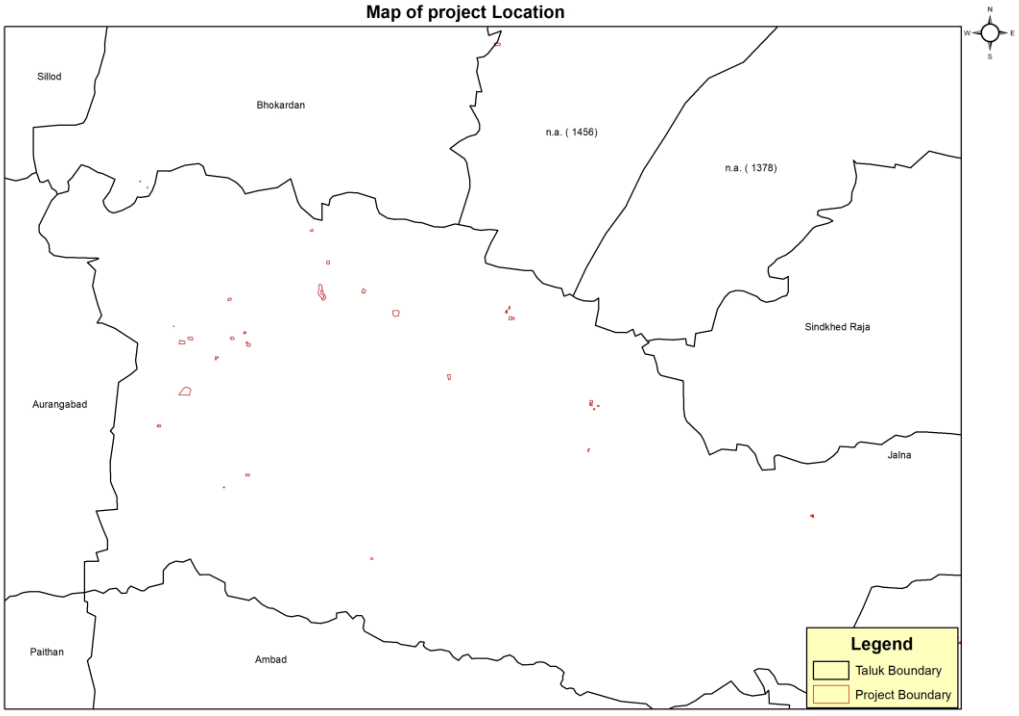


Fig. 3 Project boundary showing land parcels – Part 3

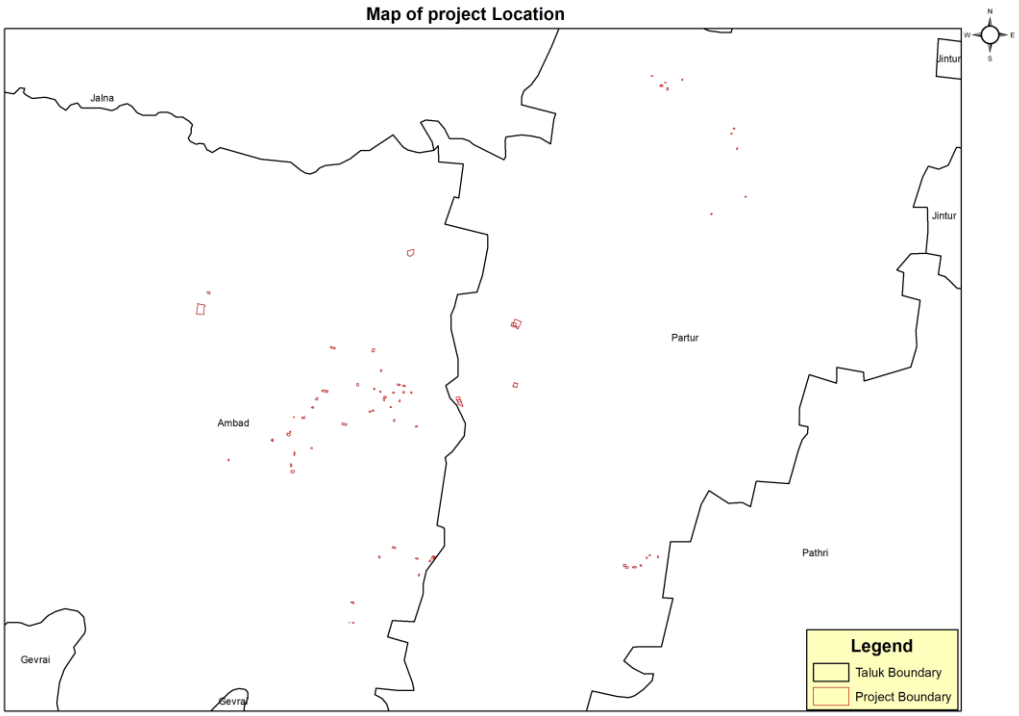


Fig. 4 Proiect boundary showing land parcels – Part 4

1.13 Conditions Prior to Project Initiation

The conditions prior to the project initiation has been described in the baseline section – section 3.4. The group project activity is located in the states of Maharashtra, Karnataka, Telangana, and Andhra Pradesh. The project has not been implemented to generate GHG emissions for their subsequent reduction, removal, or destruction. The afforestation and reforestation activity will make use of vacant land which were not forested before the implementation.

A general description of the project is described below, to have this information as a baseline for the project.

Physical Characteristics

Geography: - The first project instance area has spread over the four states of India which are Maharashtra, Karnataka, Telangana, and Andhra Pradesh.

Maharashtra occupies the western and central part of the country and has a long coastline stretching 720 kilometers along the Arabian Sea. One of the more prominent physical features of Maharashtra is the Deccan plateau, which is separated from the Konkan coastline by 'Ghats'. Physiographically this state may be divided into three natural divisions - the coastal strip (the Konkan), the Sahyadri or the Western Ghats, and the plateau. The Konkan consists of undulating low lands. North Konkan has the vast hinterlands. The Western Ghats run almost parallel to the sea coast. Thorny savanna-like vegetation occurs in areas of lesser rainfall, notably in upland Maharashtra. Subtropical vegetation is found on higher plateaus that receive heavy rain and have milder temperatures. Bamboo, chestnut, and magnolia are common. Maharashtra has a tropical climate, with three distinct seasons: summer (March-May), monsoon (June–September), and winter (October–February). However, dew and hail also occur sometimes, depending on seasonal weather. The winter season starts between October to February is followed by summer between March and May and the monsoon season between June and September. Summers i.e. March, April, and May are extremely hot months where temperatures rise from 22 °C to as high as 43 °C. Rainfall starts normally in the first week of June. July is the wettest month in Maharashtra, while August also gets substantial rain. The rainy season starts its retreat with the coming of September. Rainfall in Maharashtra differs from region to region. Rainfall is particularly high in areas adjacent to the Sahyadri Mountains such as coastal Konkan on the west and foothills of the mountain range on the eastern side. Central Maharashtra receives less rainfall.

Karnataka is located at 11°30' North and 18°30' North latitudes and 74° East and 78°30' East longitude. It is situated on a tableland where the Western Ghats and the Eastern Ghats converge into the complex, in the western part of the Deccan Peninsular region of India. The State is bounded by Maharashtra and Goa States in the north and northwest; by

the Arabian Sea in the west; by Kerala in the south-west and Tamil Nadu in the south and south-east, Andhra Pradesh in the south-east and east, and Telangana in the north-east. Karnataka extends to about 750 km from north to south and about 400 km from east to west. It is situated in the Deccan Plateau and is situated at the angle where the Western Ghats and Eastern Ghats of South India converge into the Nilgiri hills. The highest point in Karnataka is the Mullayanagiri hill in Chikkamagaluru district which has an altitude of 1,929 metres above sea level. The common type of soil group found in Karnataka are as follows[6]

- Red Soil
- Black Soil
- Lateritic soil
- Alluvio-Colluvial soil
- Brown forest soil
- Costal laterite-alluvial soil

Karnataka is divided into three metrological zones i.e.

- Coastal Karnataka: This zone comprises the districts of Uttara Kannada, Udupi, and Dakshina Kannada. It is a region of heavy rainfall and receives an average rainfall of 3638.5 mm per annum.

- North Interior Karnataka: This zone comprises the districts of Belgaum, Bidar, Bijapur, Bagalkot, Haveri, Gadag, Dharwad, Gulbarga, Koppal, Bellary, and Raichur Districts. This is an arid zone and receives only 711.5 mm of average rainfall per annum

- South Interior Karnataka: The rest of the districts of Karnataka falls into this zone. This zone receives 1064.8 mm of average rainfall per annum.

The southwest monsoon accounts for almost 80% of the rainfall that the state receives. The annual rainfall across the state ranges from low 50 cm to copious 350 cm. The districts of Bijapur, Raichur, Bellary, anthe d the Southern half of Gulbarga experience the lowest rainfall ranging from 50 to 60 cm while the west coastal region and Malenadu enjoy the highest rainfall.

Andhra Pradesh lies between 12°41' and 19.07°N latitude and 77° and 84°40'E longitude, and is bordered by Telangana to the north and west, Chhattisgarh to the north-west, Orissa to the north, the Bay of Bengal to the east, Tamil Nadu to the south and Karnataka to the southwest and west. Andhra Pradesh has a coastline of around 974 km, which gives it the second-longest coastline in the nation. Two major rivers i.e. the Godavari and the Krishna run across the state. The state includes the eastern part of the Deccan plateau as well as a considerable part of the Eastern Ghats. The climate of Andhra Pradesh is generally hot and humid in the lowland coastal regions, while it is mostly semi-arid in parts of Anantapur district, Kurnool district and Kadapa district. These areas fall under the rainshadow region of the Western Ghats. The summer season in this state generally extends from March to May or

[6]https://en.wikipedia.org/wiki/Geography_of_Karnataka

June. During these months the moisture level is relatively higher than in winters, and it is generally higher in the coastal lowlands.

Telangana is situated on the Deccan Plateau, in the central stretch of the eastern seaboard of the Indian Peninsula. It covers 112,077 square kilometres. The region is drained by two major rivers, with about 79% of the Godavari River catchment area and about 69% of the Krishna River catchment area, but most of the land is arid. Telangana is also drained by several minor rivers such as the Bhima, the Maner, the Manjira, and the Musi. The annual rainfall is between 900 and 1500 mm in northern Telangana and 700 to 900 mm in southern Telangana, from the southwest monsoons. Telangana contains various soil types, some of which are red sandy loams (Chalaka), Red loamy sands (Dubba), lateritic soils, salt-affected soils, alluvial soils, shallow to medium black soils, and very deep black cotton soils. These soil types allow the planting of a variety of fruits and vegetable crops such as mangoes, oranges, coconut, sugarcane, paddy, banana, and flower crops.

Details of the socio-economic and cultural activities in the region

State: Maharashtra

Cultural Activities: - Maharashtra has a richly diverse culture and heritage. It has its own identity in India for its **Ganesh festival, Great monuments** and numerous **old temples.** Maharashtra is divided into various regions; **Marathwada, Vidarbha, Khandesh, Konkan,** etc., and each region has its own cultural identity in the form of different dialects of the Marathi language, folk songs, food, and ethnicity.[7]

The state was being initially the land of the great warriors who have left behind grandeur, high spirits, exuberance, and might. All these features add to rich culture and heritage to the Marathi's. The Maharashtrians are known for their special dance forms which accompanies most festivals of the state. The Sholapur district in Maharashtra is noted for its Dhangari Gaja dance where the people adorn themselves with dhoti, angarakha, and pheta and colorful handkerchiefs. The people of Maharashtra perform a special type of dance known as Lavani in any gatherings like social functions never miss the Povadas dance which mainly depicts the history of the Maratha ruler, Shri Chhatrapati Shivaji Maharaj. **Mumbai** in **Maharashtra** is home to **Bollywood** the country's Hindi film industry.[8]

Social – Economic activities: - Population as per Census– (2011)

Total	1, 12,374
Males	58,243
Females	54,131
Rural	61,556
Urban	50,818

[7] https://www.ritiriwaz.com/maharashtra-culture-and-tradition/

[8] https://www.indianmirror.com/culture/states-culture/maharashtra.html

Scheduled Castes	13,276
Scheduled Tribes	10,510
Density of population (per sq. km)	365
Literacy rate (per cent)	82
Sex ratio (Females per thousand males)	929
Urban population (per cent)	45

Agriculture and allied activities sector is one of the important sectors of the State economy. Around half of the State population is dependent on this sector for their livelihood. The average share of Agriculture and allied activities sector in the State economy is 11.9 per cent. Average share of Crop sector is 63.7 per cent in Agriculture & allied activities sector of the State. Average share of horticulture in total crop production is about 28.4 per cent. Over a few decades, the State has significantly diversified its production base from coarse cereals to high value crops like cotton, sugarcane, soybean, maize, fruits, vegetables and flowers.[9]

State: Telangana

Cultural Activities: - Telangana State has long been a meeting place for diverse languages and cultures. It is known as "**South of North and North of South**" It is also known for its **Ganga-Jamuna Tehzeeb** and the capital Hyderabad as a miniature India. A mix of **Persian, Mogal, Qutubshahi,** and **Nizam** traditions can be found in the culture of Telangana. But here, most of the impact of the culture of South India is seen. The culture of these states is very rich. Various types of classical music, paintings, Burra Katha folk dances, puppet shows, Perini Sivatandavam, Gusadi dance, and Kolatam are seen here.[10] Telangana may be a new state but has a rich and traditional culture. The people are well versed with technological developments but have not left their traditions, festivals and art behind. They are proud of their rich culture. Women make beautiful decorative designs in the front yards of their houses after sweeping the floors. Children learn traditional music and dances at an early age.[11]

Social – Economic activities: - According to Telangana State Statistical Abstract, 2021:-

Total Population (Lakhs)	350.04
Male Population (Lakhs)	176.12
Female Population (Lakhs)	173.92
Sex Ratio (Females per 1,000 Males)	988
Literacy Rate (%)	66.54
Rural Population (Lakhs)	213.95

[9] http://mls.org.in/pdf2022/budget/ESM_2021_22/Economic%20Survey%20of%20%20Maharashtra%202021-22.pdf

[10] https://www.ritiriwaz.com/telangana-culture-and-tradition/

[11] https://www.telanganaonline.in/about/profile/culture

Urban Population (Lakhs)	136.09
Density of population (per sq. km)	312

The agriculture sector is the backbone of the rural economy in Telangana. 4 key sub-sectors constitute the 'Agriculture & Allied Sectors' — Crops, Livestock, Forestry and Logging, and Fishing and Aquaculture. The sector is a principal source of employment for around 55% of the population in the state. Since state formation, the contribution of the 'Agriculture and Allied Sectors' to Telangana Gross State Value Added at current prices has consistently improved from 16.3% in 2014-15 to 20.5% in 2020-21(PE). There was a 142% increase in the Gross Value Added by the sector between 2014-15 and 2020-21.[12]

State: Andhra Pradesh

Cultural Activities: - A significant state in South India, Andhra Pradesh is a land of a unique culture with rich history and traditions. It is a prominent agricultural state and the largest producer of rice in the country. Thereby boasting the title of the Rice Bowl of India.[13]

The culture of Andhra Pradesh is rich and varied with several art forms like Kalamkari, Bidri, Nirmal paintings along with the spectacular weaving of Gadwal, Pochampalli, and Venkatagiri. The meticulous effort imparted by the Andhra craftsmen can be witnessed in their exclusive metalware, brass, stone, and wood carving pieces. Sari-blouse and dhoti-kurta is the national dress of Andhra Pradesh. The culture of Andhra Pradesh is enriched with its music heritage, wherein Carnatic has a maximum fan following. Most of the renowned Carnatic singers and musicians are the descendants of the tribe of Telugus. The folk music of this state is quite popular. Andhra Pradesh has a plethora of rich culture and tradition embedded in varied forms of dance too. Kuchipudi is the most popular classical dance form of Andhra Pradesh.[14]

Social – Economic activities: - Population as per Census– (2011)[15]

Approximate Population	8.46 Crores
Actual Population	84,580,777
Male	42,442,146
Female	42,138,631
Population Growth	10.98%
Percantage of total Population	6.99%
Sex Ratio	993
Child Sex Ratio	939
Density/km2	308
Area(Km 2)	275,045

[12] https://horticulture.tg.nic.in/downloads/TelanganaStateStatisticalAbstract_19_Jan_2022.pdf

13 caleidoscope.in/art-culture/andhra-pradesh-culture-1

[14] https://www.adotrip.com/state-detail/andhra-pradesh

[15] https://www.census2011.co.in/census/state/andhra+pradesh.html

Total Child Population (0-6 Age)	9,142,802
Literacy	67.02%
Male Literacy	74.88%
Female Literacy	59.15%

State: Karnataka

Cultural Activities: - The ever-evolving state of Karnataka has a rich cultural heritage, literature, architecture, folklore, music, painting, and many art forms that have been inherited from their ancestors. Apart from the architectural marvels left by the Mauryan Empire, many ancient monuments and fossils have been excavated in Karnataka. Leading ahead in the IT sector, the state is also known as the knowledge, research, and innovation hub of Asia.

Bidriware is one of the rare handicrafts of Karnataka which is about intricate carvings done on the metal plates. The Mysore silk of Karnataka is famous all over the world for its luster and color.[16]

Social – Economic activities: - Population as per Census– (2011)[17]

Approximate Population	6.11 Crores
Actual Population	61,095,297
Male	30,966,657
Female	30,128,640
Population Growth	15.60%
Percentage of total Population	5.05%
Sex Ratio	973
Child Sex Ratio	948
Density/km2	319
Area(Km 2)	191,791
Total Child Population (0-6 Age)	7,161,033
Literacy	75.36%
Male Literacy	82.47%
Female Literacy	68.08%

Land-use and vegetation cover in the project area

State: Maharashtra

Vegetation: - The vegetation mainly consists of forests in the eastern region and the Sahyadri Ranges,the Satpura Ranges and the Chandrapur region. Shrub jungles pre-dominate the plateaux. The coastal region of the Konkan Coast has paddy fields as the vegetation. The coastal belt consists of eminent trees like the

[16] https://www.adotrip.com/state-detail/karnataka

[17] https://www.census2011.co.in/census/state/karnataka.html

mango and the coconut and shrubs.
The forests have a very high value because they yield teak, bamboo, myrobalan etc. the vegetation is rich in areas which have a good annual rainfall. Thick evergreen deciduous forests cover 17% of the land of Maharashtra.[18]

Land use: - Maharashtra, the third largest state of the country is located in the western part of India. It has an area of 30.77 million ha which is 9.36 % of the country's total area. It lies between lat 15°35' and 22°02' N and long 72°36' and 80°54' E.[19]

Land Use	Area in 000 ha	Percentage
Total geographical area	30771	
Reporting area for land utilization	30758	100.00
Forests	5926	19.27
Not available for cultivation	2997	9.74
Permanent pastures and other grazing lands	1341	4.36
Land under misc, tree crops & groves	226	0.73
Culturable wasteland	903	2.94
Fallow lands other than current fallows	1171	3.81
Current fallows	1189	3.87
Net area sown	17636	57.34

State: Telangana

Vegetation: - Thorny vegetation covers the scattered hills of the plateau areas, while dence woodlands are found in the northeast along and near the Godavari River. The forests, covering about one-fourth of the Land area, consist of both moist deciduous and dry savanna vegetation; teak rosewood, wild fruit trees, and bamboo are plentiful. Elsewhere in the state, neem, banyan, mango and pipal are among the common trees.

The type of forests met within Telangana are tropical moist deciduous forests, southern dry deciduous forests, Northern mixed dry deciduous forests, Dry savannah forests and tropical dry evergreen scrub.[20]

Land use: - The total geographical area of the state is 114.84 lakh hectares, out of the total geographical area 40.5 per cent is under net area sown, 23.9 per cent is under forests, 10.5 per cent is under current fallow lands, 7.7 per cent is under non-agricultural uses and 5.4 per cent is under barren land uncultivable land.[21]

[18] https://www.mapsofindia.com/maps/maharashtra/geography-and-history/soil-and-vegetation.html#:~:text=The%20vegetation%20mainly%20consists%20of,paddy%20fields%20as%20the%20vegetation.

[19] https://fsi.nic.in/sfr2005/maharashtra.pdf

20 https://telangana.pscnotes.com/telangana-geography/vegetation-of-telangana/

21https://www.telanganaslbc.com/StateProfile.aspx

State: Andhra Pradesh

Vegetation: - Andhra Pradesh state comprises of mainly four vegetation types, the forest, along the coast, in aquatic zones and waste lands and weed vegetation. They constitute a total of 2601 plant species belonging to 1035 genera and 173 families. A total of 19 Rare, Endangered and Threatened plants are encountered in this region. Many plants that are endemic to peninsular India and some exclusive endemics are edaphically and climatically adapted to different ecological zones of this region.[22]

Land use: - Geographical area of the State is 1, 62,968 sq. km which is 4.96% of the geographical area of the country. The State lies between 12°37' N to 19°55' N latitude and 76°45' E to 84°46' E longitude and is bordered by Odisha & Chhattisgarh in the north, Telangana & Karnataka in west and Tamilnadu in the south. Bay of Bengal is on the East to the State.[23]

Land Use Types	Area (in 000' ha)	Percentage
Geographical Area	16,276	
Reporting area for land utilization	16,276	100.00
Forests	3,663	22.51
Not available for land cultivation	3,353	20.60
Permanent pastures and other grazing lands	214	1.32
Land under misc. tree crops and groves	159	0.98
Culturable wasteland	391	2.40
Fallow land other than current fallows	858	5.27
Current fallows	1,402	8.61
Net area sown	6,236	38.31

State: Karnataka

Vegetation: - Karnataka is blessed with some of the most magnificent tropical forests of the Indian sub-continent. The state is endowed with varieties of forest vegetation with an enormous diversity of species the floral diversity is so wide and varied that in some districts, all types of forest from wet evergreen to dry thorn forest are encountered within a crow-fly distance of less than 100 km. About 60 of Karnataka's forests are situated in the Western Ghats, one of the mega biodiversity hotspots of the world. The remaining forests situated in the Eastern Plains - although these have limited coverage - exhibit high degree of plant diversity including varieties of medicinal plants. The total number of flowering plants (angiosperms) so far recorded in Karnataka is about 4,700 species belonging to 1,512 genera under 189 families. Out of these, over 600 species are endemic to southern India and 95 are exclusively endemic to Karnataka.[24]

Land use: - Karnataka is located in southwestern part of the country and lies between lat. 11°30' to 18°25' N and long 74°10' to 78°35' E. it has a geographic area of 19.18 million ha constituting 5.83% of the total area of the country. It has a coastline of approximately 400 km. The recorded forest area is 38284 km^2,

[22] https://www.researchgate.net/publication/299561095_FLORA_AND_VEGETATION_OF_ANDHRA_PRADESH

[23] https://fsi.nic.in/isfr19/vol2/isfr-2019-vol-ii-andhra-pradesh.pdf

[24] https://aranya.gov.in/aranyacms/(S(mwxfzqhnltgm4zcr0t5yhcqw))/English/Forest.aspx

which constitutes 19.96 % of the geographic area of the state, reserved forest constitutes 74.94%, protected forest 10.27 % and unclassed forest 14.79%.[25]

Land Use	Area in 000 ha	Percentage
Total geographical area	19179	
Reporting area for land utilization	19050	100
Forests	3068	16.10
Not available for cultivation	2106	11.06
Permanent pastures and other grazing lands	959	5.03
Land under misc. tree crops & groves	303	1.59
Culturable wasteland	427	2.24
Fallow lands other than current fallows	409	2.15
Current fallows	1367	7.18
Net area sown	10410	54.65

[25] https://fsi.nic.in/sfr2005/karnataka.pdf

Settlement Structures

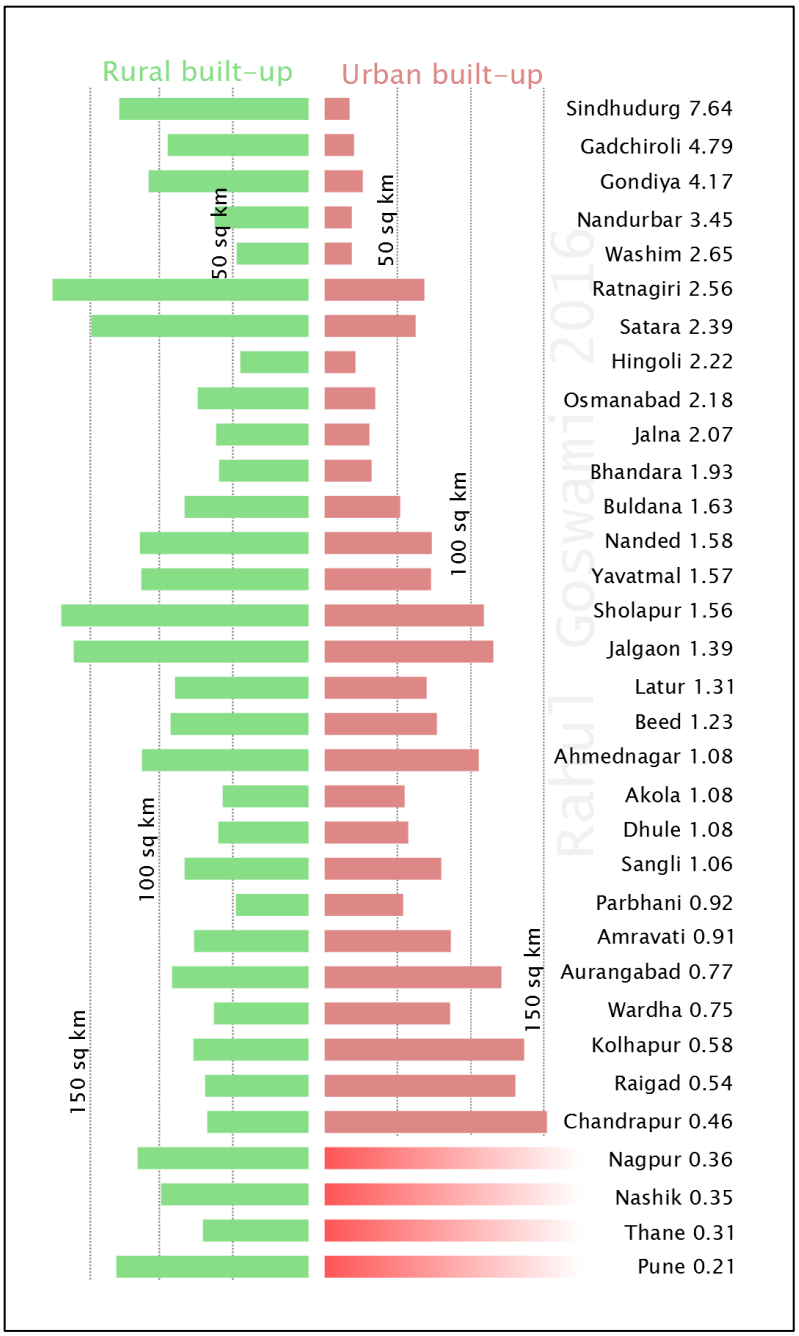
State: Maharashtra

The districts of Jalna, Osmanabad, Hingoli, Satara, Ratnagiri, Washim, Nandurbar, Gondiya, Gadchiroli and Sindhudurg in Maharashtra all enjoy a rural built-up to urban built-up ratio of more than 2 (where the built-up area of the district's rural settlements are at least twice the area of its urban settlements). [26]

In the chart, the light green bars show a district's rural built-up area, the light maroon its urban built-up area. The number associated with the name of the district is the ratio between the two kinds of built-up area.

The comparison helps us to understand the dependency of the two kinds of populations in a district, rural and urban, upon the natural resources (as classified by land types). The chart shows us that some districts i.e. Jalgaon, Sholapur, Satara and Ratnagiri have total rural built-up areas of 150 square kilometres and above. But whereas the urban built-up areas of Jalgaon and Sholapur are more than 100 sq km each this is not so for the other two districts.

There are 15 districts in which there is at least 1.5 sq km of rural built-up area for 1 sq km of urban built-up and this indicates that in these districts the base of agricultural and allied activities is still strong and therefore needs continuous encouragement. There are 7 districts for which this ratio is between 1.5 and 1 and these therefore must be watched for signs of quickening urbanisation which will need to be curbed in the interests of sustainability and indeed of the provision of food.



State: Telangana

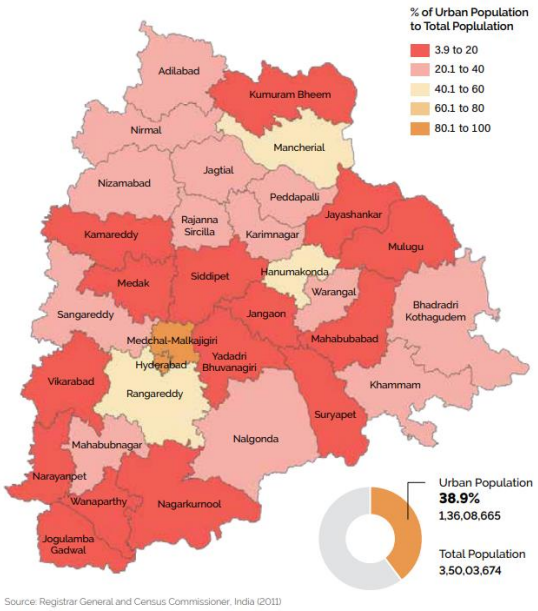
The state of Telangana was formed on the 2nd of June, 2014, and it is the youngest state in the Indian Union. It is a land-locked state located in the southern Indian peninsula on the Deccan Plateau, with

[26] https://makanaka.wordpress.com/2016/10/21/sizing-rural-urban-maharashtra/

Hyderabad as its capital. The region lies between 15°50'10" N and 19° 55'4" N latitudes and 77°14'8" E and 81°19'16" E longitudes.[27]

- The total population of Telangana as of 2011 was 3,50,03,674. This was nearly 2.89% of the population of India in 2011.
- According to the projections of the National Commission on Population, Ministry of Health & Family Welfare, Government of India, the population of Telangana in the years 2021 and 2031 would be 3,77,25,000 and 3,92,07,000 respectively. This is 2.77% and 2.66% of the total population of the country in 2021 and 2031 respectively.
- The state's share in the national population is estimated to decrease by 0.23 percentage points between 2011 and 2031.
- The urban and rural population of Telangana are 1,36,08,665 and 2,13,95,009 respectively.
- The share of the urban and rural population out of the total population in the state is 38.88% and 61.12% respectively.
- Hyderabad and Medchal Malkajgiri are the most urbanized districts in the state, with 100% and 91.47% of their populations, respectively, residing in urban areas.
- Mulugu has the highest share of rural population at 96.10% followed by Narayanpet at 92.63%.

Urban Population

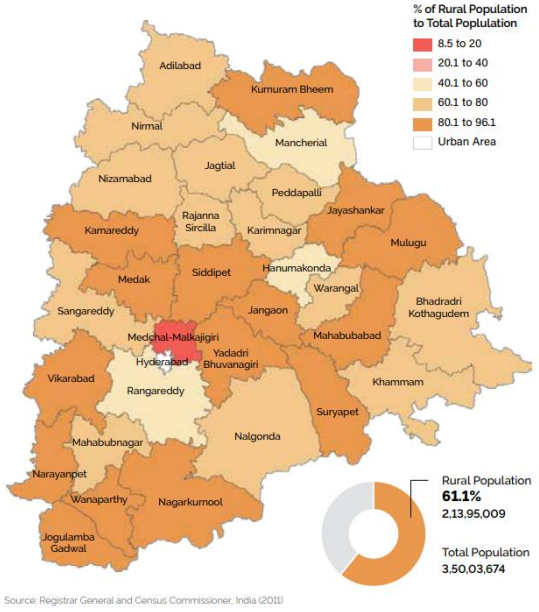


Source: Registrar General and Census Commissioner, India (2011)

S.No	District	Total Population	Urban Population	% of Urban Population
1	Mulugu	2,94,671	11,493	3.9
2	Narayanpet	5,66,874	41,752	7.4
3	Medak	7,67,428	58,854	7.7
4	Mahabubabad	7,74,549	76,376	9.9
5	Jayashankar	4,16,763	42,387	10.2
6	Nagarkurnool	8,61,766	87,830	10.2
7	Jogulamba Gadwal	6,09,990	63,177	10.4
8	Kamareddy	9,72,625	1,23,622	12.7
9	Vikarabad	9,41,383	1,24,969	13.3
10	Jangaon	5,34,991	71,357	13.3
11	Siddipet	10,12,065	1,39,052	13.7
12	Suryapet	10,99,560	1,71,039	15.6
13	Wanaparthy	5,77,758	92,288	16.0
14	Yadadri Bhuvanagiri	7,70,833	1,23,165	16.0
15	Kumuram Bheem	5,15,812	86,984	16.9
16	Rajanna Sircilla	5,52,037	1,16,892	21.2
17	Nirmal	7,09,418	1,51,682	21.4
18	Jagtial	9,85,417	2,21,336	22.5
19	Khammam	14,01,639	3,16,828	22.6
20	Nalgonda	16,18,416	3,68,303	22.8
21	Adilabad	7,08,972	1,67,746	23.7
22	Mahabubnagar	9,05,660	2,66,451	29.4
23	Nizamabad	15,71,022	4,64,750	29.6
24	Karimnagar	10,05,711	3,08,984	30.7
25	Warangal	7,37,148	2,27,091	30.8
26	Bhadradri Kothagudem	10,69,261	3,39,083	31.7
27	Sangareddy	15,27,628	5,29,965	34.7
28	Peddapalli	7,95,332	3,04,013	38.2
29	Mancherial	8,07,037	3,53,847	43.8
30	Hanumakonda	10,62,247	5,63,629	53.1
31	Rangareddy	24,26,243	14,00,130	57.7
32	Medchal-Malkajgiri	24,60,095	22,50,267	91.5
33	Hyderabad	39,43,323	39,43,323	100.0

[27] https://www.tsdps.telangana.gov.in/Statistical_Abstract_2021.pdf

Rural Population

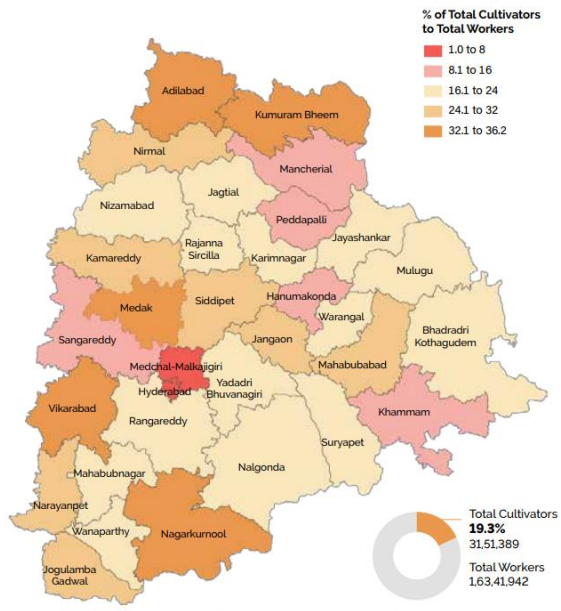


Source: Registrar General and Census Commissioner, India (2011)

S.No	District	Total Population	Rural Population	% of Rural Population
1	Hyderabad	39,43,323	–	0.0
2	Medchal-Malkajgiri	24,60,095	2,09,828	8.5
3	Rangareddy	24,26,243	10,26,113	42.3
4	Hanumakonda	10,62,247	4,98,618	46.9
5	Mancherial	8,07,037	4,53,190	56.2
6	Peddapalli	7,95,332	4,91,319	61.8
7	Sangareddy	15,27,628	9,97,663	65.3
8	Bhadradri Kothagudem	10,69,261	7,30,178	68.3
9	Warangal	7,37,148	5,10,057	69.2
10	Karimnagar	10,05,711	6,96,727	69.3
11	Nizamabad	15,71,022	11,06,272	70.4
12	Mahabubnagar	9,05,660	6,39,209	70.6
13	Adilabad	7,08,972	5,41,226	76.3
14	Nalgonda	16,18,416	12,50,113	77.2
15	Khammam	14,01,639	10,84,811	77.4
16	Jagtial	9,85,417	7,64,081	77.5
17	Nirmal	7,09,418	5,57,736	78.6
18	Rajanna Sircilla	5,52,037	4,35,145	78.8
19	Kumuram Bheem	5,15,812	4,28,828	83.1
20	Yadadri Bhuvanagiri	7,70,833	6,47,668	84.0
21	Wanaparthy	5,77,758	4,85,470	84.0
22	Suryapet	10,99,560	9,28,521	84.4
23	Siddipet	10,12,065	8,73,013	86.3
24	Jangaon	5,34,991	4,63,634	86.7
25	Vikarabad	9,41,383	8,16,414	86.7
26	Kamareddy	9,72,625	8,49,003	87.3
27	Jogulamba Gadwal	6,09,990	5,46,813	89.6
28	Nagarkurnool	8,61,766	7,73,936	89.8
29	Jayashankar	4,16,763	3,74,376	89.8
30	Mahabubabad	7,74,549	6,98,173	90.1
31	Medak	7,67,428	7,08,574	92.3
32	Narayanpet	5,66,874	5,25,122	92.6
33	Mulugu	2,94,671	2,83,178	96.1

The cultivator map shows that Hyderabad and Medchal-Malkajgiri district is the lowest percewntage of cultivators whereas Medak, Nagarkurnool, Kumuram Bheem, Vikarabad & Adilabad are the highest percentage of cultivators. There is always a reverse relationship with agriculture and polulation, the high percentage of urban population is always a less percentage of cultivators. Both Population and cultivator maps show the reverse linkage.

Cultivators



Note: Cultivator is a person who is engaged as employer or worker in cultivation of certain crops on land owned by him or held by him for payment in money, kind or share. Cultivators include supervision or directions of cultivation.
Source: Registrar General and Census Commissioner, India (2011)

S.No	District	Total Workers	Total Cultivators	% of Total Cultivators
1	Hyderabad	14,13,297	28,308	2.0
2	Medchal-Malkajgiri	9,64,732	26,675	2.8
3	Mancherial	3,44,785	45,831	13.3
4	Peddapalli	3,45,214	46,115	13.4
5	Khammam	4,53,845	95,769	13.6
6	Hanumakonda	7,04,729	62,040	13.7
7	Sangareddy	6,88,156	1,09,650	15.9
8	Rangareddy	10,22,641	1,65,705	16.2
9	Karimnagar	4,63,920	78,516	16.9
10	Bhadradri Kothagudem	5,17,111	89,435	17.3
11	Suryapet	5,61,528	98,773	17.6
12	Yadadri Bhuvanagiri	3,74,074	67,500	18.0
13	Nizamabad	7,62,566	1,44,090	18.9
14	Nalgonda	8,06,091	1,58,951	19.7
15	Wanaparthy	2,96,149	60,914	20.6
16	Jagtial	5,36,436	1,11,345	20.8
17	Mulugu	1,62,818	35,561	21.8
18	Warangal	3,62,407	80,658	22.3
19	Mahabubnagar	2,98,663	96,949	22.3
20	Rajanna Sircilla	4,34,908	66,751	22.3
21	Jayashankar	2,21,031	51,785	23.4
22	Jogulamba Gadwal	3,28,086	85,048	25.9
23	Kamareddy	4,94,181	1,33,267	27.0
24	Nirmal	2,97,668	1,03,498	27.5
25	Narayanpet	3,76,760	81,911	27.5
26	Jangaon	2,70,772	80,477	29.7
27	Mahabubabad	4,07,484	1,22,597	30.1
28	Siddipet	5,09,563	1,56,467	30.7
29	Medak	2,53,001	1,29,530	33.6
30	Nagarkurnool	3,85,810	1,54,560	33.8
31	Kumuram Bheem	4,56,762	88,045	34.8
32	Vikarabad	4,77,633	1,68,305	35.2
33	Adilabad	3,49,121	1,26,363	36.2

State: Karnataka[28]

Karnataka is a state in the southern part of India. It was created on 1 November 1956, with the passing of the States Reorganisation Act. Karnataka is bordered by the Arabian Sea to the west, Goa to the north-west, Maharashtra to the north, Telangana and Andhra Pradesh to the east, Tamil Nadu to the south-east, and Kerala to the south-west. The state covers an area of 74,122 sq mi (191,976 km2), or 5.83% of the total geographical area of India. It comprises 30 districts.

- Kannadigas form the dominant ethnic group in Karnataka, making up to 67% of the total population of the state. They are the native speakers of the Kannada language
- Tuluvas are the native speakers of Tulu language. They form the dominant ethnic community in the district of Dakshina Kannada of Karnataka, which is often termed as a single region called as Tulu Nadu. Yakshagana, Nagaradhane, Bootha Kola and Aati kalenja are the distinctive features of Tuluva culture. Tuluvas follow a matrilineal system of inheritance known as Aliyasantana which has given them a unique cultural status. As per the 2011 census, Tuluvas formed 2.61% of the total population of the state.
- Konkani language are widely settled in the districts of Uttara Kannada, Udupi and Dakshina Kannada (Udupi and Dakshina Kannada were the erstwhile South Canara district). In Karwar Taluk (Uttara Kannada district) alone, Konkani language is spoken by about 78% of the population. Significant population of Konkani people has also settled in Belgaum, Sirsi and Bangalore. As per the 2011 census, speakers of Konkani form 1.29% of the total population of the state. In Karnataka, which has the largest number of Konkanis, leading organizations and activists have similarly demanded that Kannada script be made the medium of instruction for Konkani in local schools instead of Devanagari. Most Konkani-speaking people of the state are bilingual in Kannada and Tulu.
- Kodava people are the native speakers of Kodava language and are of a martial race mainly settled in the district of Kodagu. As per the 2011 census, the speakers of Kodava Takk make up up to 0.18% of the total population of the state. According to Karnataka Kodava Sahitya Academy, apart from Kodavas, 18 other ethnic groups speak Kodava Takk in and outside the district including Heggade, Iri, Koyava, Banna, kudiya, Kembatti, and Meda.
- In Karnataka, Urdu is spoken in the form of Dakhni, as in the other states of Deccan. People speaking Urdu as their mother tongue form the second largest ethnic group in Karnataka (10.83% of the total population as per the 2011 census), the majority of population are Muslims (constituting 85.6% of the Muslim population in Karnataka in the 1991 census). Almost 57.5% of the total Urdu population in Karnataka are bilingual. Kannada is the most preferred language among the Urdu speakers of Karnataka. About 43.5% of the total Urdu population has bilingualism in Kannada.

State: Andhra Pradesh[29]

The population of Andhra Pradesh, like that of the other states of India, is highly diverse. In general, the state's various communities are identified more readily by a combination of language, religion, and social class or caste than they are by specific ethnic affiliation. Telugu is the official and most widely spoken language in the state.

[28] https://en.wikipedia.org/wiki/Karnataka_ethnic_groups

[29] https://www.britannica.com/place/Andhra-Pradesh/People

The great majority of the residents of Andhra Pradesh practice Hinduism. Smaller segments of the population follow Islam or Christianity. Christians live mostly in the urban centres and coastal areas, while Muslims are concentrated in the Rayalaseema region.

Nearly one-third of the population lives in urban areas. Of the urban dwellers, about half live in the state's 10 most-populous urban areas, notably the industrial and manufacturing regions around Visakhapatnam and Vijayawada in the northeast. Other large cities in Andhra Pradesh include Guntur, Kurnool, and Rajahmundry.

Andhra Pradesh is one of the leading rice-growing states in the country and is a major producer of India's tobacco. The state's rivers—particularly the Godavari and the Krishna, but also the Penneru—account for its agricultural importance.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

There is no such mandate, regulations or laws specific for the tree plantation or reforestation activities. There are policies which promote the tree plantation and increase in forest cover. There are some policies or acts which has been described below in the context of the project activity.

National Forest Policy (1988) –The main of National Forest Policy, 1988 is to ensure stability of environment and maintenance of balance of ecosystem including atmospheric equilibrium which are vital for sustenance of all life forms, human, animal and plant. The derivation of direct economic benefit must be subordinate to this principal aim. The project activity will help in removing excess carbon dioxide from the atmosphere and therefore will contribute to climate change mitigation.

Biological Diversity Act (2002) – The Government of India enacted the Biological Diversity Act to meet the obligations under Convention on Biological Diversity (CBD), in which India became a member party in 2022. The act was adopted for the preservation of biological diversity in India and provides mechanisms for equitable sharing of benefits arising out of the use of traditional biological resources and knowledge. The project activity aims at planting diverse tree species and thus contribute which can provide habitat to birds and insects. Therefore, the project will complement The Biological Diversity Act (2002).

National Agroforestry Policy (2014) – India became first country in the world to adopt a policy exclusively for the promotion of agroforestry. The main aim of The National Agroforestry Policy is to encourage and expand tree plantation in complementarity and integrated manner with crops and livestock to improve productivity, employment, income and livelihoods of rural households, especially the small holder farmers. The project activity supports the aim of The National Agroforestry Policy by promoting forestation outside the forest areas.

Environment Protection Act (1986) – The Environment Protection Act was adopted by The Government of India in the year 1986 for the protection and improvement of human environment and the prevention of hazards to human beings, other living creatures, plants and property. The tree plantation activities do not come under purview of the Environment Protection Act (1986). The project activity may enhance the quality of the atmosphere and protect the soil from erosion and therefore may contribute to the environment protection and conservation.

The Water (Prevention and Control of Pollution) Act 1974 - The Water (Prevention and Control of Pollution) Act was enacted in 1974 to provide for the prevention and control of water pollution, and for the maintaining and/or restoring of the water and water resources in the country. The Act establishes a Central Board for Prevention and Control of Water Pollution and similar boards in the States (hereinafter known as the Central Board or the State Board). These boards are empowered to control pollution primarily through standards laid down by them and the issue of consent orders. For violating the standards or a consent order, stiff penalties have been provided by the Act, namely, imprisonment which shall not be less than six months but which may be extended to six years and fine. The project activity does not discharge any effluent or conduct any activity which may pollute the water bodies. Therefore, the project does not violate the act.

The Indian Forest Act (1927) - The Indian Forest Act, 1927 is a comprehensive legislation relating to forests management that consolidates pre-existing laws such as the Indian Forest Act, 1865 and the Forest Act, 1878. The act lays down the conditions and rules for notifying "Reserve Forests", "Village Forests" and "Protected Areas". Under this the State Government may constitute any forest-land or waste-land which is the property of Government, as a reserved forest. Also, the State Government may make rules for regulating the management of village forests, prescribing the conditions under which the community to which any such assignment is made may be provided with timber or other forest-produce or pasture, and their duties for the protection and improvement of such forest. The project activity does not fall under any reserve forests, village forests and protect areas.

Forest (Conservation) Act, 1980 - In order to regulate the unchecked diversion of the forest lands for non-forestry purposes, the Government of India enacted a legislation, the Forest (Conservation) Act on 25 October, 1980. It provides a regulatory framework for unavoidable use of forest land for various developmental purposes. Under this act, every State/union territory (UT) Government, before permitting investigation/survey/prospecting in forest land and diverting/de-reserving forest land for non-forest purposes, must seek prior approval from the Central Government. The project activity has not been carried out on privately owned lands and do not involve any diversion of government-owned forest lands for non-forest purposes.

National, regional, and/or local laws, statutes or regulatory frameworks on workers' rights and safety relevant to the project activity.

The Child Labour (Prohibition & Regulation) Act, 1986[30] - The Child Labour (Prohibition and Regulation) Act is an act enacted by the Government of India on 23-December-1986 to prohibit the engagement of children in certain employments and to regulate the conditions of work of children in certain other employments. Under the project activity, no child below or near 18 years has been hired by the Project Proponent to execute the project activity. The project activity does not promote child labour in any form.

The Bonded Labour System (Abolition) Act, 1976[31] - The Bonded Labour System (Abolition) Act enacted on 9-February-1976 by the Government of India to provide for the abolition of bonded labour system with a view to preventing the economic and physical exploitation of the weaker sections of the people and for matters connected therewith or incidental thereto. The Project Proponent in project activity has not employed any bonded labour as well as enforced any one to work for the project activity without their consent.

The Code on Social Security, 2020[32] - The Code on Social Security, 2020 enacted on 28-September-2020 by the Government of India to amend and consolidate the laws relating to social security with the goal to extend social security to all employees and workers either in the organised or unorganised or any other sectors and for matters connected therewith or incidental thereto. The Project Proponent is in consonance with this code and considers its full time employee for social security.

National, regional, and/or local laws, statutes or regulatory frameworks on Carbon Trading Regulations

Kyoto Protocol and Clean Development Mechanism – Under the Clean Development Mechanism of Kyoto Protocol, the Union Government of India has established National Clean Development Mechanism (CDM) Authority a designated national authority (DNA) intending to protect and improve the quality of the environment in terms of the Kyoto Protocol. However, the Kyoto Protocol and Clean Development Mechanism (CDM) are the part of compliance and mandatory market. The project activity is being proposed under Verra VCS Mechanism, which comes under Voluntary Carbon Credit Mechanism. The voluntary carbon market is free from the mandate of Kyoto Protocol and Clean Development Mechanism (CDM). For voluntary mechanism like Verra VCS, there is no need or mandate to seek host country approval from designated national authority (DNA).

Perform, Achieve and Trade (PAT)[33] - Perform, Achieve and Trade (PAT) is a regulatory mechanism to reduce Specific Energy Consumption (SEC) in energy intensive industries, with an associated market based mechanism to enhance the cost-effectiveness through certification of excess energy saving which can be traded. The project activity comes under the sectoral scope of Agriculture, Forestry and Other Land Uses (AFOLU) under the category Afforestation, Reforestation and Revegetation (ARR). Therefore, project activity do come under the PAT mechanism.

Renewable Energy Credit Trading System (REC) - Renewable Energy Credit Trading System was started by the Government of India to promote renewable energy in India. Under this REC mechanism, a renewable energy generator will produce power in any part of the world by renewable resources and the generator gets the cost equal to that from any traditional source when the environmental characteristic is sold at the market-determined exchanges. The project activity

[30] https://mahakamgar.maharashtra.gov.in/images/pdf/child-labour-prohibition-regulation-act-1986.pdf

[31] https://labour.gov.in/sites/default/files/TheBondedLabourSystem(Abolition)Act1976.pdf

[32] https://labour.gov.in/sites/default/files/SS_Code_Gazette.pdf

[33] https://beeindia.gov.in/sites/default/files/press_releases/Brief%20Note%20on%20PAT%20Scheme.pdf

comes under the sectoral scope of Agriculture, Forestry and Other Land Uses (AFOLU) under the category Afforestation, Reforestation and Revegetation (ARR). Therefore, project activity do come under the Renewable Energy Credit Trading System (REC).

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project is neither registered nor seeking registration under any other GHG program.

1.15.2 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG program.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The group project does not have any emission trading program or any mechanism that includes GHG allowance trading.

1.16.2 Other Forms of Environmental Credit

The group project has not sought or received another form of GHG-related environmental credit.

1.17 Sustainable Development Contributions

1.17.1 Sustainable Development Contributions Activity Description

The group project activity can help in achieving Sustainable Development Goals (SDGs) laid down by United Nations Development Program (UNDP). The specific goals which can be achieved are as follows:

SDG 13 – Climate Action - Afforestation and reforestation project activity can mitigate climate change through carbon sequestration. The trees will sequester carbon dioxide from the atmosphere for many decades. Since these trees are planted for non-timber use, these trees will stand for ages sequestering carbon from the project area. Only Mahogany will be going to harvest after 21 years and the rest of the species will standstill which will support climate change. This will help the project area in reducing carbon emissions.

SDG 15 – Life on Land – A variety of birds, insects, animals and reptiles live and thrive on the trees for food and shelter. Trees can hold the top layer of soil intact protecting it from any erosion. A protected soil can hold the nutrients for a longer period and therefore can support further growth and survival of vegetation.

SDG 3 – Good health and well-being: Trees will release oxygen as part of their photosynthesis process as well as protect the people from noise pollution by acting as a sound barrier. The trees, forests and urban green patches can act as recreational places helping many to maintain good mental health and wellbeing of people living in the surroundings.

1.17.2 Sustainable Development Contributions Activity Monitoring

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	1.2.1	Proportion of population living below the national poverty line, by sex and age	Implemented activities to decrease	By bringing the 140 number of land owners/farmers who living below the national poverty line in the project activity, it is able to provide extra source income. Therefore, it contributes to reducing the level of poverty among the farmers/landowners living below the poverty line.	Cumulatively, by bringing the 140 number of land owners/farmers who living below the national poverty line in the project activity, it is able to provide extra source income. Therefore, it contributes to reducing the level of poverty among the farmers/landowners living below the poverty line.
2)	13	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By planting trees in the project area, the project activity has removed 22,708 tCO_2e of CO_2 from the atmosphere.	Cumulatively, the project activity has removed 22,708 tCO_2e of CO_2 from the atmosphere from the plantation trees in the project area.
3)	15.1.1	Forest area as a proportion of total land area	Implemented activities to increase	By planting trees in the barren lands, the project activity has added 501.47 hectares of area under the forest cover.	Cumulatively, the project activity has added 501.47 hectares of area under the forest cover.

1.18 Additional Information Relevant to the Project

Leakage Management

The tree plantation drive and reforestation activity are being carried out on barren land with negligible grazing activities and no agricultural activities. Therefore the group reforestation project does not lead to any kind of displacement of pre-project activity that would lead to an increase of GHG emissions outside the project boundary.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description

Further Information

Crop Zone maintains documents and data relevant to the tree plantation, afforestation and reforestation. The PP is also in close contact with other stakeholders for sharing/collecting information and management of the information system. Based on any request of project consultants, VVBs and Verra Board, regarding the group project, the PP can provide information accordingly.

2 SAFEGUARDS

2.1 No Net Harm

There is no potential negative environmental and socio-economic impact envisaged in the project. Reforestation activities on barren land can generally lead to a positive impact on the environment. The plantation technique has been kept as simple as so that there will be an impact on soil also.

There is no potential socio-economic impact of the project activity. The Project Proponent has taken utmost care in enrolling the landowners in the project activity. The enrolment of the landowners is purely voluntary and non-coercive. The landowners have entered into an agreement with the Project Proponent where the clauses of the agreement and roles and responsibilities have been clearly mentioned. In addition, the Project Proponent also did stakeholders' consultations to identify any potential negative socio-economic impacts. No negative socio-economic impacts were identified. The only impacts the project activity envisages are positive ones. For example, the participating landowners will get additional income from the carbon credit revenue. The Project Proponent has proposed the project activity as a grouped project so that it can be scaled up to bring carbon benefits to landowners of the

future project activity instances as well. Moreover, the project is being implemented on the fallow agricultural lands with scope of human displacement. Apart from that, the lands are individually owned private lands and no community-owned land has been covered in the project activity. Therefore, the project activity has no impact on the community-owned or communal lands.

The project activity also does not cause any negative impact as well. As a requirement of Verra VCS Standard, the project has not done any sort of draining of the native ecosystem. In fact, there is no water body in the project area as well. Also, no invasive species have been planted in the project activity. These species have well-adapted to the environment of the project area and these are non-invasive in nature as well.

2.2 Local Stakeholder Consultation

- Project Proponent had conducted local stakeholder consultation during registration of the project through identification of stakeholders, invitation of stakeholders for a meeting, explanation on the project and resolving comments/suggestions/ grievances of the stakeholders. The landowners/farmers enrolled in the project activity are the major stakeholders in the project activity. They were consulted for the tree plantation, its role in climate change mitigation and generation of carbon credit benefits. Apart from that local communities including village government representatives (Gram Panchayat) where the project land parcels have been located have also been identified as the stakeholders of the project activity. They also have been involved as well for the local stakeholders consultation processes.

The process of local stakeholder consultation is continuous. Besides, the PP has also kept provision for submitting comments/grievances/suggestions from local stakeholders through direct mail. However, no major comments/grievances/suggestions have been received from the aforementioned stakeholders during the current monitoring period and all such minor suggestions have been taken care of by the PP.

Stakeholder consultations include questionnaires surveys and stakeholder meetings, requiring stakeholders to present their opinions on the project and their willingness to participate. Before the project began, stakeholder consultations were conducted through different consultation meetings. The details of the meeting have given below table.

District	Date of Stakeholder meeting conducted
Jalgaon	26-05-2017
Nellore	29-02-2017
Nalgonda	25-04-2020
Aurangabad	22-12-2017
Dhule	25-05-2017
Jagityal	11-02-2017
Jalna	19-12-2018
Kurnool	19-10-2018
Ballary	03-02-2020
Ananthapur	09-06-2019
Mandya	05-09-2021
Solapur	15-02-2020

Parbhani	16-02-2020

Stakeholders have no negative views on the project implementation. The aim of all the meetings held was to inform local stakeholders (Farmers) about the project and its design, and allow them to discuss and provide feedback on the project. The overall goal was to improve the project design based on stakeholders' comments and suggestions and increase the local awareness and involvement of farmers in the project.

For the successful and effective implementation of the project activity in the entire duration of the project crediting period. To achieve these following actions are being done on how project has communicated the following:

Demonstration requirements for AFOLU Projects on how the following actions are being done on how project has communicated following:	**Explanation**
The project design and implementation, including the results of monitoring.	The project has been designed in participation with the landowners and farmers enrolled in the project activity. The implementation of the project activity has been done with their active participation. The online Verra registry is accessible to the project proponent where they can communicate the project progress with the relevant stakeholders. Similarly, result of monitoring will be communicated. The direct

	stakeholders – the landowners / farmers also participate in the monitoring process as well.
The risks, costs and benefits the project may bring to local stakeholders.	During the stakeholders' consultation meeting, no major risks were identified. The costs associated with the project and benefits to be accrued from the project activity were communicated during stakeholders' consultation meetings.
All relevant laws and regulations covering workers' rights in the host country.	In the VCS PD itself, the PP has explained relevant laws and regulations which the project activity does not violate. The project is being implemented in active association with the landowners/farmers without taking away any rights. They have been informed already they will have full ownership of their lands as well as their workers' rights will be respected in the stakeholders' consultation. The PP will communicate the same if the questions regarding relevant laws and regulations covering workers' rights in the host country arise during third party auditing of monitoring of the project activity.
The process of VCS Program validation and verification and the validation/verification body's site visit.	The process of VCS Program validation and verification and the validation/verification body's site visit are important and critical part of the project activity for its success in delivering carbon credit benefits. The whole process of VCS Program validation and verification and the validation/verification body's site visit has been described during the stakeholders' consultation processes. The direct stakeholders – farmers/landowners of individual land parcels under the project activity have been informed about their importance of their participation and cooperation during validation and verification and the validation/verification body's site visit. During preparation of monitoring report and field-based data collection, the landowners/farmers will be informed much earlier in advance about their availability and time required. Accordingly, verification and the validation/verification body's site visit will be planned.

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The PP is in direct touch with individual landowners enrolled in the project activity. The landowners/farmers are direct stakeholders who are direct beneficiary of the project activity. Therefore, they have been in communication with the PP on a regular basis. In fact, the project activity has been designed and developed by involving the landowners/farmers on which project activity has been carried out.

2.3 Environmental Impact

This project activity is an A/R CDM project activity and comes under AFOLU (Agriculture, Forestry and Other land Use) category. According to India's EIA notification (2006)[34], afforestation or reforestation project activities do not come under any category that requires conducting Environment Impact Assessment.

2.4 Public Comments

During the time of listing of the group project, any comments received during the public comments period (30 days) would have been answered and /or addressed. The project activity was open for public comment from 01-March-2022 to 31-March-2022. However, no comments were received during the public comment period.

2.5 AFOLU-Specific Safeguards

The participation of landowners in the project activity is completely voluntary. The plantation activities have been taken by the landowners themselves. They will have the ownership of the land and the trees planted on the land as well as a share of VCUs accrued from the project activity. Crop Zone (the project management has encouraged the landowners to go for tree plantation for carbon sequestration.
The AFOLU-specific safeguards have been described in the following table:

#	AFOLU-specific safeguards	Response/description
1	Local stakeholder identification process and a description of results.	Local stakeholders were directly or indirectly affected by the project activity. Crop Zone conducted a meeting with landowners about the involvement of other stakeholders who may be affected by the project activity. As described in section 2.2, the stakeholders include the owners of the land where plantation activities are being carried out. Apart from that landowners, general citizens of the Project area, local NGOs and Officials representatives from government organizations like the Sarpanch, Agricultural department were identified as the major local stakeholders.
2	Risks to local stakeholders due to project implementation and how the project will mitigate such risks.	The participation of the landowners is completely voluntary. They have been informed about the processes involved in the VCS project cycle in a very transparent manner. During the stakeholders' consultation meetings (as described in Section 2.2), the stakeholders were explained about the project activity and queries

[34] http://www.environmentwb.gov.in/pdf/EIA%20Notification,%202006.pdf

		raised during consultations were addressed at the same time.
3	Risks to local stakeholder resources due to project implementation and how the project will mitigate such risks, including the plans to ensure the project will not impact local stakeholders' property rights without the free, prior and informed consent.	Throughout the lifetime of the project activity, the project proponent has been maintaining direct communication with the project stakeholders. The potential risks associated with the project activity to the stakeholder's resources could be fire and pest outbreaks. The participating landowners have long experience in planting and managing tree plantations. Any burning activities of the vegetation are forbidden in the project area. They have the technical capacity to manage and monitor any potential risks to their resources. The land owners have their land rights with them and they have been informed that participating in VCS project activity will not lead to any change in the land rights. The project activity has an adaptive way of managing any issues or any foreseeable risks in the future to effectively address and manage any future risks. The project proponent will time to time review the progress of the project activity and integrate any lesson learned in the project management plan.
4	Processes to ensure ongoing communication and consultation with local stakeholders, including a grievance redress procedure to resolve any conflicts which may arise between the project proponent and local stakeholders.	The project proponent has been noticing local stakeholders through routine announcements regarding every milestone of the project activity development such as project description document preparation, collection of relevant documents, listing, as well as future validation/verification and issuance of VCUs. In case of any conflicts and grievances, stakeholders can directly appeal to the Project Proponent to make the problem solving process more effective.
5	The location of communities, local stakeholders and areas outside the project area that are predicted to be impacted by the project.	The project activity is limited to the land parcels where tree plantation activities have been carried out. In the vicinity of the project land parcels, the local communities have been consulted about the project activity.
6	Whether the project proponent nor any other entity involved in project design or implementation are involved in any form of discrimination or sexual harassment. How communication and consultation are performed in a culturally appropriate manner, considering language and gender sensitivity with all stakeholders.	The Project Proponent as well as any entity have not been involved in any form of discrimination or sexual harassment. The regular communications and consultations have been mainly carried out in local vernacular languages only. The Project Proponent has presence in all four states of the first instance and well-aware and very much sensitive about the local culture and traditions.

7	Any legal or customary tenure/access rights to territories and resources, including collective and/or conflicting rights, held by local stakeholders.	There is no legal or customary tenure/access rights to territories and resources, including collective and/or conflicting rights, held by local stakeholders. The lands under the project activity are privately-owned by the participating individual farmers. There is no community-owned or community-managed land that has been covered in the project activity.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Title of the methodology applied: AR-ACM0003: Afforestation and reforestation of lands except for wetlands

Reference:
https://cdm.unfccc.int/methodologies/DB/C9QS5G3CS8FW04MYYXDFOQDPXWM4OE

Version no. – Version 2.0

Applied tools:

(a) Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities (Version 1.0)[35].

(b) Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/RCDM project activities (Version 4.2)[36].

(c) Calculation of the number of sample plots for measurements within A/R CDM project activities (Version 2.1.0)[37].

3.2 Applicability of Methodology

As per the applied methodology AR-ACM0003, the applicability conditions are described in the following table.

Applicability Criteria AR-ACM0003	Description
a) The land subject to the project activity does not fall into the wetland category.	*(a)* The area in which the project activity instance is situated does not come under the category

[35] https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-02-v1.pdf

[36] https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-14-v4.2.pdf

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

	of wetland. There is no wetland in the project area.
b) Soil disturbance attributable to the project activity does not cover more than 10 percent of the area in each of the following types of land, when these lands are included within the project boundary	*(b)* Soil disturbance attributable to the project will in no case cover more than 10% of the total surface. No machinery will be used for the preparation and installation of trees in the ground.
C). Land containing organic soils and which, in the baseline, is subjected to land-use and management practices and receives inputs listed in appendices 2 and 3 to this.	The land on which the reforestation has been established does not contain organic soils. The soils of the initial project instances and the grouped project area were classified according to the procedures of the Intergovernmental Panel on Climate Change (IPCC) utilizing soil maps, vector files and maps, soil classification. The land selected for the reforestation activity does not get subjected to land-use and management practices and receives inputs listed in appendices 2 and 3 to this.

The applicability conditions for each applied tool are described as follows:

(a) Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities (Version 1.0)[38].

Applicability conditions	Justifications
Forestation of the land within the proposed project boundary performed with or without being registered as the A/R CDM project activity shall not lead to violation of any applicable law even if the law is not enforced.	The forestation work under the project activity do not lead to any violation of any law. There is n law or regulation specific to forestation of privately owned lands.
This tool is not applicable to small - scale afforestation and reforestation project activities.	The project is categorized as Project as per the Verra VCS Standard v4.3. in terms of UNFCCC CDM, the project activity can be classified as small-scale afforestation/reforestation project activity. However, small-scale afforestation/reforestation project activity can use simplified procedure of demonstration of additionality including only barrier analysis.

[38] https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-02-v1.pdf

	According to the section 3.13.1 (2) of VCS Standard v4.3[39] "Where the applied methodology was developed under an approved GHG program and uses an activity method or other simplified procedure for demonstrating additionality, the project proponent shall demonstrate to the validation/verification body that the simplified procedure is appropriate to apply to the project considering the project characteristics, including the context in which the project activity takes place. Failing this demonstration, the project proponent shall not use the simplified procedure for demonstrating additionality, and shall instead use an appropriate additionality assessment method in substitution." It cannot be demonstrated that the project activity can use the simplified procedure for demonstrating additionality. Therefore, the project activity uses the already established additionality tool which is adopted by UNFCCC CDM (Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities) which is not simplified and uses step-by-step approach to demonstrate additionality including barrier analysis.

(b) Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/RCDM project activities (Version 4.2)[40].

This is tool has no applicability conditions.

(c) Calculation of the number of sample plots for measurements within A/R CDM project activities (Version 2.1.0)[41]

This tool has no applicability conditions.

3.3 Project Boundary

The project area is comprised of land parcels spread over the different districts of state Maharastra, Karnataka,m Andhra Pradesh & Telangana. The project district are as follows

i. Andhra Pradesh:- Anathapur, Chittoor, Kurnool, Nellore & Visakhapatnam

[39] https://verra.org/wp-content/uploads/2022/06/VCS-Standard_v4.3.pdf

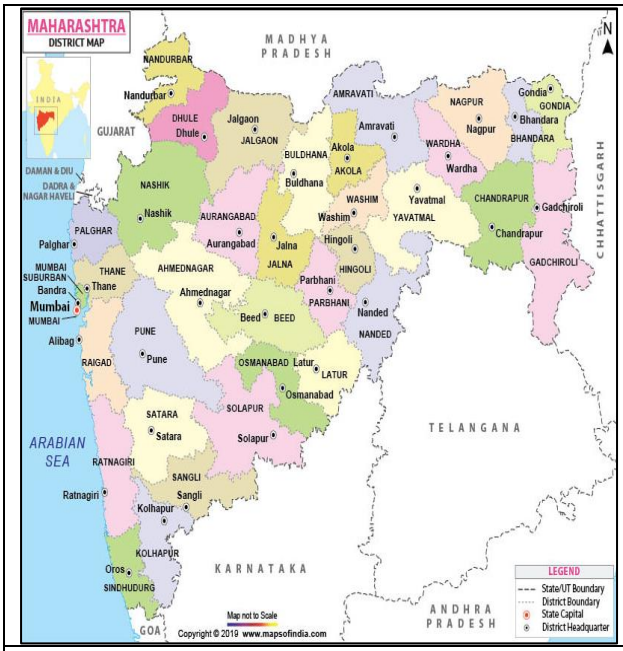
[40] https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-14-v4.2.pdf

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

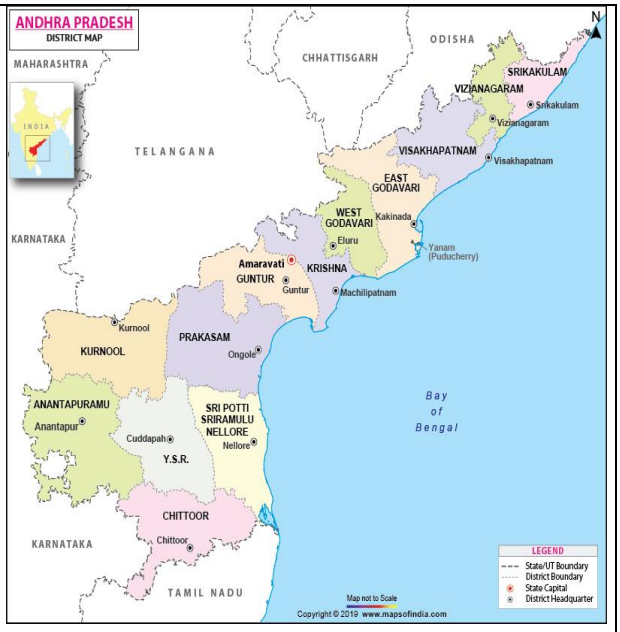
ii. Karnataka:- Bagalkot, Bellary, Kolar, Mandya, Shimogga&Tumkur.

iii. Maharashtra:- Aurangabad, Dhule, Jalana, Jalgaon, Parabhani, & Solapur.

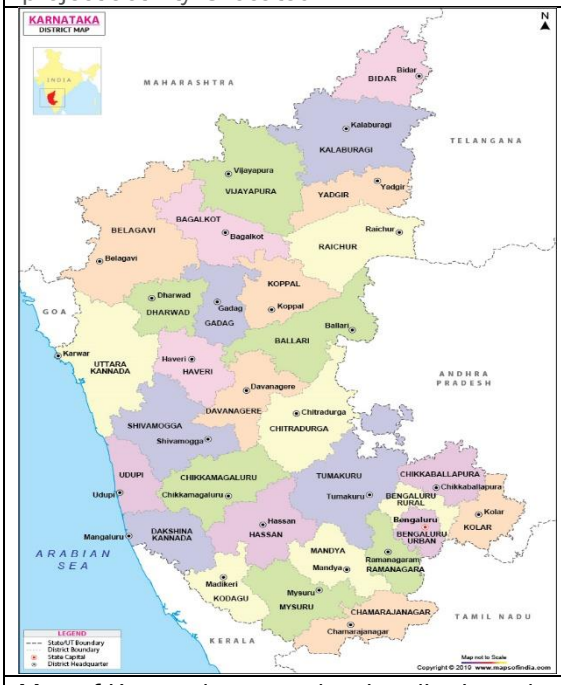
Iv. Telangana:- Jagityal, Nalgonda &Rangareddy.



Map of Maharashtra state showing districts where project activity is located



Map of Andhara Pradesh state showing districts where project activity is located



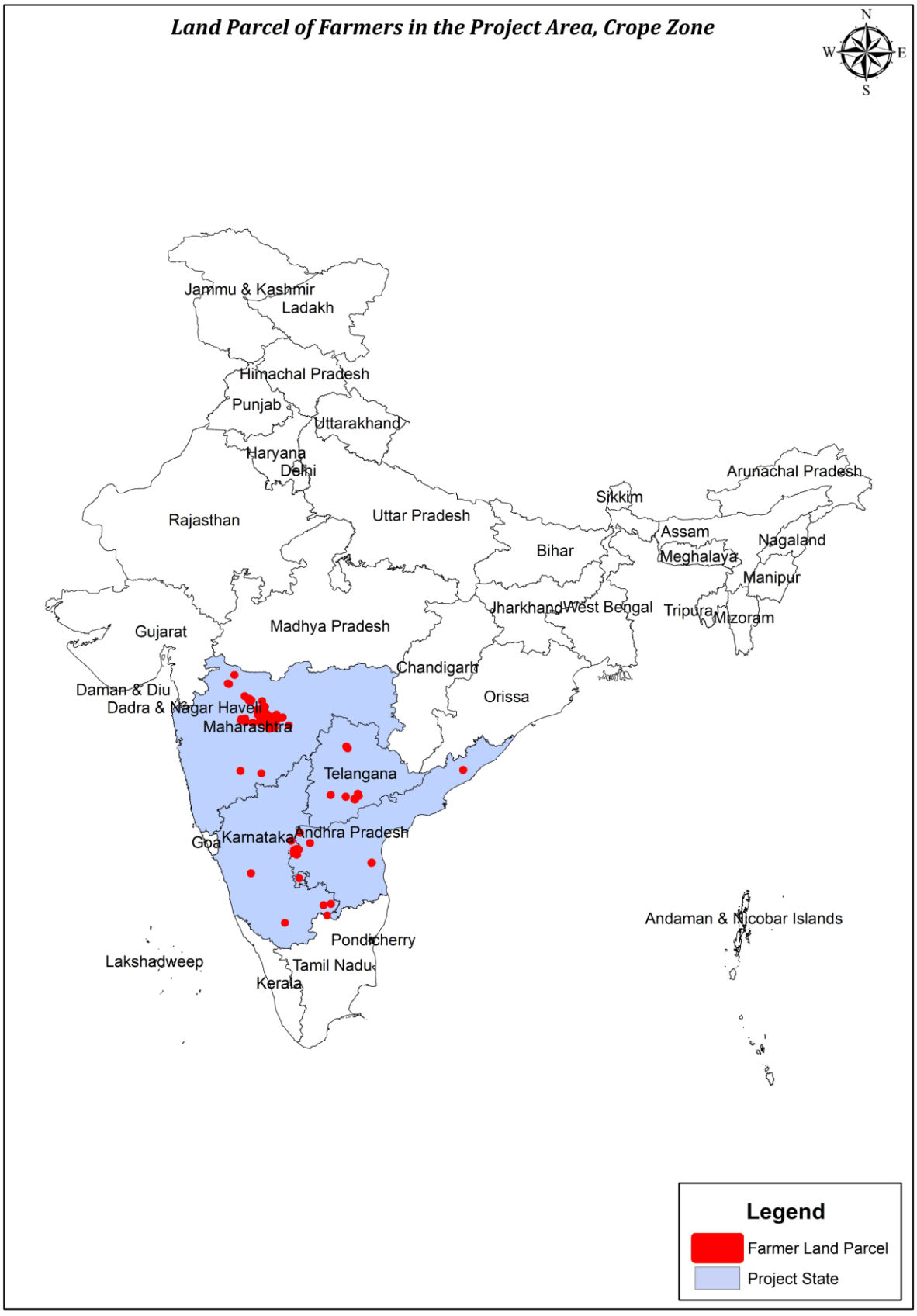
Map of Karnataka state showing districts where project activity is located

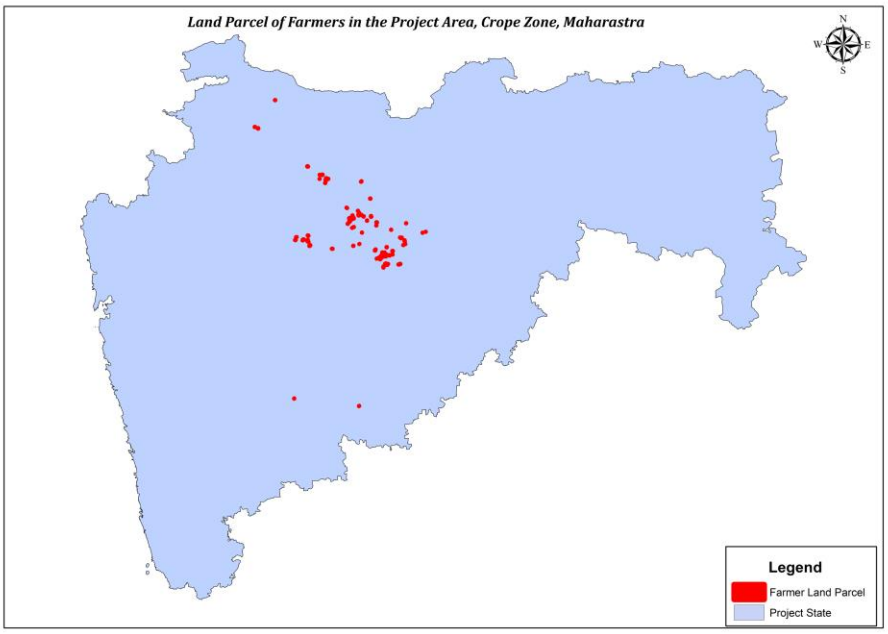
Map of Telangana state showing districts where project activity is located

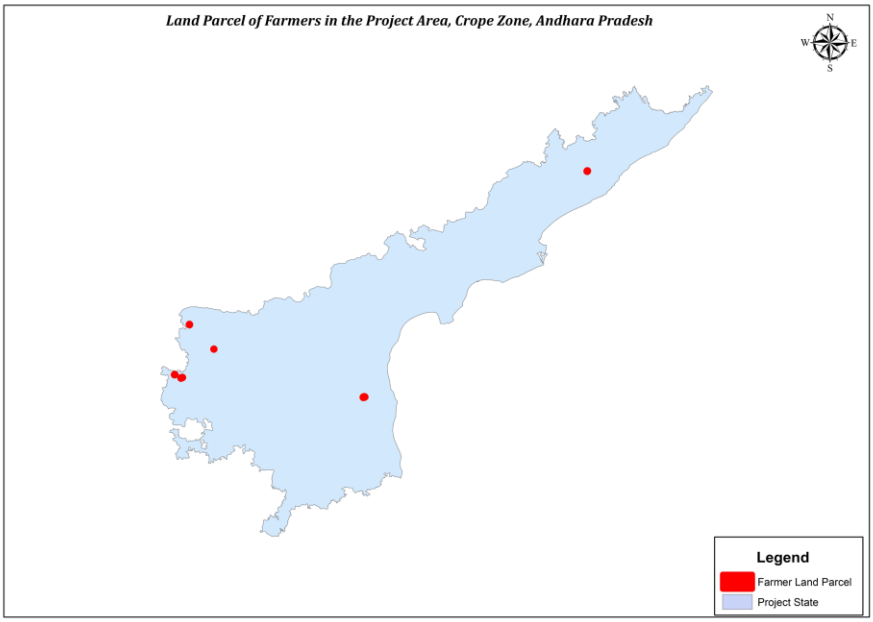
The relevant GHG sources, sinks and reservoirs for the project and baseline scenarios (including leakage, if applicable) are described in the given below table.

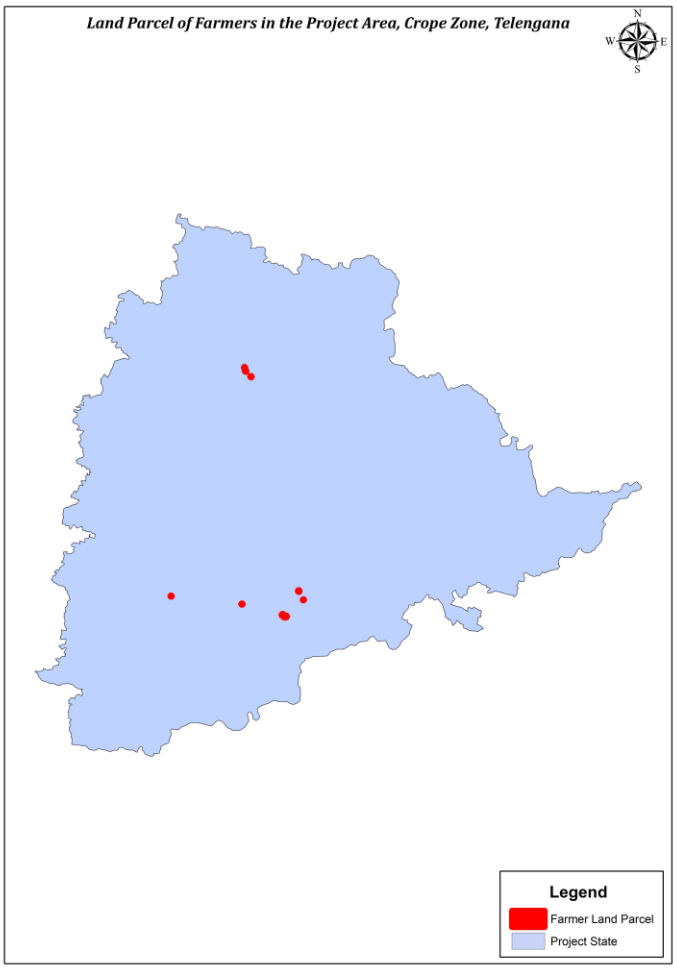
Source		Gas	Included?	Justification/Explanation
Baseline	Aboveground biomass	CO_2	Yes	Preexisting vegetation is non-existent negligible
		CH_4	No	Pre-existing vegetation is not slashed nor burned
		N_2O	No	Pre-existing vegetation is not slashed nor burned
		Other		
	Belowground biomass	CO_2	Yes	Preexisting vegetation is non-existent negligible
		CH_4	No	Pre-existing vegetation is not slashed nor burned
		N_2O	No	Pre-existing vegetation is not slashed nor burned
		Other		
Project	Aboveground biomass	CO_2	Yes	This is the major carbon pool of the project activity
		CH_4	No	Not sequestered in this pool
		N_2O	No	Not sequestered in this pool
		Other		
	Belowground biomass	CO_2	Yes	This is the major carbon pool of the project activity
		CH_4	No	Not sequestered in this pool
		N_2O	No	Not sequestered in this pool
		Other		

The project locations are shown below country wise and state wise. The KML file boundary has been shared separately.


Land Parcel of Farmers in the Project Area, Crope Zone
N
W
E
S
Jammu & Kashmir
Ladakh
Himachal Pradesh
Punjab
Uttarakhand
Haryana
Delhi
Rajasthan
Uttar Pradesh
Bihar
Sikkim
Arunachal Pradesh
Assam
Nagaland
Meghalaya
Manipur
Tripura
Mizoram
Jharkhand
West Bengal
Gujarat
Madhya Pradesh
Chandigarh
Orissa
Daman & Diu
Dadra & Nagar Haveli
Maharashtra
Telangana
Goa
Karnataka
Andhra Pradesh
Andaman & Nicobar Islands
Pondicherry
Lakshadweep
Tamil Nadu
Kerala
Legend
Farmer Land Parcel
Project State


Land Parcel of Farmers in the Project Area, Crope Zone, Maharastra
N
W
E
S
Legend
Farmer Land Parcel
Project State


Land Parcel of Farmers in the Project Area, Crope Zone, Andhara Pradesh
N
W
E
S
Legend
Farmer Land Parcel
Project State

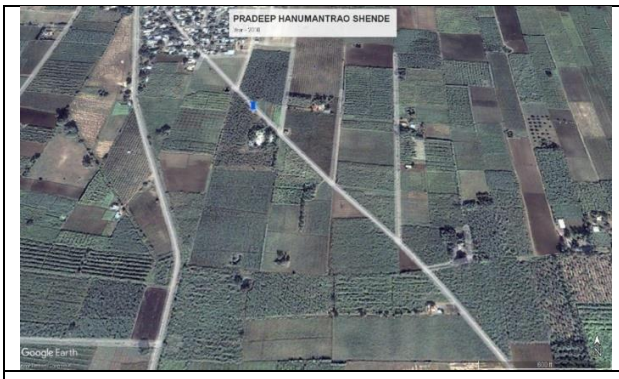
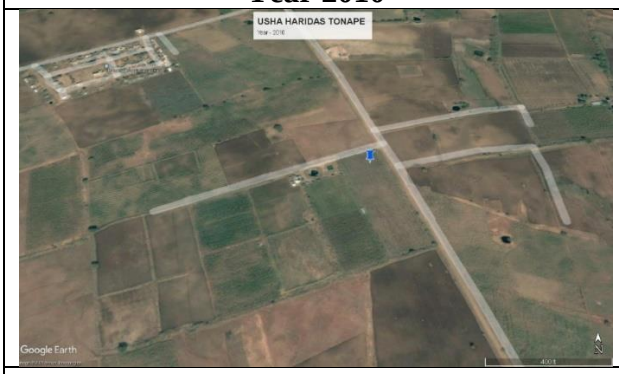


3.4 Baseline Scenario

The methodology requires justification that "the most likely baseline scenario of the large-scale A/R CDM project activity is considered to be the land-use prior to the implementation of the project activity, either barren, grasslands or croplands." The most likely baseline scenario is the continuation of pre-project land use. The pre-project land uses in the group project are barren / fallow/ cropland and the same is analyzed by taking two different time zone satellite imagery.

The time series analysis has been performed through satellite imagery of different times to do a comparative analysis of pre and post-project conditions. Crop Zone has done plantation in the barren land situated within the project boundary and also on the vacant land available in the vicinity. The satellite image of two different time zone reveals that the project during baseline project is not a wetland. The pre and project inception scenario has given below with a visual analysis of both the conditions.

Pradeep Hanumantrao Shende, Solapur District, Maharashtra	
Year 2010	**Year 2020**

	
Usha HaridasTonape, Solapur District, Maharashtra	
Year 2010	**Year 2021**
	
GulabraoTryambak Patil, Survey gate no - 274/2,266/1, 275,278/1,278/2,277, 268/2,197,198,199,200,290,202/1, Dhule District, Maharashtra	
Year 2007	**Year 2017**
	
Year 2021	

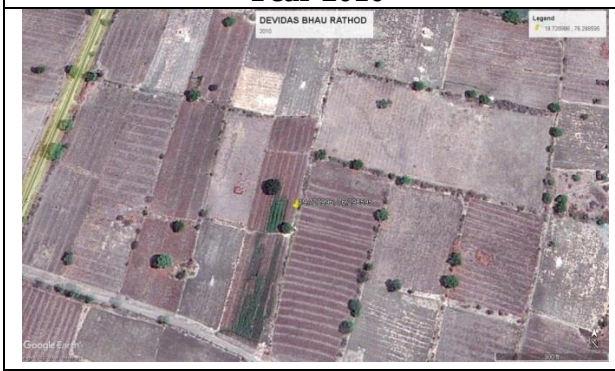
GulabraoTryambak Patil, Survey gate no - 276,266/2,268/1,201,203,206/2,266/2b,269 Dhule District, Maharashtra

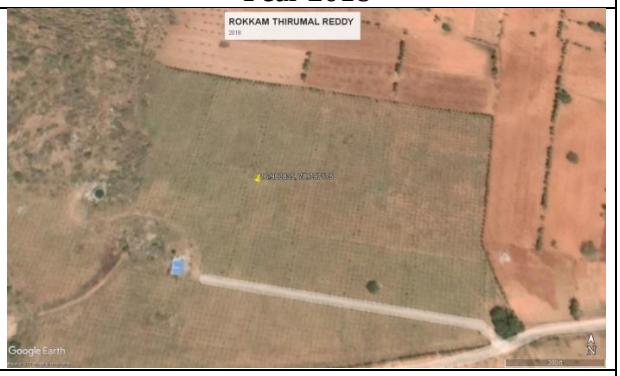
Year 2007	Year 2017
	

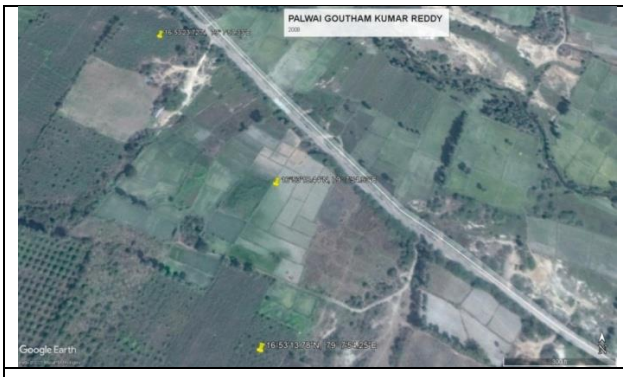
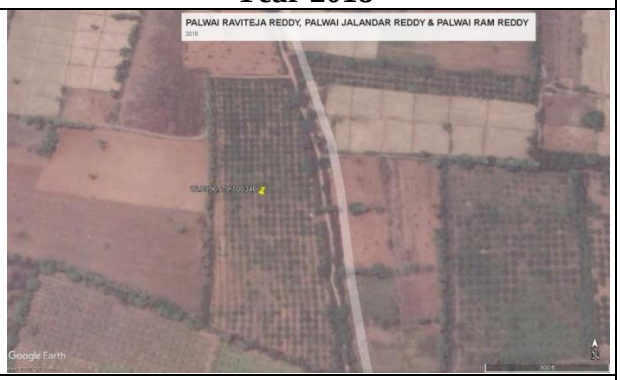
JANARDAN NAMADEV RATHOD, Parabhani District, Maharashtra

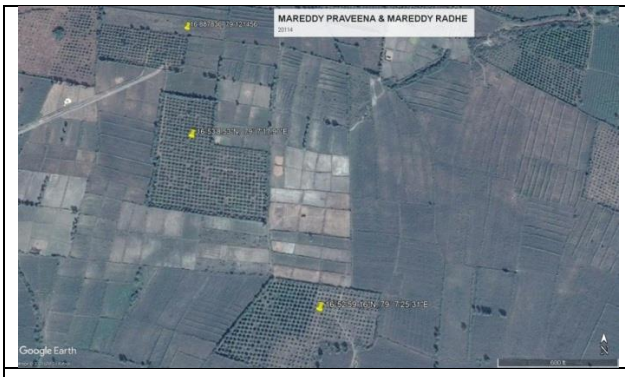
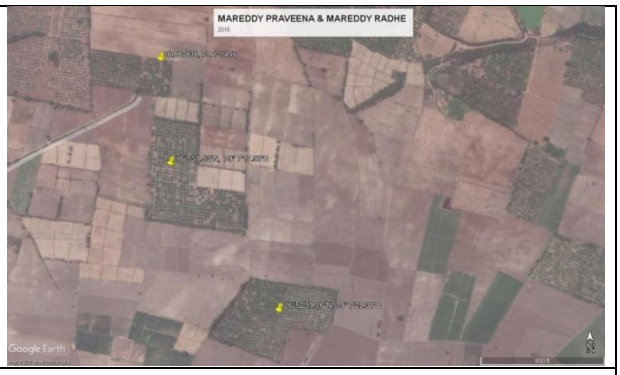
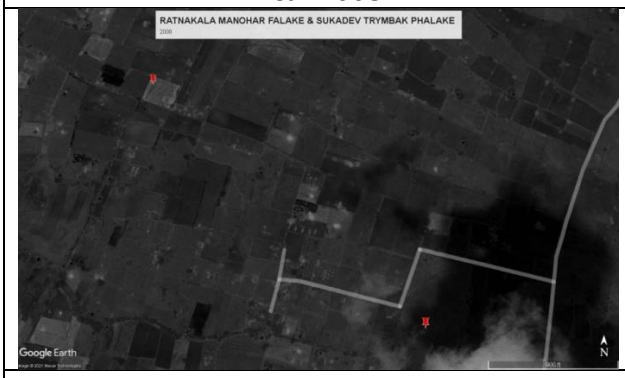
Year 2010	Year 2020
	

ROHIDAS CHATARU CHAVAN, Parabhani District, Maharashtra

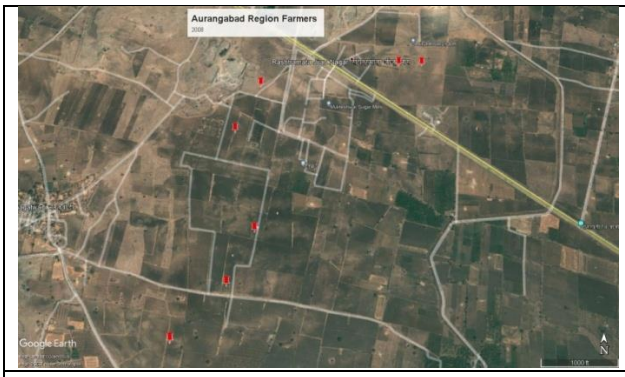
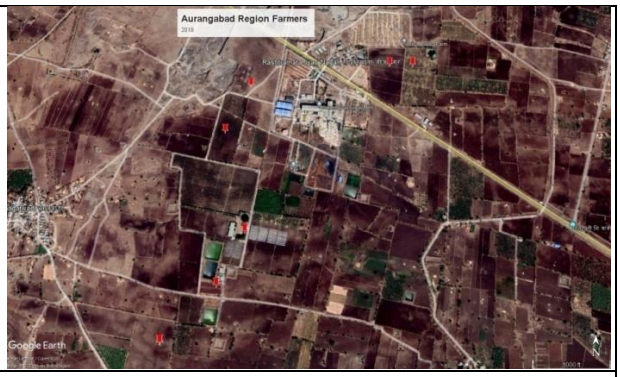
Year 2010	Year 2020
	
PANDIT JEMALA CHAVAN, Jalna, Maharashtra	
Year 2010	**Year 2020**
	
DEVIDAS BHAU RATHOD, Jalna, Maharashtra	
Year 2010	**Year 2020**
	
SAVITRI.S, survey gate no 2, 2.06, 134, Mandaya, Karnataka	
Year 2010	**Year 2020**

	
K SREERAMULU REDDY, Chittor, Andhra Pradesh	
Year 2008	**Year 2018**
	
ROKKAM THIRUMAL REDDY, Nalgonda, Telangana	
Year 2008	Year 2018
	
PALWAI GOUTHAM KUMAR REDDY & PALWAI VIMALA, Nalgonda, Telangana	
Year 2008	**Year 2018**

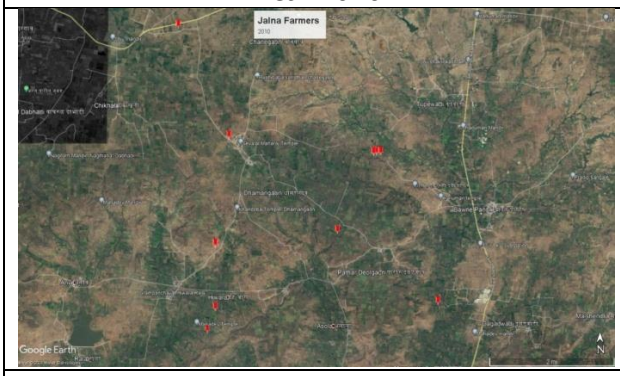
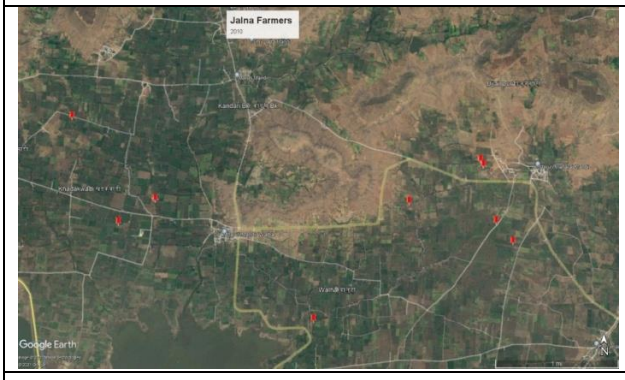
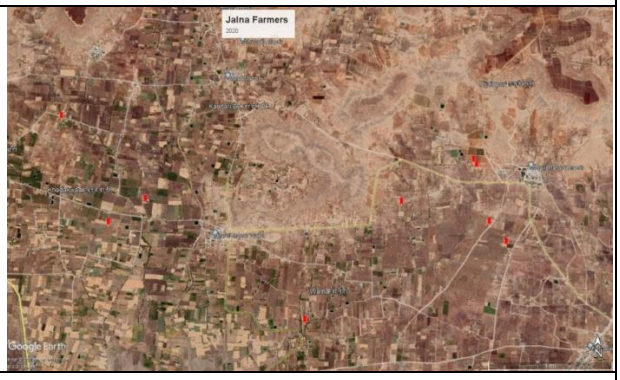
	
PALWAI RAVITEJA REDDY, PALWAI JALANDAR REDDY & PALWAI RAM REDDY, Nalgonda, Telangana	
Year 2008	**Year 2018**
	
MD ABDUL HAMID, Nalgonda, Telangana	
Year 2008	**Year 2018**
	
MAREDDY PRAVEENA & MAREDDY RADHE, Nalgonda, Telengana	
Year 2014	**Year 2018**

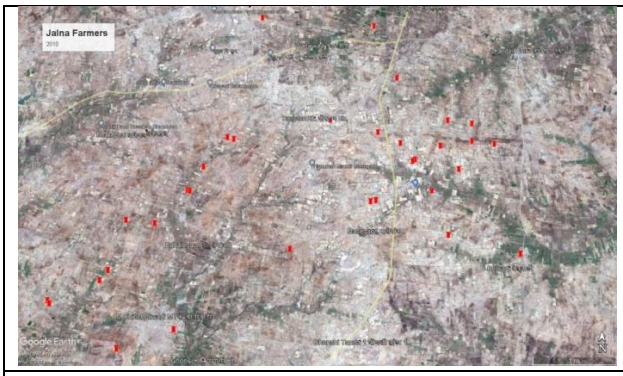
	
MAREDDY RADHE, Nalgonda, Telengana	
Year 2014	**Year 2018**
	
RATNAKALA MANOHAR FALAKE & SUKADEV TRYMBAK PHALAKE, Phulambiri, Aurangabad, Maharashtra	
Year 2008	Year 2018
	
GANGAMAI INDUSTRIES AND CONSTRUCTIONS LIMITED, Aurangabad	
Year 2010	Year 2019

	
Rupali Vishwas Nangre Patil, Lata PadmakarMulay, Gangamai Industries And Constructions Limited, Ranjeet PadmakarMulay, Parth Ranjeet Mulay Farmers, Aurangabad	
Year 2008	Year 2018
	
PadmakarHaribhavMulay, Malhar Sameer Mulay, Ajeet Seeds Pvt Ltd, Chhatrapati Shahu Maharaj Shikshan Sanstha, Rupali Vishwas Nangre Patil Farmers, Aurangabad	
Year 2009	Year 2019
	
GANGAMAI INDUSTRIES AND CONSTRUCTIONS LIMITED, LATA PADMAKAR MULAY, PADMAKAR HARIBHAV MULAY, SAMEER PADMAKAR MULAY, CHHATRAPATI SHAHU MAHARAJ SHIKSHAN SANSTHA Farmers, Aurangabad	
Year 2008	Year 2009

	
AJEET SEEDS PVT LTD & RUPALI VISHWAS NANGRE PATIL Farmers, Aurangabad	
Year 2007	Year 2018
	
CHHATRAPATI SHAHU MAHARAJ SHIKSHAN SANSTHA, Aurangabad	
Year 2007	Year 2018
	
RANJEET PADMAKAR MULAY, JANHAVI VISHWAS NANGARE PATIL & RANVEER VISHWAS NANGARE PATIL Farmer, Aurangabad	
Year 2009	Year 2021

	
MANGAL ANNASAHEB MALAGHAN, BHASKAR SARJERAO SOLANKE, SUNITA BALU CHAUDHARI, SUBHASH DNYANOBA CHAUDHARI, RAJESH DASHARATH CHAUDHARI, BALU SHUBHASH CHAUDHARI, ARUN RAMAKANT SOLANKE, ASHOK BHAGAWANRAO SOLANKE, SANDIPAN DNYANOBA CHAUDHARI, PRAKASH GITARAM WAGHRAL Farmers, Jalna, Maharashtra	
Year 2010	Year 2020
	
YAMUNABAI SHESHARAO PAWAR, KASHIBAI SOPAN RATHOD & VINAYAK KISAN JADHAV- Jalna Farmers, Aurangabad	
Year 2010	Year 2020
	
SACHIN DHARMA CHAVAN, SANTOSH HARIBHAU CHAVAN, SANJAY HARIBHAU CHAVAN, SAVITRA RAJARAM RATHOD, DIGAMBAR RAMRAO RATHOD, SHIVAJI TARACHAND RATHOD, TARACHAND DHANA RATHOD Farmers Jalna, Maharashtra	
Year 2010	Year 2020

	
RAMESH KANHU RATHOD, RAJU RAMESH RATHOD, RAMESH KANHU RATHOD, BALIRAM RAMESH RATHOD, POYANABAI GULAB RATHOD, BHARAT SUKHADEV KORADE, RAGHUNATH MOTIRAM NARODE, ASHOK BARIKRAO KADAM, SHILABAI RAJENDRA BORUDE, RAJENDRA DNYANDEV BORUDE, RAJENDRA DNYANDEV BORUDE, RAJENDRA DNYANDEV BORUDE, SUDHAKAR DINAKARAO SOLUNKE, Farmers, Jalna, Maharashtra	
Year 2010	Year 2020
	
AJINATH KASHINATH SHINDE, SEMIANTH RAKHAMAJI SHINDE, SUDAM BAPURAO JADHAV, NANDABAI BABASAHEB SHINDE, LAHU KISAN RATHD, ASHOK VITHOBA SHIRSATH, NILESH BANADU FATALE, SANJAY BALU BORUDE, RAMESH RAMBHAU KHENDAKE, DADARAO ANNA SHINGARE, DEVIDAS BALAJI SHINGARE, JANARDAN GULAB SHINGARE, Jalna Farmers, Maharashtra	
Year 2010	Year 2020
	
Year 2010	Year 2020

	
PANDIT JEMALA CHAVAN, DEVIDAS BHAU RATHOD, ULHAS JEMALA CHAVAN, KAVITA KAILAS RATHOD, RAMKOR RAMESH RATHOD, JANARDAN SHRIRAM CHAVAN, Jalna Farmers, Maharashtra	
Year 2010	Year 2020
	

3.5 Additionality

Regulatory Surplus

The Project Activity is not mandated by any law, statute, or other regulatory framework and systematically enforced legislation. The project activity involves tree plantation on the fallow agriculture lands. There is no such law, statute, or other regulatory framework and systematically enforced legislation which mandates tree plantation or forestation on agricultural lands. There are policies and laws which may be relevant to the tree plantation or forestation activities but do not enforce or mandate tree plantation. The policies and laws have been described in the section 1.14. However, those policies and laws are described here as well.

(i) **Indian Forest Act, 1927**[42] – The Indian Forest Act was adopted in 1927. It was an act to consolidate the law relating specifically relating to forests, the transit of forest-produce and the duty leviable on timber or other forest-produce. The project activity has not been implemented on state or central Government-owned lands. The project activity has been implemented on privately owned fallow agricultural lands. Therefore, the project activity is outside the purview of The India Forest Act, 1927.

[42] https://www.indiacode.nic.in/bitstream/123456789/15385/1/the_indian_forest_act%2C_1927.pdf

(ii) **Forest (Conservation) Act, 1980**[43] – The Forest (Conservation) Act, 1980 was enforced on 25-October-1980. It is an act adopted to provide for the conservation of forests and for matters connected therewith or ancillary or incidental thereto. The lands covered under the project activity are fallow agriculture land owned by private individuals. The lands covered under the project area are not state or central government owned forest lands. Therefore, the project activity does not come under the purview of The Forest (Conservation) Act, 1980.

(iii) **National Forest Policy, 1988**[44] – On the date 12-May-1952, the Central Government of India enacted the National Forest Policy to be followed in the management of State Forests in India. As per the section 3.2 of The National Forest Policy, diversion of good and productive agricultural lands to forestry is discouraged in view of the need for increased food production. In The National Forest Policy, there is also no mandate or enforcement conditions for tree plantation on the fallow agricultural lands as well. Therefore, the project activity is outside the purview of The National Forest Policy, 1988.

(iv) **Biological Diversity Act, 2002**[45] – The Biological Diversity Act was adopted by the Government. It is an Act to provide for conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected therewith or incidental thereto. There is no provision of tree plantation on agriculture land in the Biological Diversity Act. Therefore,the project activity is outside the purview of **Biological Diversity Act, 2002**.

(v)

Demonstration of Additionality

To identify the baseline scenario and demonstrate the additionality of this ARR project activity the AR-CDM tool - "Combined tool to identify the baseline scenario and demonstrate additionality in ARR CDM project activities" is applied. The additionality assessment has been done according to the first project activity instance. The steps are described as follows.

STEP 0. Preliminary screening based on the starting date of the ARR activity

The start date of the Project activities is 4 June 2017. Vouchers of saplings collected from the Nurseries and agreement with farmers are documented by crop zone. From the Voucher& farmer agreement, it can be confirmed that tree plantation activities have started on June 4, 2017.

Crop Zone is responsible for conducting the planting and maintenance of the records of ARR activity. To meet the cost of monitoring and maintenance and to promote more, Crop Zone is applying for carbon credits relating which could be generated from the ARR activities. This plantation process has no profit intention. The project has no return of investment from the monetary perspective. Therefore, the incentive from the planned sale of VCUs (partly as up-front funding) was seriously considered in the decision to proceed with the project activity.

[43] https://www.indiacode.nic.in/bitstream/123456789/1760/1/forestAA1980.pdf

[44] https://asbb.gov.in/Downloads/National%20Forest%20Policy.pdf

[45] https://www.indiacode.nic.in/bitstream/123456789/2046/1/200318.pdf

STEP 1. Identification of alternative land use scenarios

This step serves to identify alternative land use scenarios to the proposed CDM project activity that could be the baseline scenario.

Sub-step 1a. Identification of alternative land use scenarios to the proposed project activity

The following alternatives to the project activity will be evaluated:

- Land use will continue as pre-project land as cropland, fallow, barren lands.
- Afforestation of the selected lands without the incentives from the carbon market.
- Afforestation/reforestation of lands using commercial tree

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

To demonstrate that identified alternatives to the ARR project activity comply with all the applicable legal and regulatory requirements, and applicable Central and State Government laws and regulations. The alternative land uses are within the laws and regulations.

STEP 2. Barrier analysis: This step serves to identify barriers and to assess which of the land use scenarios identified in sub-step 1b are not prevented by these barriers.

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

The barriers included are:

- Investment barriers, other than insufficient financial returns
- Institutional barriers,
- Technological barriers; t
- Barriers related to local tradition;
- Barriers due to prevailing practice;
- Barriers due to local ecological conditions;
- Barriers due to social conditions and
- Barriers relating to land tenure, ownership, inheritance, and property rights.

The table below displays the barrier analysis matrix which identifies alternatives and barriers. A more complete discussion of the barriers follows.

Alternative land use scenarios	Investment	Institutional	Technological	Local tradition	Prevailing practices	Ecological conditions	Social conditions	Land tenure
Continuation of pre-project land use underdeveloped with little or non-managed gardens						×		
Afforestation/reforestation of the selected lands without the incentives from carbon market.	×				×		×	
Afforestation/reforestation of croplands/ barren lands using commercial tree	×	×				×		

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

Scenario 1: Continuation of the pre-project land use: Fallow and barren lands with marginal cultivation.

Before the implementation of project activities, most of the lands were poorly managed and were barren/degraded/fallow land. If the project was not implemented the land would have continued to degrade. No new trees will be planted

Scenario 2: Afforestation/Reforestation of degraded lands without incentives from carbon market

The Afforestation/Reforestation has not been done fully with profit intentions. The PP has planted mahogany (*Swietenia macrophylla*) and teak (*Tectona grandis*) for harvesting purposes but the same tree will be harvested after 21 years. The rest of the trees belong to farmers and would not be harvested. So, there is an investment barrier. So there won't be any sudden return of investment on a monetary basis for the PP. However, the PP may have to recruit many experts and train caretakers for efficient management. Apart from that, monitoring trees every year will also have to be done with experts. As this is not a plantation for timber or any other produce there will be financial and investment barriers, where tree plantation has been considered for carbon finance.

Scenario 3: Afforestation of degraded land /barren land/fallow land using commercial tree

Another land use scenario is afforestation using commercial trees. Even though this will provide financial assistance for the afforestation activity it has many barriers. Project areas are all scattered across the respective project district. Therefore, any kind of tree harvesting will be very difficult. Harvesting for timber won't give much return of investment as the activity is scattered. The PP has planted mahogany (*Swietenia macrophylla*) and teak (*Tectona grandis*)

for harvesting purposes but the same tree will be harvested after 21 years. So, there is an investment barrier.

Apart from the investment barrier, there are restrictions on the harvesting of some of the important economic timber species of the Project district. The difficulty in tree felling, harvesting and securing transit pass for transportation is a very long cumbersome and difficult process. The commercially viable species (such as Tectonagrandis and Sandalwood) are subjected to Tree Felling Rules of Project area. Moreover, there is a state law on the transit of harvested woods for transporting of woods from one place to another. The harvester will have to seek a no-objection certificate from the concerned authorities which is again a long and tedious process and generally discourage the people to go for commercial forestry. Furthermore, only six tree species and a bamboo species are exempted from the transit rules which do not include commercial species like Tectonagrandis and Sandalwood. Therefore it is an institutional barrier.

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

Forestation without being registered as an A/R project activity under Verr VCS Program is also considered as a land use scenario. From the barrier analysis, we can see that the land use scenario has many barriers like the Investment barrier, prevailing practice barrier and Social conditions barrier. Prevailing practice in the area is to do traditional farming or to leave the land barren. Social conditions like poverty, lack of awareness, lack of institutional support etc. are also acting as barriers here. Similarly, other identified land use scenarios also have barriers. With respect to barrier analysis, the project is additional. So we can go to step 4 common practice analysis.

Barriers associated with relevant land use scenarios have described below.

Investment Barrier

There is lack of information on availability of credit for tree plantation. The land owners and farmers in India are with small and marginal land holding sizes. They do not have access to information regarding credit possibilities for tree plantation under various government schemes (Balooni and Singh, 2003)[46].

There is lack for insurance cover for the tree plantation activities on agricultural lands as well. Therefore, the farmers practising tree-based farming cannot avail insurance and other financial services. Initiatives of tree insurance[47] have been undertaken in Tamilnadu state of India for limited number tree species like *Casuarina, Eucalyptus, Gmelina arborea, Melia dubua, Alianthis excelsa* and *Leucaena leucocephala* by United India Insurance. The projecy activity is not located in Tamilnadu. Therefore, the benefit from tree insurance by United India Insurance cannot be accrued by the land owners in the project activity. Similarly, Kerala state of India has a scheme for coconut

[46] Balooni, K., & Singh, K. (2003, August). Financing of wasteland afforestation in India. In *Natural Resources Forum* (Vol. 27, No. 3, pp. 235-246). Oxford, UK: Blackwell Publishing Ltd. (Available at: http://115.249.96.25/xmlui/bitstream/handle/2259/365/Afforestation%20%281%29.pdf?sequence=1&isAllowed=y)

[47] https://uiic.co.in/product/miscellaneous/Plantation-Insurance

and rubber[48]. However, the project activity is not located in Kerala state of India. There is also insurance scheme of for bio-fuel plants such as *Jatropha curcas* and *Pongamia pinnata by* Agricultural Insurance Company India Limited[49]. However, this project activity does not cover any bio-fuel species.

Institutional Barrier

There is a risk related to change in the government-related policies and laws. Planting of commercial tree species for timber and paper/pulp industry is often challenging at individual level. There are restrictions on various species over the tree-felling and transit of the trees in various states of India (Chavan, et al. 2015)[50]. There have been restrictions imposed by the various state governments of India on harvesting, transporting and marketing of tree produce. The process of tree felling is cumbersome, costly and frustrating legislation in respect of tree felling, wood transportation, processing and marketing. It plays a major role in the behavior of the farmer looking to adopt agroforestry from commercial point of view (Sharma, et al., 2017)[51]. Therefore, farmers and landowners avoid planting trees on their lands if they have commercial reasons. In addition, marketing infrastructures for agroforestry produce are unavailable in the country except in the few states. Therefore, majority of profit is extracted by the middlemen. All these make farmers resistant to take tree plantation on commercial level. All these procedures make farmer hesitant to adopt this system and therefore they do not integrate tree plantation component on their lands (Pandey, 2007)[52].

Barriers due to Prevailing Practices

The land use scenario is the "first of its kind": No activity of this type is currently operational in the host country or region: This is a first kind of project where 21 species of woody perennials are being planted simultaneously in four different states of India – Karnataka, Andhra Pradesh, Maharashtra and Telangana.

Barriers due to Ecological Conditions

Unfavourable course of ecological succession: The land parcels covered under the project activity are fallow agricultural lands. Prior to the tree plantation, these lands were devoid of any appreciable tree vegetation. The revegetation of these fallow agricultural lands through natural process depends on the seed arrival and dispersal with good/stable soil to support the survival of growing seedlings. However, these lands cannot support a natural course of ecological succession.

Barriers due to Social Conditions

[48] http://keralaagriculture.gov.in/wp-content/uploads/2021/04/TR28254-20-03.06.2020.pdf

[49] https://agritech.tnau.ac.in/crop_insurance/crop_insurance_scheme_biofuel.html

[50] Chavan, S. B., Keerthika, A., Dhyani, S. K., Handa, A. K., Newaj, R., & Rajarajan, K. (2015). National Agroforestry Policy in India: a low hanging fruit. *Current Science*, 1826-1834. (Available at: https://krishi.icar.gov.in/jspui/bitstream/123456789/21066/1/1826.pdf)

[51] Sharma, P., Singh, M. K., Tiwari, P., & Verma, K. (2017). Agroforestry systems: Opportunities and challenges in India. *Journal of Pharmacognosy and Phytochemistry*, *6*(6S), 953-957. (Available at: https://www.phytojournal.com/archives/2017/vol6issue6S/PartV/SP-6-6-241.pdf)

[52] Pandey, D. N. (2007). Multifunctional agroforestry systems in India. *Current science*, 455-463. Available at: http://www.kiran.nic.in/pdf/agri-info/jhum%20cultivation/multifunctional.pdf)

Lack of skilled and/or properly trained labour force: The enrolling farmers mostly belong to the poor sections of the society with a land-holding sizes of ranging from 1 to 2 hectares of agricultural lands. In the project activity, 140 land owners enrolled in the project activity instance live below the national poverty line of India (described in the section 1.17.2 as well). They hold the BPL Card (Below Poverty Line) Card issued by the Department of Food and Public Distribution, Government of India. This BPL card helps them to avail services of food and other basic services through public distribution services. "Lack of skilled and/or properly trained labour force" is another barrier which prevents the adoption on tree plantation in the project lands. Tree plantation requires multiple activities such as nursery management, digging of pits, plantation of saplings and management and protection. There is no properly trained labour force to conduct such tree plantation.

STEP 4. Common practice analysis

The specific characteristics of the project makes it unique. These are as following.

1. Geographic location – the project activity is spread over four different states of India – Maharashtra, Andhra Pradesh, Telangana and Karnataka covering 501.47 hectares of land.
2. Landowners – Majority of landowners (total 140) or farmers under the project activity live below the national poverty line.

With the growth of forestry sector in the project states there has been afforestation/reforestation/revegetation activities underway but they differ from the project activity in multiple ways. The tree plantation activities are being carried out in designated fallow croplands which are mainly owned by small and marginal farmers with land holding sizes ranging from 1 to 2 hectares. Among the landowners enrolled in the project activity, 140 landowners are living below the poverty line. India has set its official poverty line at India Rupees 26 a day (US $0.43 a day) in rural areas and about Indian Rupees 32 per day (US $0.53 a day) in urban areas[53]. So, the majority of landowners/farmers in the project activity are not capable to plant trees on their own.

No such initiatives or Government supported program, which are undergoing targets specifically for the tree cultivation on lands owned small and marginal farmers living below the poverty line.

Under the project activity, forestation activities have been done as block plantations. However, it is not common practice to plant trees in block plantation or intercropping model. Block plantations are generally carried out in community land. Tree plantations on farmland generally done of bunds or boundary of it.

Trees Outside Forest (TOF), are defined as 'trees growing outside the forest'. In India, trees growing outside the recorded forest areas (RFA) are termed as TOF. The recorded forest area are mainly owned by the respective state government forest departments. Trees Outside Forest (TOF), are found in diverse formations in the rural and urban landscapes in the country like small woodlots, block plantations, trees along linear features such as roads, canals, bunds, etc and scattered trees on farmlands, agricultural lands, homesteads, community lands and urban areas.

There are various classification of TOF. These are as following:

[53] https://www.indiatoday.in/india/north/story/planning-commission-bpl-earn-rs-25-a-day-india-141619-2011-09-20

1. As per the land use

1.1.Trees with Settlements:

- Urban
- Rural

1.2.Trees with Agricultural Lands:

- Agroforestry

1.3.Trees along Manmade or Natural Features:

- Beside Railways
- Beside Roads
- Beside Canals / Rivers

In India, tree outside forest are categorized into the following:

- Block plantation
- Linear plantation
- Scattered

Under the project activity the following states have percentage wise break-up of Block Plantation, Linear Plantation and Scattered Plantation.

State	Percentage Contribution		
	Block (%)	Linear (%)	Scattered (%)
Maharashtra	6.71	0.22	89.49
Karnataka	19.03	0.25	78.51
Telangana	38.15	0.13	60.32
Andhra Pradesh	54.58	0.63	41.22

Source: FSI Technical Series, Volume 2, No.1 (2020)[54]

The project activity instance is located in the rural areas. The plantation have been done on a block plantation model. As per the aforementioned table, except Andhra Pradesh, rest of the states including Maharashtra, Karnataka and Telangana have block plantation contribution less than 50% in total Tree Outside Forest cover. Specifically, in Maharashtra where the 60% of the total project area is located, block plantation in general contributes less than 10% (6.71 %) of the total tree outside forests. Therefore, block plantation is not a common practice in majority (more than 50%) of the project area. Under the project activity, the tree plantation has been done in block plantation model which is not a common practice in majority of the project states.

According to the assessment done by Forest Survey of India (FSI), the tree outside the forest (TOF) cover in the project states has increased in Andhra Pradesh, Telangana and Karnataka whereas reduced in Maharashtra.

[54]Forest Survey of India (2020)-Tree Outside Forest Resources in India, FSI Technical Information Series Volume 2 (1), Ministry of Environment, Forest & Climate Change, Government of India, Dehradun - 248195 http://webline.co.in/fsi-result/technical-information-series-vol2-no1-2020.pdf

State	Tree outside forest (2021) (hectares)[55]	Tree outside forest (2019) (hectares)[56]	Percentage change (%)
Andhra Pradesh	10,22,400	8,93,200	14.46
Telangana	5,36,600	4,82,700	11.17
Karnataka	23,67,600	22,36,100	5.88
Maharashtra	26,86,600	26,94,500	-0.29
Total	**6613200**	**6306500**	**4.86**

Source: Forest Survey of India

In total area coverage, Maharashtra state covers 60% of the total area under the initial project activity instance.

State	Area (in hectares)	Percentage (%)
Maharashtra	299.36	60
Telangana	64.72	13
Karnataka	45.56	9
Andhra Pradesh	91.84	18
	501.47	**100**

So, in the more than 50% of the project area, that is 60% of the total project area (in Maharashtra state) have reported decline in tree outside the forest. Therefore, in the majority of the project tree plantation outside the forest area (more than 50%) is not a common practice.

Outcome: The proposed ARR VCS group project activity is not the baseline scenario and, hence, it is additional.

3.6 Methodology Deviations

There is no deviation in methodology.

[55] https://www.fsi.nic.in/forest-report-2021

[56] https://www.fsi.nic.in/forest-report-2019

4 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

The criteria mentioned in the adopted AR-ACM0003 will be used to estimate the baseline. The net GHG removals by sinks in the baseline scenario are established using the following equation.

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

Where:

$\Delta C_{BSL,t}$= Baseline net GHG removals by sinks in year *t*; t CO2-e

$\Delta C_{TREE\_BSL,t}$= Change in carbon stock in baseline tree biomass within the project boundary in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks

$\Delta C_{SHRUB\_BSL,t}$= Change in carbon stock in baseline shrub biomass within the project boundary, 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 CO2-e

$\Delta C_{DW\_BSL,t}$ = Change in carbon stock in baseline dead wood biomass within the project boundary, 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 CO2-e

$\Delta C_{LI\_BSL,t}$= Change in carbon stock in baseline litter biomass within the project boundary, 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 CO2-e

The methodological tool AR-Tool - "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" Version 04.2 was used to estimate the baseline stock change.

As per Section 5 of the tool, the carbon stock in trees in the baseline can be accounted as zero if all of the following conditions are met:

a. The pre-project trees are neither harvested, nor cleared, nor removed throughout the crediting period of the project activity;

b. 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;

c. The pre-project trees are not inventoried along with the project trees in the monitoring of carbon stocks but their continued existence, consistent with the baseline scenario, is monitored throughout the crediting period of the project activity.

The baseline land use has been considered to be degraded or severely degraded or fallow or barren lands or lands with subsistence agriculture. Although there may be a few trees present in the areas identified, they will fall below the threshold to be defined as a forest as per the Indian definition of forest. Existing trees will not be cut. The whole plantation and land preparation will be done according to the presence of existing trees. Any extraction of existing trees for timber, fuelwood, etc. is not planned and is completely discouraged. The existing trees will not be estimated for their carbon stocks and carbon stock change but will be monitored for continued existence throughout the project duration.

4.2 Project Emissions

The actual net GHG removals by sinks are estimated using the following equation.

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

Where:

$\Delta C_{ACTUAL,t}$= Actual net GHG removals by sinks, in year *t*; t CO2-e

$\Delta C_{P,t}$ = Change in the carbon stocks in the project, occurring in the selected carbon pools, in year *t*; t CO2-e

$GHG_{E,t}$ = Increase in non-CO2 GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year *t*, as estimated in the tool "Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; t CO2-e

Change in the carbon stocks of selected carbon pools is estimated using the following equation.

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{DW\_PROJ,t} + \Delta C_{LI\_PROJ,t} + \Delta SOC_{AL,t}$$

Where:

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year *t*; t CO2-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 CO2-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 CO2-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 CO2-e

$\Delta C_{LI\_PROJ,t}$= Change in carbon stock in litter 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 CO2-e

$\Delta SOC_{AL,t}$= Change in carbon stock in SOC in project, in year *t*, in areas of land meeting the applicability conditions of the tool "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities", as estimated in the same tool; t CO2-e

Estimation in the changes of carbon stock in tree biomass:
The change in carbons stock in tree biomass was estimated as per the requirements in the methodological tool AR-TOOL 14 Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities Version 4.2.

Estimation in the changes of carbon stock in shrub biomass:
There is no planting of shrubs as a part of the project activities therefore this parameter will be estimated as zero in both ex-ante and ex-post calculations.

Estimation in the changes in carbon stock in dead wood:
Deadwood is expected to remain in the project area and will not be removed. Conservatively, the carbon stock contained in this pool is expected to remain unchanged for the program duration.

Estimation in changes in carbon stock in soil organic carbon (SOC)
SOC will be calculated according to the following formula using "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities"

$$\Delta SOC_{PROJ,t} = \frac{44}{12} \times \sum_{t=1}^{t} A_{PLANT,t} \times dSOC_t \times 1\ year$$

Where:

$\Delta SOC_{PROJ,t}$ = Change in SOC stock within the project boundary, in year *t*; t CO_2-e

$A_{PLANT,t}$ = Area planted in year *t*; ha

$dSOC_t$ = The rate of change in SOC stocks within the project boundary, in year *t*; t C ha^{-1} $yr^{-}1$.

The following default value of is used, unless transparent and verifiable information can be provided to justify a different value:

(i) $dSOC_t$= 0.50 t C ha^{-1} yr^{-1} for $t = t_{PLANT}$ to $t = t_{PLANT}$ + 20 years, where t_{PLANT} is the year in which planting takes place;

(ii) $dSOC_t$ = 0 t C ha^{-1} yr^{-1} for $t > t_{PLANT}$ +20.

4.3 Leakage

As per section 5.6 of the methodology AR-ACM0003 version 2.0 leakage is to estimate as follows

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

Where:

LK_t = GHG emissions due to leakage, in year *t*; t CO2-e

$LK_{AGRIC,t}$ = Leakage due to the displacement of agricultural activities in year *t*, as estimated in the tool "Estimation of the increase in GHG emissions attributable to the displacement of pre-project agricultural activities in A/R CDM project activity"; t CO_2-e

The lands on which the project will be implemented are degraded/barren/fallow lands or land with subsistence agriculture. The lands selected for program implementation are lands not classified as forest lands according to the definition of the forest of India. Except for lands with subsistence agriculture, degraded/barren/fallow lands have not been used for agriculture, including rice paddies.

In addition, the lands on which project implementation will occur are not and have not been grazing lands. Most of the project areas are degraded barren fallow lands or lands with grass and sparse, dispersed vegetation. Grazing is not a common practice in the area. These lands have no prior history of agriculture or grazing. Therefore, there is no displacement of agricultural activities as a result of project activities and leakage has been estimated to be zero.

The net anthropogenic GHG removals by sinks shall be 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*; t CO2-e

$\Delta C_{ACTUAL,t}$= Actual net GHG removals by sinks, in year *t*; t CO2-e

$\Delta C_{BSL,t}$= Baseline net GHG removals by sinks, in year *t*; t CO2-e

LK_t= GHG emissions due to leakage, in year *t*; t CO2-e

4.4 Estimated Net GHG Emission Reductions and Removals

The net anthropogenic GHG removals by sinks shall be 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*; t CO_2-e

$\Delta C_{ACTUAL,t}$= Actual net GHG removals by sinks, in year *t*; t CO_2-e

$\Delta C_{BSL,t}$= Baseline net GHG removals by sinks, in year *t*; t CO_2-e

LK_t= GHG emissions due to leakage, in year *t*; t CO_2-e

The net anthropogenic GHG removals by sinks in the first instance are summarized in the table below.

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
2017	0	3916	0	3916
2018	0	7742	0	7742
2019	0	8238	0	8238
2020	0	10681	0	10681
2021	0	11431	0	11431
2022	0	11431	0	11431
2023	0	11431	0	11431
2024	0	11431	0	11431
2025	0	11431	0	11431
2026	0	11431	0	11431
2027	0	11431	0	11431
2028	0	11431	0	11431
2029	0	11431	0	11431
2030	0	11431	0	11431
2031	0	11431	0	11431
2032	0	11431	0	11431
2033	0	11431	0	11431
2034	0	11431	0	11431
2035	0	11431	0	11431
2036	0	11431	0	11431

Total	0	213467	0	213467
Average annual ER		10673		10673

5 MONITORING

5.1 Data and Parameters Available at Validation

During the first instance and each instance data and parameters will be provided during the time of validation as described in each table.

During the first instance and each stance, data and parameters will be provided during the time validation as described in each table.

Data / Parameter	A_I
Data unit	Ha
Description	Area of strata i
Source of data	Field measurement
Value applied:	The total area will depend on each project instance
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of Data	The parameter is used to calculate actual net GHG removals.
Comments	NA

Data / Parameter	$BEF_{2,J}$
Data unit	Dimensionless
Description	Biomass expansion factor for conversion of stem biomass to above-ground biomass
Source of data	IPCC GPG LULUCF2003
Value applied:	3.4
Justification of choice of data or description of	Default data

measurement methods and procedures applied	
Purpose of Data	The parameter is used to calculate actual net GHG removals.
Comments	N/A

Data / Parameter	CF_{TREE}
Data unit	t C t^{-1}d.m.
Description	Carbon fraction of tree biomass for species or group of species j
Source of data	IPCC GPG LULUCF2003
Value applied:	*0.47*
Justification of choice of data or description of measurement methods and procedures applied	Default data
Purpose of Data	The parameter is used to calculate actual net GHG removals.
Comments	*N/A*

Data / Parameter	D_j
Data unit	t d.m.m^{-3}
Description	Basic wood density
Source of data	IPCC GPG LULUCF2003
Value applied:	Dependent on the type of species.
Justification of choice of data or description of measurement methods and procedures applied	Default value for each species
Purpose of Data	The parameter is used to calculate actual net GHG removals
Comments	N/A

Data / Parameter	R_J

Data unit	Dimensionless
Description	Root-shoot ratio
Source of data	IPCC GPG LULUCF2003
Value applied:	0.27
Justification of choice of data or description of measurement methods and procedures applied	Default value
Purpose of Data	The parameter is used to calculate actual net GHG removals.
Comments	N/A

5.2 Data and Parameters Monitored

Data and parameters will be monitored according to the following template and presented in the following template

Data / Parameter	$V_{TREE,j}$; $V_{TREE,l,p,j,i}$
Data unit	m^3
Description	Stem volume of tree species j; Stem volume of tree l of species j in sample plot p of stratum i
Source of data	Field measurement
Description of measurement methods and procedures applied	For ex-ante estimation, the growth curve (age-volume) equations are used to estimate the stem volume. For the ex-post estimation, allometric equations of each tree species are used to calculate the stem volume.
Frequency of monitoring/recording	Before every verification.
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures applied	Quality control/quality assurance (QA/QC) procedures prescribed under National Forest Inventory are applied. In absence of these, QA/QC procedures from published handbooks, or from IPCC GPG LULUCF 2003 may be applied.
Purpose of data	The parameter is used to calculate actual net GHG removals.
Calculation method	For the ex-post estimation during the following verification, allometric equations based on tree dimensions are used to

	calculate the stem volume. The tree dimensions usually comprise height and diameter at breast height.
Comments	N/A

Data / Parameter	$H_{l,p,j,i}$; $DBH_{l,p,j,i}$
Data unit	m; cm
Description	Height of tree l of species j in sample plot p of stratum i; Diameter at breast height of tree l of species j in sample plot p of stratum i
Source of data	Field measurements in sample plots
Description of measurement methods and procedures applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In absence of these, SOPs from published handbooks or the IPCC GPG LULUCF 2003, may be applied.
Frequency of monitoring/recording	Before every verification event
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures applied	Quality control/quality assurance (QA/QC) procedures prescribed under National Forest Inventory are applied. In absence of these, QA/QC procedures from published handbooks, or IPCC GPG LULUCF 2003 may be applied.
Purpose of data	The parameter is used to calculate actual net GHG removals.
Calculation method	These two parameters are two tree dimensions used as entry data into the volume equations for the calculation of the stem volume of trees.
Comments	For the ex-post estimation during the following verification, the allometric equations of each tree species will be used to calculate the stem volume, and the allometric equation used will be demonstrated to be appropriate for estimation of tree biomass by applying the tool, "Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities", in the project monitoring report.

Data / Parameter	A_i; $A_{PLOT,i}$
Data unit	Ha
Description	Area of stratum i; Size of sample plot in stratum i

Source of data	Field measurement
Description of measurement methods and procedures applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Frequency of monitoring/recording	Before verification
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures applied	N/A
Purpose of data	The parameter is used to calculate actual net GHG removals
Calculation method	N/A
Comments	N/A

Data / Parameter	$N_{i,j}$
Data unit	trees/ha
Description	Number of the tree species j of strata i
Source of data	Field measurement
Description of measurement methods and procedures applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Frequency of monitoring/recording	Before every verification event
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures applied	N/A
Purpose of data	The parameter is used to calculate actual net GHG removals

Calculation method	N/A
Comments	N/A

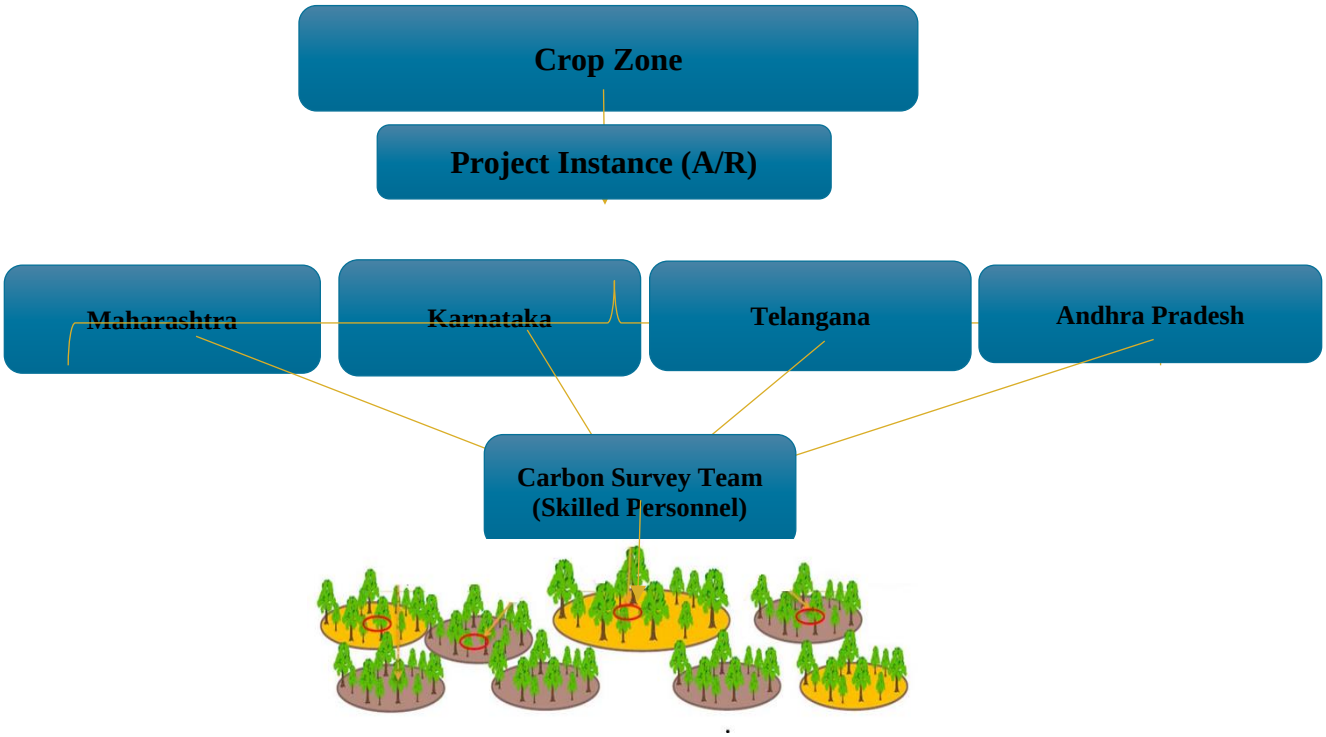
5.3 Monitoring Plan

Crop Zone has established a standard monitoring process for all project activities. The Crop Zone has conducted a training program to sensitize all stakeholders involved in the project and also place a carbon survey team i.e. group of skilled personnel in each project area i.e. Maharastra, Karnataka, Telangana & Andhra Pradesh.

The team will undertake all carbon project monitoring surveys in the project area to ensure consistency in the measurements. The supervise team from Crop Zone was assigned to do periodic physical checks in the field and ensure all quality control measures would be followed or not. In addition to that, the Crop Zone team has also done the cross-check of collected data by visiting surveyed plot.

The carbon team of Crop Zone has given training to all survey teams which comprise of following topics.

- How to collect data from plantation sites effectively.
- How to ensure a good survival rate.
- Measuring tree growth (DBH and height).
- Tree identification.
- Establishment of project boundary using tracking systems



The data which was collected by the carbon survey team will be reported to and archived in the concerned implementer in both hard and soft copy format. After that, the data will be archived in the online drive and transferred to the EKI office for further analysis purposes.

Establishment of project boundary using tracking systems.

All land parcels subject to plantations under this project activity are delineated using GPS tracking function and for this, extensive training is conducted A step-wise guidance of geo-tagging procedure is provided in the SOPs Each planting plot, and the tracks are downloaded and recorded as Google Earth kml file, as shapefile, and an Excel file. This allows for further processing of the tracks via GIS applications.

Stratification and sampling framework

The ex-ante stratification of the project will be done on the year of planting. The sampling framework adopted will be as follows:

The number of samples and sample size will be calculated using "Calculation of the number of sample plots for measurements within A/R CDM project activities (Version 02.1.0)[57]".

The number of required plots will be calculated using the following equation:

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

Where:

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

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_I Estimated standard deviation of biomass stock in stratum *i*; t d.m. (or t d.m. ha^{-1})
E Acceptable margin of error (i.e. one-half the confidence interval) in the estimation of biomass stock within the project boundary; t d.m. (or t d.m. ha^{-1}), i.e. in the units used for s_i
i *1, 2, 3, .* biomass stock estimation strata within the project boundary

The number of plots allocated to each stratum will be calculated as follows:

$$n_i = n * \frac{w_i * s_i}{\sum_i w_i * s_i}$$

Where:
n_i Number of sample plots allocated to stratum *i*; dimensionless
n Number of sample plots required for estimation of biomass stocks within the project boundary; 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_I Estimated standard deviation of biomass stock in stratum *i*; t d.m. (or t d.m. ha^{-1})
i *1, 2, 3, .* biomass stock estimation strata within the project boundary

The sampling plot area to 20 m x 20 m plots of 0.04 ha (400 m^2) will be laid out. The QC and QA measures for monitoring and collection of field data will be as follows:
(1) Collection of field data promptly.
(2) Independent random checking of data by an independent expert
(3) Entering the data in a computer system followed by analysis and storing the same in cloud storage.

Description of steps

(1) Collection of field data promptly.
A team consisting of people belonging to the project area will be formed. The team will be carrying out field monitoring. Before that, they will undergo training in data collection, data entry and data analysis. Specific duties will be assigned to each team member.
(2) Independent random checking of data by an independent expert
The data collection team will do random checks from sampling plots. In case of any error reported, they will be collected and recorded.
(3) Entering the data in the computer system followed by analysis and archiving the same.
Data management will be done in electronic and paper format. Data entering will cover all the parameters for the calculation of GHG removals, carbon stock changes and records of project participants. GIS shapefiles and maps will be stored electronically in the local hard drive and cloud network.

Sampling design

- **Types of plots**

For monitoring the project over the project period, permanent sample plots will be established and managed just like the rest of the project area.

- **Number of plots**

The number of plots will be calculated using the aforementioned formulae

- **Location of sampling plots**

The locations of sampling plots will be randomly distributed to avoid any project developer biases and it will represent all strata. The geographical locations (geo coordinates), ID numbers of stratum will be recorded and archived.

- **Monitoring frequency**

Permanent sample plots will be monitored annually to measure the parameters required for assessing change in carbon stock accumulation.

- **Measuring and estimating carbon stock change**

Using the parameters measured from the permanent sample plots carbon stocks in aboveground biomass and belowground biomass will be estimated.

- **Stratification and sample size**

Sample plots of 0.04 ha (400 m^2) with 20 m x 20 m will be established randomly in each stratum based on the year of plantation. The *ex-ante* stratification will be according to the year of planting.

Allocation of sample plot

Stratum name	Stratum Area	No of Sample plots
Aurangabad	71.02	15
Bagalkot	3.52	1
Bellary	59.87	10
Dhule	16.52	2
Jagityal	15.42	3
Jalana	144.64	4
Kurnool	7.69	2
Nalgonda	53.83	2
Nellore	53.73	5
Solapur	3.92	1
Visakhapatnam	48.22	1
	501.471	**46**

Note: The calculation of the number of sample plots using the A/R CDM tool resulted in total 40 sample plots. However, based on the size of the three strata and diversity of species, six more sample plots were also added to have representation of species diversity. Therefore, PP had to select six more PSPs in the following strata:

a) Aurangabad – 4
b) Dhule – 1
c) Nellore – 1

This was done to have inclusive representation of whole project area. For example, in Aurangabad, *Citrus spp*. have also been planted which has different carbon sequestration rate when compared to Mahogany (*Swietenia macrophylla*). Therefore, to represent *citrus spp*., PP has to increase the number of sample plots.

Task allotment for team members consisting of one team member

Team Member	Task Descriptions
Field Enumerator 1	Demarcation of sample plot of 20*20 sqm with knotting the rope in the site
Field Enumerator 2	Taking GPS value of the demarcated sample plot boundary
Field Enumerator 3	Measuring height and girth of the plant species
Field Enumerator 4	Recoding all data and taking snaps of the plantation and sample plot sites

The area of each sample plot will be 0.04 hectares

20 m

20 m

Parameters collected and measured in the field

The monitoring survey format has been designed for collecting the data from the sample plot which is given below

i. Name of the Farmer
ii. Village Name
iii. Block
iv. District
v. Geo-Coordinates of the sample plantation site

GPS Coordinates of Plot	1	2
	3	4

Species Diversity at Plantation Site

Sl. No	Name of the Species	Height (m)	GBH (cm)

vi. Photograph of the site (Photograph will be captured through "Notecam Application")
vii. https://www.indiamart.com/proddetail/suunto-clinometer-4938177173.html?pos=5&pla=n (link for clinometers procurement)

Procedures for internal auditing and QA/QC

As stated in the IPCC GPG for LULUCF (page 4.111) monitoring requires provisions for quality assurance (QA) and quality control (QC) to be implemented via a QA/QC plan. The plan will be part of project documentation and cover procedures as described below for:

- Collecting reliable field measurements;
- Verifying methods used to collect field data;
- Verifying data entry and analysis techniques; and
- Data maintenance and archiving. Especially this point is important, as time scales of project activities are much longer than technological improvements of electronic data archiving.

To produce reliable carbon estimates the proper entry of data into the data analyses spreadsheets is required. Steps have been taken to ensure that errors are eliminated. Tree measurements are collected by the field officers at plantation sites in their notebooks and transferred to the Measurement Register/ Sheet. Discrepancies found if any are intimated to concerned field officer and the same is clarified or corrected as the case may be.

6 ACHIEVED GHG EMISSION REDUCTIONS AND REMOVALS

6.1 Data and Parameters Monitored

Data / Parameter	H
Data unit	Meter (m)
Description	Height of tree planted
Value applied:	Field measurements in sample plots.
Comments	NA

Data / Parameter	D
Data unit	cm (centimeter precision)
Description	Tree Diameter
Value applied:	GBH is measured from the field in sample plots. Then diameter is calculated using the equation: $D=GBH/\pi$
Comments	NA

Data / Parameter	Ai
Data unit	Ha
Description	Sample plot area.
Value applied:	0.04 Ha
Comments	NA

6.2 Baseline Emissions

The baseline emission for the project is considered as zero.

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

$\Delta C_{BSL,t}$= Baseline net GHG removals by sinks in year *t*; t CO2-e

6.3 Project Emissions

Net anthropogenic removals by the sinks has been estimated by the sinks is estimated as the actual net GHG removals by sinks minus baseline net GHG removals minus leakage. The following general formula described in the methodology is used to calculate the net anthropogenic GHG removals by sinks of an A/R project activity, in t CO2-e:

$C_{AR-CDM} = \Delta C_{ACTUAL} - \Delta C_{BSL} - LK$

Where:

C_{AR-CDM}	Net anthropogenic GHG removals by sinks; t CO_2-e
ΔC_{ACTUAL}	Actual net GHG removals by sinks; t CO_2-e
ΔC_{BSL}	Baseline net GHG removals by sinks; t CO_2-e
LK	Total GHG emissions due to leakage; t CO_2-e

The actual net GHG removals by the sinks were estimated using the following equation described in the applied methodology:

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

Where:

ΔC_{ACTUAL}	Actual net GHG removals by sinks, in year t; t CO_2-e
$\Delta C_{P,t}$	Change in the carbon stocks in project, occurring in the selected carbon pools, in year t; t CO_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 estimated in the tool "Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; t CO_2-e

There has not been any use fire for site preparation or to clear the land. Therefore, there will be no GHG emissions from biomass burning.

Therefore: $GHG_{E,t} = 0$.

Carbon stock changes

Carbon stock changes ($\Delta C_{P,t}$) is the sum of the changes in above-ground and below-ground tree biomass, dead wood, litter and soil organic carbon stocks in the project scenario. Changes in the carbon stocks in project were estimated using the following equation described in the methodology:

$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{DW\_PROJ,t} + \Delta C_{LI\_PROJ,t} + \Delta SOC_{AL,t}$

$\Delta C_{P,t}$	Change in the carbon stocks in project, occurring in the selected carbon pools, in year t; t CO2-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. This pool is conservatively dismissed in these estimations.
$\Delta C_{DW\_PROJ,t}$	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 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, in areas of land meeting the applicability conditions of the tool "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities", as estimated in the same tool; t CO_2-e

Biomass carbon pool estimation

Aboveground and belowground biomass have been estimated according to the field measurement of Monitoring parameters described in the section 6.1

The aboveground and belowground biomass includes only the tree biomass. No shrubs, herbs and soil organic carbon have been considered for the estimation. The following equation has been used for estimation ex-post aboveground and belowground biomass.

$C_{TREE} = 44/12 \times CF_{TREE} \times B_{TREE}$

Where:

C_{TREE}	Carbon stock in trees in the tree biomass estimation strata; t CO_2e
CF_{TREE}	Carbon fraction of tree biomass; 0.47 has been used
B_{TREE}	Tree biomass in the tree biomass estimation strata; t d.m.

Estimation of aboveground and belowground biomass

Measurement of trees including diameter at breast height (DBH) and tree height in the sample plots were done on the sample plots of size 0.04 hectares. The number of sample plots were estimated using A/R CDM Tool – "Calculation of the number of sample plots for measurements within A/R CDM project activities" version 02.1.0. The procedure of sample plots measurement has been described in section 5.3.

In the sample plot, after collecting parameters like DBH and tree height, following allometric equation.

B_{TREE} = AGB + BGB
Where:

AGB Aboveground Biomass

BGB Belowground Biomass

AGB was calculated using the allometric equation proposed by Food and Agricultural Organization[58] (FAO) which were developed from the equation by Gillespie, et al. 1992[59]. The equation to calculate using FAO and Gillespie, et al. 1992 is described below.

AGB = exp{-2.134+2.530*ln(DBH)}

Where:

DBH Diameter at breast height

BGB was calculated using the following equation:

BGB = AGB × R_j. (Source: Equation 3.4.6, IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry[60])

Where:

AGB Aboveground Biomass

R_j Root to shoot ratio (a value of 0.27 taken from IPCC GPG for LULUCF Table- 3A.1.8[61])

6.4 Leakage

There is no leakage found in this project activity and can be counted as zero.

[58] https://www.fao.org/3/W4095E/w4095e06.htm#3.2.1%20biomass%20regression%20equations%20

[59] Gillespie, Andrew JR, Sandra Brown, and Ariel E. Lugo. "Tropical forest biomass estimation from truncated stand tables." *Forest Ecology and Management* 48.1-2 (1992): 69-87. https://www.sciencedirect.com/science/article/abs/pii/037811279290122P

[60] https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/GPG_LULUCF_FULL.pdf

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

LK_t= 0

LK_t= GHG emissions due to leakage, in year *t*; t CO2-e

6.5 Net GHG Emission Reductions and Removals

Long-term average (LTA)

LTA calculated in section 1.10 considers the ex-ante values of annual volume increment. The annual volume increment values have been selected from the IPCC volume increment tables and registered CDM projects. Harvesting is planned only for the Mahogany and Teak trees. Since the remaining trees are fruit-bearing species, there is no intention of harvesting for other species. Ex-ante calculations are done based on the values given in the table. Ex-post values are not considered in the LTA calculations in section 1.10.

Tree species (Common name)	Scientific name	Basic Wood Density (tonnes/m^3)	Volume increment(M^3/ha/year)	Source of volume increment
Amla	*Phyllanthus emblica*	0.86	1.50	Conservative estimation
ANZIR	*Ficus carica*	0.39	1.50	Conservative estimation
Bamboo	*Bambusoideae*		1.50	Conservative estimation
BLACK BERRY	*Rubus fruticosus*	0.35	1.50	Conservative estimation
Chandan	*Santalum album*	0.84	1.50	Conservative estimation
SAPOTA	*Achras Sapota*	0.83	1.50	Conservative estimation
Coast Sheoak	*Casuarina equisetifolia*	0.85	1.50	Conservative estimation
Coconut	*Cocos nucifera*	0.50	1.50	Conservative estimation
Custard apple	*Anona Reticulata*	0.36	1.50	Conservative estimation
Pomegranate	*Punica granatum*	0.77	1.50	Conservative estimation
Guava	*Psidium guajava*	0.58	1.50	Conservative estimation
Jambhul	*Syzygium cumini*	0.69	1.50	Conservative estimation
Lemon	*Citrus Limon*	0.83	1.50	Conservative estimation
Mahogany	*Swietenia macrophylla*	0.49	18.50	IPCC guidelines
Malabar Neem	*Melia Dubia*	0.42	1.50	Conservative estimation

Mango	*Mangifera Indica*	0.52	1.50	Conservative estimation
Moringa	*Moringa oleifera*	0.50	1.50	Conservative estimation
Mosambi	*Citrus limetta*	0.67	1.50	Conservative estimation
Neem	*Azadirachta indica*	0.52	1.50	Conservative estimation
Nerali	*Artocarpus hirsutus*	0.58	1.50	Conservative estimation
Red Sandal	*Pterocarpus santalinus*	0.58	1.50	Conservative estimation
Silver	*Grevillea robusta*	0.53	1.50	Conservative estimation
Sweet Lemon	*Citrus limetta*	0.83	1.50	Conservative estimation
Tamarind	*Tamarindus indica*	0.75	1.50	Conservative estimation
Teak	*Tectona grandis*	0.50	12.00	IPCC guidelines

Parameter Name	Symbol	Value	Unit	Reference	Link
Biomass Expansion Factor	BEF	3.4	tons/Per Hector	IPCC GPG LULUCF	Link
Root Shoot Tree	Rj	0.27	Ratio	IPCC GPG LULUCF	Link
Carbon Fraction	CF	0.47	Ratio	IPCC GPG LULUCF	Link
CO2 Coversion Factor(44/12)	CO2 Coversion	3.67	Ratio	Calculated	
Conservative estimation		1.5	M^3/hectare	Conservative volume incerement used in CDM project ID 10201	Link
Teak volume increment		12	M^3/hectare	IPCC GPG LULUCF	Link
Mahogany Volume increment		18.5	M^3/hectare	IPCC GPG LULUCF	Link

LTA has been recalculated using the EX-post values obtained in the first monitoring period. LTA have been calculated for all the species in the project simultaneously. The updated LTA is 114407 tCO2e. The total GHG benefits in the monitoring period is 25321 tCO2e. So the long term average estimated have not been reached in this monitoring period.

Year	Actual Net GHG Removals	Baseline net GHG removals by sinks (tCO2e)	GHG emissions due to leakage (tCO2e)	Net anthropogenic GHG removals by sinks	Cumulative anthropogenic GHG removals by sinks (tCO2e)	VCUs
1	1538	0	0	1538	1538	1538

2	4252	0	0	4252	5790	4252
3	5499	0	0	5499	11288	5499
4	6574	0	0	6574	17862	6574
5	6624	0	0	6624	24487	6624
6	744	0	0	744	25231	744
7	11431	0	0	11431	36662	0
8	11431	0	0	11431	48092	0
9	11431	0	0	11431	59523	0
10	11431	0	0	11431	70954	0
11	11431	0	0	11431	82384	0
12	11431	0	0	11431	93815	0
13	11431	0	0	11431	105245	0
14	11431	0	0	11431	116676	0
15	11431	0	0	11431	128107	0
16	11431	0	0	11431	139537	0
17	11431	0	0	11431	150968	0
18	11431	0	0	11431	162399	0
19	11431	0	0	11431	173829	0
20	11431	0	0	11431	185260	0
21	-52002	0	0	-52002	133258	0
22	-60757	0	0	-60757	72501	0
23	268	0	0	268	72769	0
24	-31429	0	0	-31429	41340	0
25	-10524	0	0	-10524	30815	0
26	2505	0	0	2505	33320	0
27	2505	0	0	2505	35825	0
28	2505	0	0	2505	38330	0
29	2505	0	0	2505	40835	0
30	2505	0	0	2505	43340	0
31	2505	0	0	2505	45845	0
32	2505	0	0	2505	48350	0
33	2505	0	0	2505	50855	0
34	2505	0	0	2505	53360	0
35	2505	0	0	2505	55865	0
36	2505	0	0	2505	58370	0
37	2505	0	0	2505	60875	0
38	2505	0	0	2505	63380	0
39	2505	0	0	2505	65885	0
40	2505	0	0	2505	68390	0
41	2505	0	0	2505	70895	0
42	2505	0	0	2505	73400	0

43	2505	0	0	2505	75905	0
44	2505	0	0	2505	78410	0
45	2505	0	0	2505	80915	0
46	2505	0	0	2505	83420	0
47	2505	0	0	2505	85925	0
48	2505	0	0	2505	88430	0
49	2505	0	0	2505	90935	0
50	2505	0	0	2505	93440	0
51	2505	0	0	2505	95945	0
52	2505	0	0	2505	98450	0
53	2505	0	0	2505	100955	0
54	2505	0	0	2505	103460	0
55	2505	0	0	2505	105965	0
56	2505	0	0	2505	108470	0
57	2505	0	0	2505	110975	0
58	2505	0	0	2505	113480	0
59	2505	0	0	2505	115985	0
60	2505	0	0	2505	118490	0
61	2505	0	0	2505	120995	0
62	2505	0	0	2505	123500	0
63	2505	0	0	2505	126005	0
64	2505	0	0	2505	128510	0
65	2505	0	0	2505	131015	0
66	2505	0	0	2505	133520	0
67	2505	0	0	2505	136025	0
68	2505	0	0	2505	138530	0
69	2505	0	0	2505	141035	0
70	2505	0	0	2505	143540	0
71	2505	0	0	2505	146045	0
72	2505	0	0	2505	148550	0
73	2505	0	0	2505	151055	0
74	2505	0	0	2505	153560	0
75	2505	0	0	2505	156065	0
76	2505	0	0	2505	158570	0
77	2505	0	0	2505	161075	0
78	2505	0	0	2505	163580	0
79	2505	0	0	2505	166085	0
80	2505	0	0	2505	168590	0
81	2505	0	0	2505	171095	0
82	2505	0	0	2505	173600	0
83	2505	0	0	2505	176105	0

84	2505	0	0	2505	178610	0
85	2505	0	0	2505	181115	0
86	2505	0	0	2505	183620	0
87	2505	0	0	2505	186125	0
88	2505	0	0	2505	188630	0
89	2505	0	0	2505	191135	0
90	2505	0	0	2505	193640	0
91	2505	0	0	2505	196145	0
92	2505	0	0	2505	198650	0
93	2505	0	0	2505	201155	0
94	2505	0	0	2505	203660	0
95	2505	0	0	2505	206165	0
96	2505	0	0	2505	208670	0
97	2505	0	0	2505	211175	0
98	2505	0	0	2505	213680	0
99	2505	0	0	2505	216185	0
100	2505	0	0	2505	218690	0
Total					**11440716**	**25231**
LTA					**114407**	

The net GHG emission reductions or removals is 25,231 tCO_2e and after considering buffer pool allocation the total Verified Carbon Unit for issuance is 22,708 tCO_2e.

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)	Buffer pool allocation	VCUs eligible for Issuance
04-June 2017 to 31-December-2017	0	1538	0	1538	154	1384
01-January-2018 to 31-December-2018	0	4252	0	4252	425	3827
01-January-2019 to 31-December-2019	0	5499	0	5499	550	4949
01-January-2020 to 31-December-2020	0	6574	0	6574	657	5917

01-January-2021 to 31-December-2021	0	6624	0	6624	662	5962
01-January 2022 to 10-February-2022	0	744	0	744	74	670
Total		**25231**	**0**	**25231**	**2523**	**22708**

APPENDIX X: <TITLE OF APPENDIX>

Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.