CCBA Project Description
for
TIST Program in India
CCB-001

for validation under

The Climate, Community and Biodiversity Standard

Second Edition

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CLEAN AIR ACTION CORPORATION

Institute for Environmental Innovation

Institute for Environmental Innovation

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Project Overview

The International Small Group and Tree Planting Program (TIST) is a combined reforestation and sustainable development project, in India, carried out by subsistence farmers. The farmers plant trees on their land and retain ownership of the trees and their products. They receive training from TIST and a share of the carbon revenues from CAAC.

TIST empowers Small Groups of 6-to-12 subsistence farmers in India, Kenya, Tanzania, and Uganda to combat the devastating effects of deforestation, poverty and drought. Combining sustainable development with carbon sequestration, TIST already supports the reforestation and biodiversity efforts of over 64,000 subsistence farmers. Carbon credit sales generate participant income and provide project funding to address agricultural, HIV/AIDS, nutritional and fuel challenges. As TIST expands to more groups and more areas, it ensures more trees, more biodiversity, more climate change benefit and more income for more people.

Replication of TIST in India began in 2002, with tree planting beginning in 2003, and has grown to over 4,000 TIST participants in over 700 Small Groups. Because tree planting in the Project Areas subject to this PD did not begin until 2004, this PD starts January 1, 2004.

TIST provides an administrative backbone that supplies training in building nurseries, tree planting, conservation farming, building fuel-efficient stoves and malaria and HIV/AIDS prevention. Part of the backbone is a two-way communications network that includes newsletters, weekly meetings at the Small Group level, monthly meetings where groups of Small Groups receive training, periodic seminars at the national level and an award winning monitoring system based on hand-held computers and GPS. TIST is available to everyone and all are considered equal. The rotating leadership and the Small Group rules empower women and the undereducated. Those who are the most successful, regardless of education levels or gender, become mentors and leaders.

This project description is for a subset of the TIST India program and corresponds to TIST VCS project descriptions VCS-001. It applies to 452 Small Groups, 2,599 members, 924 project areas and 671.8 ha.

General Section

G1. Original Conditions in Project Area

G1.1 General Information: location of the project and basic physical parameters

TIST India is comprised of about 4,000 individual project areas that are owned or controlled by the individual TIST members. The individual project areas of this PD are located in villages in the five districts of Tamil Nadu State, namely Kancheepuram, Tiruvannamalai, Thiruvallur, Vellore and Villupuram. The locations of the district are shown in Figure G1.1.

Figure G1.1:General area of TIST project 1

Soils: The predominant soil in the Kancheepuram, Tiruvannamalai, Vellore and Villupuram Districts is red loam. In Kancheepuram District, black or "blackcotton" soil can be found throughout, lateritic soils on the plateaus and alluvial soil along the coast. In Thiruvallur, 63% of the soils are lateritic and 28% are red loam and black soils

Topography/Hydrology: The topography of Tamil Nadu generally consists of coastal plains in the east, becoming uplands and hills to the west.[1] The coastal plains, in which TIST India groves are located, make up over half of the land area of Tamil Nadu. The Palar River is the main watershed in the Kancheepuram and Vellore Districts. There are no perennial rivers in Tiruvannamalai. The Araniyar, Kusasthalaiyar, Adyar and Cooum are the major water sheds in Thiruvallur. The main river in Villupuram is the Varaganathi River.

Climate: The climate in southern India shows only slight seasonal variations. The climate of Tamil Nadu is essentially tropical with high humidity throughout the year and an annual mean temperature of about 29º C. The temperature in the height of summer (April and May) seldom exceeds 43º C and in winter (January and February) rarely falls below 18º C. Tamil Nadu receives

[1] http://moef.nic.in/soer/state/SoE%20report%20of%20Tamilnadu.pdf

an average annual rainfall of 960 mm, most of which comes during the rainy season (October-December). Frosts occur in the high hill regions of western Tamil Nadu, but have not been recorded in the plains where TIST sites are located. The region receives a flood slightly less often than once every ten years. Droughts also occur in the region about once every ten years. Tamil Nadu also plays host to the occasional cyclone, however none have occurred in the past 30 years in regions where TIST groves are located.

G1.2 General information: types and condition of vegetation within the project area

The project areas in all five districts are in the East Deccan dry-evergreen forests ecosystem. Due to the high level of human activity, primarily for agriculture, little of the general area that surrounds the project areas is in a natural state. The pre-project trees were counted and identified and are listed by project area in worksheet "Baseline Strata." [2] The rest of the ground cover was estimated as a percent of the total individual project area size. The stratification is present in worksheet "Grove Summary."

G1.3 General information: boundaries of the project area and the project zone

There are 924 individual project areas in the associated Voluntary Carbon Standard (VCS) PD and a total of over 1,400 TIST project areas currently in India. The boundaries of each have been surveyed using a GPS and are presented four ways.

1) Appendix 01 is a Landsat 4/5 image of India showing the location of each individual project area as a dot. This is to provide an overview of the project.
2) Appendix 02 is a Landsat 7 image of India showing the location of the individual project areas as dot. This is to provide an overview of the project.
3) Appendix 03 is a KML file that displays the name, location and perimeter of each project area on Google Earth.
4) Each project area (including perimeter and current tree strata) is displayed under its TIST Small Group name on tist.org, a publicly accessible website).

Because of the dispersion and wide geographical area of TIST project areas, the Project Zone is the area of southern India centered around Chennai.

G1.4 Climate Information: baseline carbon stocks

The baseline carbon stocks were estimated based on the approved Clean Development Mechanism methodology AR-AMS0001, Version 06: *Simplified baseline and monitoring methodologies for small-scale A/R CDM project activities implemented on grasslands or croplands with limited displacement of pre-project activities*. Table G.1.4 shows the strata selected for the baseline calculation, the hectares and percent of area of each stratum and the appropriate factors needed to determine the baseline carbon stocks.

[2] All worksheets are in Excel spreadsheet "TIST IN PD-CCB-001e App04 Data 130208.xls"

Table G1.4

			AG and BG Biomass t CO2e/ha		
Baseline Strata	**Hectare**	**Area**	**Non-woody**	**Trees**	**Total**
Cropland, annual crops	23.5	3.5%	18.3	0.9	19.2
Grassland as grassland	648.3	96.5%	16.0	0.9	16.8
Total	671.8	100.0%			

*AG = Above Ground, BG = Below Ground

Assumptions:

- Hectares of cropland are based on field estimates made for each individual project area as listed in worksheet "Grove Summary."
- Annual cropland non-woody stocks = 5 t C/ha above and below ground (IPCC 2006GL, Section 5.3.1.2) = 18.3 t CO2e/ha
- Tropical dry grassland non-woody stocks = 8.7 t d.m./ha above and below ground (IPCC 2006GL, Table 6.4) = 16.0 t CO2e/ha
- Woody biomass stocks represented by trees at a density of 2.2 stems per ha (1,499 trees over 671.8 ha). The numbers of baseline trees were determined by a physical count of each tree.[3]
- Average DBH of pre-existing trees = 20.2 cm from inventory of pre-existing trees.[4]
- Above ground tree biomass calculated applying equation for dry forest, where Kg dry mass = exp(-1.996+2.32*ln(DBH cm)).[5]
- Root:shoot ratio of 0.48.[6]
- Carbon fraction of dry biomass = 0.5

G1.5 Community information: description of communities in project zone

Tamil Nadu is the seventh most populous state in the India, with a population of 72 million people across 32 districts. The main language of the state is Tamil. Approximately 52 percent of the state's people live in the villages of rural areas.[7] Communities are diverse in nature, with the Vellalas community is mostly concentrated in the remote parts of the region, and Shanaars spread throughout the region.

The 2011 census counted 36,158,871 males and 35,980,087 females in Tamil Nadu, with the following counts in the five districts where TIST currently operates:

[3] Appendix 04, "Baseline Strata" worksheet.
[4] Ibid.
[5] Brown, S. 1997. "Estimating biomass and biomass change of tropical forests: a primer." FAO Forestry Paper 134, Rome, Italy. Section 3, "Methods for Estimating Biomass Density from Existing Data." Citing Brown et al. (1989). Accessed 22 September 2010 at http://www.fao.org/docrep/W4095E/W4095E00.htm. Also See AR-AMS0001, Appendix C
[6] GPG-LULUCF, Annex 3A.1 Biomass Default Tables for Section 3.2 Forest Land, Table 3A.1.8, Woodland/savannah
[7] http://www.census2011.co.in/census/state/tamil+nadu.html

District	Population[8]	Percent male	Percent female
Vellore	3,928,106	49.89%	50.11%
Thiruvallur	3,725,697	50.42%	49.58%
Tiruvannamalai	2,468,965	50.17%	49.83%
Kancheepuram	3,990,897	50.37%	49.63%
Villupuram	3,463,284	50.38%	49.62%

The literacy rate is 80.33% as per 2011 population census, with higher literacy for males than females, (86.81 versus 73.86 %), and lower literacy in rural areas (82.08% for males and 65.52 % for females).

Children aged 0-6 make up 9.56% of the population, and the 2011 census found the population growing at 15.60% over the past decade.

Agriculture is the major livelihood support for rural communities in Tamil Nadu as well as in the state. There is considerable income disparity between districts of Tamil Nadu, and between urban and rural areas, with higher unemployment and illiteracy in rural areas.[9] A group of districts in the eastern part of the state below Kanchipuram has lagged behind economically and socially, and these districts are associated with low industrial development, low agricultural productivity, and low human development[10].

Tamil Nadu, as much of India, exhibits high wealth disparity, particularly between urban and rural households. In 2004, the typical Indian household earned Rs 27,856, with median incomes of Rs. 22,400 for the average rural household and of Rs. 51,200 for the average urban household. In Tamil Nadu, average incomes were lower, with average incomes of Rs. 20,081 and Rs. 35,000, for rural and urban households respectively.[11] TIST members are subsistence farmers, among the rural poor. The table below is based on community data supplied by Village Administrative Officers of TIST Program Area (Tamil Nadu State Government Officers) and indicates that most TIST members make less than US$1.00 per day.

Annual Income Brackets				
Income Level (Rs)		Income Level US$		Pct of
Min	Max	Min	Min	Groups
1,000	12,000	$21	$250	41%
12,001	15,000	$251	$313	19%
15,001	20,000	$314	$417	13%
20,001	25,000	$418	$521	21%
25,001	and up	$522	and up	6%

[8] http://www.census2011.co.in/district.php
[9] http://www.tn.gov.in/spc/english/Ch_1.pdf
[10] http://mse.ac.in/pub/wp_shanmugam.pdf
[11] Human Development in India. http://ihds.umd.edu/IHDS_files/02HDinIndia.pdf

The predominant ethno-linguistic group in Tamil Nadu is Tamil, with 89% of the population native speakers. Other major groups include the Tellugu (5-6% of population), Kannada (1.7%), and Malayam (0.6%), while many other groups represented in lower numbers also contribute to the diversity in the region.[12] There are no indigenous people. The cited people are part of the national population.

G1.6 Community Information: current land use and property rights

The pre-project land use was agriculture. The current land use is tree planting and agriculture.

Land tenure is by registered deed to the individual members participating in TIST.

No land disputes have been identified. From initial monitoring, as part of the GhG contract agreement, and in annual monitoring, Small Group members attest their ownership and right to use the land where they plant trees. Additionally, TIST meetings and seminars are open to the public. At no time has any land dispute been identified.

G1.7 Biodiversity Information: current biodiversity within the project zone

The information regarding the biodiversity within the project zone at the time the project began was based on field observations and literature research.

Ecosystems: The project areas in all five districts are in the East Deccan dry-evergreen forests ecosystem,[13] a narrow strip of dry evergreen forest formation with Gondwanaland origins. The average rainfall is 800 mm. Due to the high level of human activity, primarily for agriculture, little of the general area that surrounds the project areas is in a natural state.

The original canopy-forming deciduous species, such as *Albizzia amara* and *Chloroxylon spp*., have succumbed to human pressures, so that existing vegetation type, when present, is low forest of mostly small leathery-leaved evergreen trees with short trunks and spreading crowns. The characteristic flora include *Manilkara hexandra, Mimusops elengi, Diospyros ebernum, Strychnos nux-vomica, Eugenia spp., Drypetes sepiaria, Flacourtia indica*, and thorny species such as *Zyzyphus glabarrima, Dicrostachys cinerea*, *Randia dumetorum*, and *Carissa spinarum*.

The ecoregion does not contain any endemic mammals or birds, but the sixty-six known mammal species include two threatened species: the wild dog (*Cuon alpinus*) and sloth bear (*Melursus ursinus*). Among birds of the region, Jerdon's courser (*Rhinoptilus bitorquatus*) is endangered, and the spot-billed pelican (*Pelecanus philippensis*) and lesser florican (*Eupodotis indica*) are globally threatened (IUCN 2000). Centuries of human impact have taken a heavy toll on the natural habitat of this region, and more than 95 percent of the area is deforested. The remaining forests are scattered small fragments.

[12] http://www.censusindia.gov.in/Census_Data_2001/Census_Data_Online/Language/Statement3.htm
[13] See TIST IN PD-VCS-Ex 39 WWF Ecoregion-East Deccan.pdf

Major threats in the area include deforestation for farming and grazing, invasion by Prosopsis, a thorny exotic plant, and poaching in the Satmala Hills, Pakla Wildlife Sanctuary, and Etunagaram.

G1.8 Biodiversity Information: High Conservation Values and attributes

Little biodiversity remains in the region because of hundreds of years of human pressure, but two small, protected areas cover about 200 km^2, about 1 percent of the ecoregion's area: Vettangudi and Nelapattu Marakanam, a sacred grove near Pondicherry, is fairly well protected and represents an important example of vegetation typical of the area and of High Conservation Value as a sacred grove. Within the region encompassing the TIST project sites, protected areas include two bird sanctuaries: the Pulicat Lake Bird Sanctuary, a saline backwater lake and wetlands that are home to flamingos and endemic species including gilled leech and an unidentified bloodred fish; and Vedanthankal Lake Bird Sanctuary, home to migratory birds including pintail, garganey, grey wagtail, blue-winged teal, and common sandpiper. The area also is home to the Vandalur Reserve Forest area, home to the Vandalur Zoo and restored forest planted with species typical of dry evergreen system, and to Guindy National Park, a small, 2.82 km^2 protected area of *Albizia amara* Boiv. community (dry tropical evergreen forest) within the city of Chennai.[14]

The project areas in all five districts are in the East Deccan dry-evergreen forests ecosystem. Due to the high level of human activity, primarily for agriculture, little of the general area that surrounds the project areas is in a natural state.

Rare and Endangered Species: TIST activities are in areas where there is a long history of human habitation and agriculture and consequently these lands have low biodiversity and the wildlife habitat is severely degraded. A list of threatened species that were potentially present in the project areas was compiled through review of the literature and discussion with local experts. Field observations by TIST staff, discussions with forest department officials and villagers indicate the absence of any endangered or rare species in the project areas.

The IUCN Red List of Threatened Reptiles and a list of Threatened Mammals of India was reviewed with the biologist of the Arignar Anna Zoological Park in Chennai for species that may be present in the districts where TIST project areas are located (A. Manimoshi, personal communication, 31 July 2008). A list of endangered plants in Tamil Nadu was also reviewed and to determine which might be present in the districts where TIST project areas are located.

The following list was developed from this review:

Table G1.8: IUCN Red List of Threatened Species

Scientific Name	Common Name	Status
Mammals and Reptiles		
Bos gaurus	Gaur	VU
Canis aureus	Jackal	VU
Panthera pardus	Leopard	TR

[14] http://www.forests.tn.nic.in/WildBiodiversity/wildbiodiversity_home.html

Table G1.8: IUCN Red List of Threatened Species		
Scientific Name	Common Name	Status
Melurus ursinus	Sloth bear	VU
Python molurus molurous	Indian Python	VU
Crocodylus palustris	Mugger (march crocodile)	VU
Birds found in the area		
Brachypteryx major	White-bellied Shortwing	VU
Schoenicola platyura	Broad-tailed Grassbird	VU
Mycteria leucocephala	Painted Stork	NT
Anthus nilghiriensis	Nilgiri Pipit	NT
Garrulax jerdoni	Grey-breasted Laughingthrush	NT
Pelecanus philippensis	Spot-billed Pelican	VU
Birds- maybe found in area		
Ficedula nigrorufa	Black-and-rufous Flycatcher	NT
Eumyias albicaudata	Nilgiri Flycatcher	NT
Birds previously found but may not be found now		
Ardeotis nigriceps	Great Indian Bustard	EN
Sypheotides indica	Lesser Florican	EN
Leptoptilos javanicus	Lesser Adjutant	VU
Haliaeetus leucoryphus	Pallas's Sea-eagle	VU
Aquila clanga	Greater Spotted Eagle	VU
Eurynorhynchus pygmeus	Spoon-billed Sandpiper	VU
Rynchops albicollis	Indian Skimmer	VU
Columba elphinstonii	Nilgiri Wood-pigeon	VU
Pycnonotus xantholaemus	Yellow-throated Bulbul	VU
Chaetornis striatus	Bristled Grass-warbler	VU
Anhinga melanogaster	Oriental Darter	NT
Ephippiorhynchus asiaticus	Black-necked Stork	NT
Phoenicopterus minor	Lesser Flamingo	NT
Ichthyophaga ichthyaetus	Grey-headed Fish-eagle	NT
Sarcogyps calvus	Red-headed Vulture	NT
Circus macrourus	Pallid Harrier	NT
Anthracoceros coronatus	Malabar Pied-hornbill	NT
Buceros bicornis	Great Hornbill	NT
Birds previously not found but may be found now		
Columba punicea	Pale-capped Pigeon	VU
Ficedula subrubra	Kashmir Flycatcher	VU
Parus nuchalis	White-naped Tit	VU
Amandava formosa	Green Avadavat	VU
Threskiornis melanocephalus	Black-headed Ibis	NT
Aythya nyroca	Ferruginous Duck	NT
Ichthyophaga humilis	Lesser Fish-eagle	NT

Table G1.8: IUCN Red List of Threatened Species		
Scientific Name	Common Name	Status
Aegypius monachus	Cinereous Vulture	NT
Sterna acuticauda	Black-bellied Tern	NT
Plants	NA	
Hildegardia populifolia	NA	CR
Indigofera barberi	NA	Not assessed
Lindsaea malabarica	NA	NT
Murdannia lanceolata	NA	VU
Neuracanthus neesiamus	NA	Not assessed

Notes:

EW = Extinct in wild
CR = Critical
EN = Endangered
VU = Vulnerable
CD = Conservation Dependent
NT = Near Threatened
DD = Data Deficient
N = Non-breeding visitor

G2. Baseline Projections

G2.1 Most likely scenario

The methodology requires justification that "the most likely baseline scenario of the small-scale A/R CDM project activity is considered to be the land-use prior to the implementation of the project activity, either grasslands or croplands."[15] The baseline field observation as detailed in the "Grove Summary" worksheet indicates the project areas are grassland and cropland prior to implementation of the project activity. That this is also the most likely use of the project areas, without the project activity, is supported by:

- The project areas are private lands owned by subsistence farmers conducting the project activity. They have a history of farming and use of the land, other than natural forest or long-term forestry.
- These lands are located in an area populated by subsistence farmers, who use wood for their primary fuel. As supported by the references below, wood use, agriculture and increasing population have been key factors in deforestation.
- These factors lead to the conclusion that there is little reason to believe that the project areas will revert to forest without intervention.
- There are no alternative uses of this land that can be reasonably expected.

[15] AR-AMS0001, Section II.5.

Literature Regarding Changes in Baseline Carbon Stocks. There is a clear pattern of rural firewood use and forest degradation in India and Tamil Nadu that supports the case that carbon stocks on each individual project area would be expected to decline or, at best, are increasing at a rate of less than 10% compared to the expected removal by sinks. The lands of and surrounding the project areas have been degrading for decades, due to human intervention.

Despite 20 years of programmatic efforts by the Indian and Tamil Nadu governments[16], forestry today is in an extremely precarious position in the TIST areas.

Overall, fuel wood accounts for about 60% of the total fuel consumption in rural India.[17] In estimating fuel wood consumption, the Forest Survey of India showed only 17 million tonnes to be available on a sustainable basis and 86 million tonnes were not.[18] Rural fuel wood consumption in Tamil Nadu was estimated at 172 kg/year.[19] With a rural population of about 33 million, it equates to a demand of 5.7 million tonnes per year. An unpublished report of the Commissioner of Statistics found that about 53% of the total fuel wood consumed in Tamil Nadu was freely collected and 13.3% came from "own land."[20]

These pressures have resulted in deforestation:

- The Forest department is custodian of 22,870 square kilometers of forest land, which constitute 17.584% of the geographic area, as against 33.33% required under National Forest Policy, 1988.[21]

- Nearly half of the forest area is subjected to heavy degradation on account of biotic pressure.[22]

- Heavy biotic pressure from abutting villages is the main cause of degradation of forests.[23]

- The forest wealth of the State is vulnerable to damage and destruction by elicit felling of trees, ganja cultivation, fire, encroachment and poachers of wildlife."[24]

- The areas where TIST operates are even more deforested. Most groups are in the Kancheepuram District, where only 9.7% of the land is classified as forest.[25] This

[16] See Exhibit 02.
[17] Devendra Pandey, "Fuelwood Studies in India, Myth and Reality," Center for International Forestry Research (2002): 37. See Exhibit 09.
[18] Ibid, 18
[19] Ibid, 47
[20] Ibid, 83
[21] See Exhibit 02.
[22] http://www.tn.gov.in/policynotes/archives/policy2005-06/environment_forest.htm, Sections 2.1, 2.4.2, and 2.4.6, Government of Tamil Nadu, Environment and Forests Department, Policy Note 2005 – 2006 Demand No. 14. See Exhibit 10.
[23] Ibid
[24] Ibid

extreme deforestation has an exacerbating impact on the water quality and quantity available to all residents in areas already noted for a water deficit and wastewater discharge into surface waters.

- The Tamil Nadu Forest Department has identified "degradation on account of biotic pressure" one of the pressures affecting the State.[26]

- According to the Environmental Profile of the Thiruvallur District, "land, soil, water, air, and the life support system like forests… are threatened by serious levels of degradation."[27]

The specific project areas are part of this environment. They are lands owned and used by the rural residents and are subject to constant pressure to provide fuel wood, food and livelihood for these subsistence-level farmers.

G2.2 Document how project benefits would not have occurred without project

Additionality of TIST is proven using the "Assessment of Additionality" contained in Appendix B of Clean Development Mechanism Methodology AR-AMS0001, which demonstrates that the project activity would not have occurred in the absence of the proposed project activity. The barriers selected were "investment barrier" and "barriers due to social conditions, lack of organization".

From the Project Participant's perspective, TIST has numerous investment barriers. TIST does not create or sell any products, other than GhG credits, associated with carbon sequestration. The trees and their products are owned by the Small Groups. Any revenue generated by the tree products belongs to the Small Groups. The TIST GhG "business" has been funded by Clean Air Action Corporation (CAAC), as an investor, based solely on future GhG revenues. There is no business, or business case, without carbon revenues. There is no payback or ROI, without carbon revenues. But for the expectation of a carbon market and the expectation of the sale of GhG credits from the project activity, CAAC would not have invested in TIST. Without carbon revenues, TIST is not viable or sustainable.

From the Small Groups or member's perspectives, there are barriers that have prevented reforestation of these lands:

Investment barrier. Tree plantations require investment to obtain seedlings and, in the case of TIST farmers, to take land out of current revenue production activities, such as cropland, for long-term gain. Investment requires access to credit. However, due to their low income, the farmers participating in TIST have little opportunity for investment loans or capital. Banks tend to be

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[25] Kanchipuram District Profile, http://www.kanchi.nic.in/district_profile_pro.html, downloaded 24 October, 2012. See Exhibit 11.

[26] http://www.environment.tn.nic.in/soe/images/ForestandWildlife.pdf, State of the Environment Report 2005, Government of Tamil Nadu, Department of the Environment, downloaded 8 April, 2008, page 25. See Exhibit 12.

[27] http://www.tnenvis.nic.in/DtProfiles/thiruvallur.pdf, Environmental Profile of Thiruvallur District, Government of Tamil Nadu, Department of the Environment, 8 April, 2008. See Exhibit 13.

reluctant to lend to those living at the subsistence level, because they have few assets for collateral and little disposable income available for debt service. According to The International Fund for Agricultural Development (IFAD), "more than one billion people – 90 percent of the world's self-employed poor – lack access to basic financial services, depriving them of the means to improve their incomes, secure their existence, and cope with emergencies."[28]

At a more local level, World Bank recognized the lack of credit available to the poor when they set up the Tamil Nadu Empowerment and Poverty Reduction program.[29] While the program has made credit available to approximately 3 million impoverished women, there are another 9 million people in the State that live on less than US$1.00 per day that have no access to credit.
TIST members are the people described above. They are subsistence farmers with little access to the credit required for a plantation. Table G2.2.A is based on community data supplied by Village Administrative Officers of TIST Program Area (Tamil Nadu State Government Officers) and indicates that most TIST members make less than US$1.00 per day.

Table G2.2.A. Annual Income Brackets

Income Level (Rs)		Income Level US$		Pct of
Min	Max	Min	Min	Groups
1,000	12,000	$21	$250	41%
12,001	15,000	$251	$313	19%
15,001	20,000	$314	$417	13%
20,001	25,000	$418	$521	21%
25,001	and up	$522	and up	6%

While the trees can have a long-term financial benefit without the carbon component, day-to-day household expenses prevent these farmers from spending their minuscule income on reforestation projects. For example, seedlings cost Rs 0.20 to Rs 5.50 per seedling. Since each farmer is expected to plant a minimum of 500 trees, the total up front cost is Rs 100 to Rs 2,750 per farmer which can easily exceed 10% of their annual income.[30] To compound the situation, the marginal and small farmers that make up the TIST members typically make less money than they earn[31] leaving no "additional" income for investment.

The following table provides an example of the initial costs, to the farmers, to start a plantation. Without TIST, the farmer must buy the seedlings and incur labor costs. Without TIST, an investment is required, but there is no credit available to fund it. TIST overcomes the investment barrier two ways. First, it provides training that reduces the capital required to develop a tree

[28] Accessed 22 September 2010 at http://www.ifad.org/media/press/2004/38.htm.
[29] The World Bank, Project Appraisal Document on a Proposed Credit In the Amount of SDR 7.49 Million to the Republic of India, for the Tamil Nadu Empowerment and Poverty Reduction "Puthu Vazhvu" Project, June 7, 2005, pages 1 and 2. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2005/06/23/000090341_20050623101639/Rendered/PDF/31806a.pdf. See Exhibit 15.
[30] Additional information about the cost of tree planting to the members is provided in an attached spreadsheet, "TIST IN PDD-CDM-01 Data 090531.xls, Plantation Cost."
[31] "A Special Program For Marginal and Small Farmers", National Commission for Enterprises in the Unorganised Sector, New Delhi 2008, Table A8. See Exhibit 16.

plantation. The training teaches TIST members how to obtain seeds and build nurseries at zero cost, thereby, reducing the need for credit. Second, under the terms of the Project Participant's contracts with the TIST Small Groups, the farmers receive an annual advance on their potential carbon revenues, which eliminates the need for credit.[32] These payments are paid at least annually based on the number of live trees counted each year. The payments are $0.033, per tree, per year, and are initially of greater value than the value of the carbon. Ultimately, the Small Groups will receive 70% of the net carbon revenues.

Table G2.2.B Start-up Cost Comparison: One ha Plantation[33]

	Without TIST	With TIST
Live Trees	500	500
Income	$ -	$ 17
Cost of a 500 Tree Plantation		
Seedlings	$ 30	$ -
Labor	$ 29	$ -
Total Yearly Cost	$	$
Income/(Loss)	$ (59)	$ 17

While financial projections can vary significantly based on cost and revenue assumptions, advanced payment made to TIST farmers will exceed the net value of the carbon for the first 10 years of the project. In other words, TIST uses advanced payments farmers that are based on the expectation of carbon revenues to overcome their inability to get credit.

Barriers due to social conditions, lack of organization. Planting large plantations requires more than a single individual. The local communities lack the organizational structure to put together a volunteer effort to plant trees. This statement is supported by the fact that both India and Tamil Nadu have had a National Policy in effect since 1988 to address the problem of deforestation but are still seeing annual losses in forest cover. (see Section 2.4). TIST and the Small Group approach provide the organizational structure necessary to overcome this barrier. TIST provides the training and the member's Small Group provides the necessary manpower and support.

Laws and regulations requiring tree planting. The trees are planted on private lands and there are no laws or regulations that require the TIST farmers to plant them.

Common Practice. There are cases in the area where farmers have planted fast rotation trees without the carbon incentive. These farmers have no incentive to maintain the trees; indeed, their incentive is to harvest them as soon as possible to get the revenue. In contrast, TIST is using the annual tree payment to encourage and promote long-term, managed tree stands. The TIST GhG Agreement requires the members to "plant a minimum of 1,000 trees and raise them to maturity", "replant trees that die, for any reason, each year for the next" 20;[34] and to "not cut down trees, except when implementing best practices for agroforestry developed by TIST." This is only possible because of the potential carbon revenues.

[32] See Exhibits 03.
[33] See Appendix 04, "Plantation Costs" worksheet for assumptions and references.
[34] The contract in Exhibit 03 is for 50 years.

Conclusion. The extension activities implemented by TIST that allow the project participants to overcome these barriers, and the incentive payments TIST provides that support their decision to participate, are entirely dependent on the carbon market. These kinds of activities are not possible, without external financing of some kind. TIST's operational budget for the project is funded through an investment from CAAC, which is contingent on returns of future GhG revenues. Without carbon revenues, on which its funding solely depends, the TIST project is neither viable, nor sustainable.

G2.3 Calculate carbon stock changes without project

The methodology used to calculate the changes in carbon stock is based on CDM small scale afforestation reforestation methodology AR-AMS0001 Version 06: *Simplified baseline and monitoring methodologies for small-scale A/R CDM project activities implemented on grasslands or croplands with limited displacement of pre-project activities.* As described in section G2.1, the most likely scenario for the project lands is to continue as agricultural land, subject to ongoing intervention through human habitation. As described in Section G2.2 (Forest Policies), the project zone is undergoing a decrease in forest cover and therefore carbon stocks.

The conservative case for the change in baseline carbon stocks, without the project, is that the biomass and carbon in the cropland and grassland remain constant, and that the baseline trees continue to grow, unmolested and unaffected by actuarial mortality. Making reference to the worksheet "Baseline Strata," the baseline tree count is obtained and the mean diameter is calculated. Dividing the baseline tree count, by the total project area, yields a baseline tree density for the project. When the average diameter of the baseline trees are grown at 0.5 cm per year and the biomass is calculated using the proper allometric equation, the tonnes of CO_2 per hectare can be calculated (see Baseline Tree worksheet). When calculated for the entire project, the conservative change in carbon stocks without the project is estimated to be 1,481.1 tons (see worksheet "Baseline Growth").

There are no non-CO_2 emissions. The project does not use chemical fertilizers and the project does not own any vehicles or power equipment.

G2.4 Effect on communities without project

Without the project, thousands of subsistence farmers in the project zone would not be participating in the sustainable development, reforestation and health training of TIST. The communities would not receive the added income that has been paid to the TIST farmers as a carbon stipend and they would not receive the 70% of the project profits, once the carbon sequestered in the trees is enough to sustain the project. This added income would not be available to help pay for primary education uniforms, secondary education, metal roofs and other necessities. The farmers would not have planted the over two million trees already documented by the project. They would not have built nurseries and grown millions of seedlings. They would not have begun to grow their own sustainable on-farm fuel supplies. They would not have started using FAO conservation farming practices, which have been documented to increase crop yields two to ten times. They would not have received training in using more fuel-efficient cooking

stoves, or received training on the effects of indoor cooking smoke. They would not have received training on HIV/AIDS, malaria, hygiene, clean drinking water and nutrition. They would not have had the opportunity for developing leadership skills and become Small Groups leaders regardless of gender, religion, education or general background.

Likely changes in water, soil and other locally important ecosystems, without the project, are a continued decline. Illegal harvesting of wood and charcoal in protected areas continues, supported directly or indirectly by the people who live in the project zone, because of their need for cooking fuel. The cutting of these trees leads to loss of soil stability and erosion. It also leads to a loss of water retention. The result is higher sediment load in the critical water supplies, loss of soil, due to erosion and decrease in year-round water, as run-off increases with each rainfall and less water is absorbed in the soil. Continued deforestation leads to loss of habitat and biodiversity. The project addresses each of these and helps reverse or mitigate them.

G2.5 Effect on biodiversity without project

Biodiversity in India has been declining for decades. Despite 20 years of programmatic efforts by the Indian and Tamil Nadu governments, forestry today is in an extremely precarious position in the TIST areas (see G2.2). The increasing population continues to put more pressure on existing biodiversity, the project zone and what little is left in the project areas. Without TIST, there would be 658,377 fewer trees on sustainable woodlots that reduce the pressure on protected high biodiversity areas. There would be fewer indigenous trees. Although the threatened species in the project zone are long gone from the project areas, the indigenous trees and additional forest cover will have a positive effect on them, by improving connectivity and corridors among the protected areas.

G3. Project Design and Goals

G3.1 Summary of climate, community and biodiversity objectives

The objectives of TIST are to:

- increase biomass and carbon sequestered in project areas,
- provide a sustainable fuel wood supply for the members,
- provide a new source of revenue to the members from the sale of carbon credits,
- provide training in important social and health related subjects, and
- improve the biodiversity of the area by adding canopy and indigenous trees.

G3.2 Description of project activities

The project activities are:

- **Nursery training and development.** Farmers are trained on species selections and their benefits, on how to gather and prepare seeds, how to build and maintain nurseries. Special attention is called to the benefits of indigenous trees and trees that provide food and other

regularly available products. This is to help reduce the cost of entry to farmers. Where nurseries are highly successful, farmers can sell their excess for additional revenue. This is the first step in tree planting for climate change and revenue enhancement.

- **Tree planting.** Farmers are trained to plant seedlings using the FAO conservation farming techniques. The trees will sequester carbon as they grow and address climate change. Increased canopy, new woodlots and new indigenous trees help biodiversity. The carbon revenues and tree stipends paid to the members provide a new source of revenue.
- **Selective use of tree products.** The farmers own the trees and their products, such as nuts and fruits. They are permitted to use any deadwood. Use of trimming and thinning is permitted, as long as it is sustainable. All of these enhance income and some improve food security.
- **Provide training social and health training.** TIST conducts training seminars, trains directly in the field, and at Small Group meetings. They also use a newsletter for training and disseminating best practices. Besides subjects related to tree planting, training includes improved farming practices, malaria, HIV/AIDS, water quality, benefits of trees, erosion control, water quality, leadership skills, climate change and any other subject of interest to the members.

G3.3 Maps of project location and zone

The thousands of individual project areas are presented as follows:

- Appendix 01. This is a Landsat 4/5 image of the project zone, with dots depicting the location of each discrete project area.
- Appendix 02. This is a Landsat 7 image of the project zone, with dots depicting the location of each discrete project area.
- Appendix 03. This is a KML file for use in Google Earth that has the GPS track of each project area. Although the native format is for Google Earth, it is a GIS file that can be imported into other GIS programs.

G3.4 Project Lifetime

The starting date of the proposed small-scale A/R CDM activity and the crediting period begins 1 January, 2004. The project is scheduled to last 30 years but may be extended if the carbon market is vibrant enough to support it.

Justification: TIST, as a project, began with training, in late 1999, and tree planting, per se, began in Tanzania in 2000. The project began in India in 2002. Tree planting for this PD began in 2004.

Justification: TIST maintains a database record of each project area showing when it was first quantified by a TIST staff member and how old the trees were. These records appear at www.tist.org under “Project Areas” and under each region, group center, and Small Group where audits have taken place. The data collected by TIST indicates that the first trees planted by Small Groups, in project areas subject to this PD, were planted in 2004. See "Grove Summary" and "Strata" worksheets for age of trees.

Implementation Schedule:

2002 Initial field visit, consultation with local stakeholders, hold initial seminars, registration of initial Small Group members, deploy monitoring system, hire local staff, hire and train Quantifiers, begin training trainers.

2004-2011 Planting of first trees. Project expansion focused on adding new groups, members and trees. Continue with regular monitoring and training. Hold regular seminars. Ongoing and regular consultation with stakeholders.

2012 VCS and CCB validation and first verification.

2013-2035 Periodic verifications to be held in accordance with the minimums required by the CCB and VCS standards. Project expansion focused on adding new groups, members and trees. Continue with regular monitoring and training. Hold regular seminars. Ongoing and regular consultation with stakeholders.

The following Gantt charts show the timing of annual events for the project. The numbers along the top of each chart are years. Where "project" is indicated in the title, it is for the 30-year project life. Where "project area" is indicated, it is for events that might take place within a project area and the year one may be an event, rather than the beginning project date. With all the different project areas, species, farmers and planting schedules, these charts are very general and subject to change.

Main planting schedule (project). Main planting has taken place, but additional planting may take place in individual project areas, over the next few years, where the original planting density is low.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Replacement planting schedule (project). As trees die, farmers are to replant for 20 years. Replanting can start as soon as the second year. Replanting is shown for 25 years because of the staggered start of individual project areas.

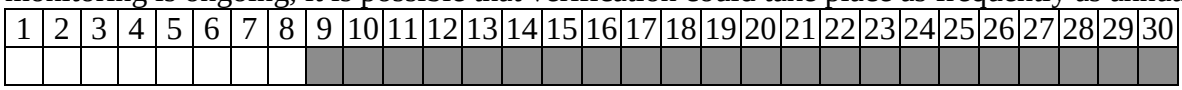
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Monitoring (project). Monitoring is ongoing. The internal goal is to quantify each grove annually. Whether that is achieved or not, the Quantifiers are out in the field, all the time, visiting the multitude of project areas.

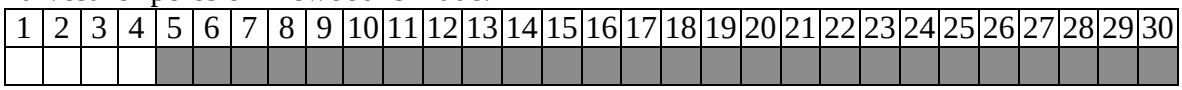
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Validation and verification (project). Validation takes place around year six, when project areas have been established and trees are already in the ground and growing. It is expected that the

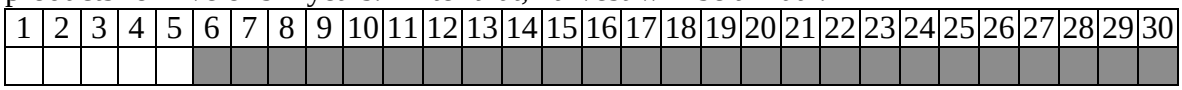
initial verification will take place at the same time. While it is a cost trade off, because the monitoring is ongoing, it is possible that verification could take place as frequently as annually.



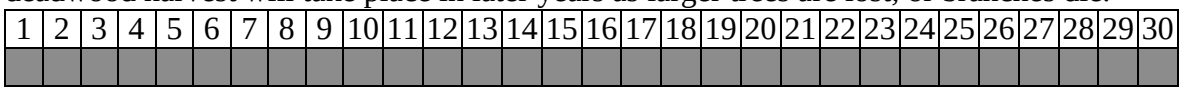
Thinning (project area). Thinning is allowed, because it improves tree growth. Because of the different species and their different growth rates, the different planting schedules, the different original spacing and different farmers, thinning can begin in as early as four years, where an early harvest for poles or firewood is made.



Fruit and nut harvest (project area). Most of the trees won't bear any fruits, nuts or other products for five or six years. After that, harvest will be annual.



Deadwood harvest (project areas). Farmers may harvest deadwood any time it exists. For those that lose trees in the first year, it will come in year one. However, it is expected that most deadwood harvest will take place in later years as larger trees are lost, or branches die.



G3.5 Natural and human-induced risks

The long-term sustainability of TIST is dependent upon a carbon market for afforestation/reforestation credits. As of the date of this PD, the market for CDM-based AR credits is essentially nonexistent. AR credits have been locked out of the largest trading system (i.e. the EUETS) and buyers have no practical use for the currency (i.e. tCERs). The market for VCS credits exists but, by definition, is dependent upon the entities buying credits to voluntarily offset their carbon emissions. An expected US market may or may not materialize and, if it does, may or may not allow AR credits from outside the Americas.

TIST is different than most AR projects, in that it was created for small-scale subsistence farmers. Because of the rules of CDM, many of the farmers in this PD have project areas too small to meet the Host Country definition of a forest. Should VCS, or a possible US program, put the same limitation on size, many of the farmers in TIST will no longer be eligible to participate in the carbon market and will lose the financial incentive to participate in the program. TIST has mitigated this risk by achieving what it has, at the lowest costs possible. Rather than using expensive Western experts, it has deployed a sophisticated, yet easy to use, monitoring system and relies on capacity building with the Small Group members and their desire to improve their lives.

Another risk is that farmers will drop out of the program. This is mitigated by the fact that there are thousands of individuals involved already and TIST continues to grow. Having a few farmers quit will not have a significant effect on the project.

Natural risks include drought, pestilence and fire. These, however, are mitigated by the fact there are thousands of individual project areas spread over thousands of square kilometers. We provide training on minimizing risks from fires in newsletter and in training broadcasts on area radio programming.

G3.6 Maintenance of the high conservation value attributes

Ongoing deforestation in India is a fact. The project areas have been settled for generations and little natural biodiversity exists. The continued need for wood and the expanding population has carried the deforestation into the protected forest, having a negative effect on biodiversity there, too. TIST is reversing this trend by planting millions of new trees, many of them indigenous. While some parties have raised barriers to prevent AR credits from participating in a global carbon market, TIST has recognized that nearly 20% of deforestation is a result of the need for wood for cooking and heating. This type of program is the only way to provide the resources needed by this vast population of subsistence farmers, as well as make a positive impact on biodiversity.

TIST trees are planted on the lands of small hold farmers, so the maintenance of HCV areas in the region, described in section G.1.8, is indirect. The proximity of the Project Areas to the natural forests will reduce illegal wood harvesting. The addition of indigenous trees, tree cover and fruit trees enhance biodiversity by providing an expanded range for some of the animals that rely on the HCV area. TIST trees are being planted where deforestation has taken place and the addition of many discrete project areas helps improve the wild life corridors between HCV areas needed for healthy animal populations.

G3.7 Measures to maintain benefits beyond the project lifetime

TIST is a comprehensive program that includes training in climate change and biodiversity. The following describes some of the training and their benefits.

- Training in the benefits of specific tree species will result in more trees selected that have a value other than as harvested wood or for carbon revenue. Example: mango trees for their fruits.
- Training in the maintenance of a sustainable woodlot. Wood and charcoal are some of the greatest expenses for subsistence farmers. Learning the value and convenience of a sustainable woodlot will ensure that it is maintained beyond the life of the project.
- Training in the benefits of biodiversity will help the farmers make the choice to keep trees, rather than cut them down. The benefits include more productive soil, return of edible indigenous plants, enhanced area ecotourism, and return of native wildlife that is useful to them personally (e.g. bees).

G3.8 Communities and other stakeholders

Membership in TIST is completely voluntarily. The actions that members take are on their own land. They maintain ownership of the land, the trees planted for sequestration and all the products that the trees yield. TIST exists for the local farmers and only grows if the local farmers support

it. The rapid growth of TIST is a reflection of the positive reaction that the farmers and other stakeholders have had about TIST.

When TIST begins in an area, they contact community leaders, village heads/village leaders, local NGOs and local government officials to determine if there is an interest in the program. If there is an interest, TIST holds a public seminar to present the program, answer questions, address concerns and receive comments. Regular and on-going meetings the public is invited to attend follow this. TIST representatives have met with numerous State, District and Village officials seeking comments and showing them the project. Since TIST is organic in its growth, this process continues as it expands to new villages. In addition to the meetings, information about TIST is disseminated by word of mouth; using "Chezhimai," a bilingual (Tamil and English) newsletter published by TIST India and direct contact with community leaders and government officials.

The original TIST program was started in Tanzania, in late 1999, to meet local needs in a sustainable way, while at the same time addressing climate change. On 31 May, 2002, India became the second country to introduce TIST. On 22 June and 23 June of that year, a seminar was conducted in Vedal where local citizens were invited to learn about TIST, ask questions and make comments. Those interested in joining TIST were invited to join. The seminar was documented in the January 2003 "Chezhimai" newsletter.

As a result of the initial expression of interest and support from the community and farmers, TIST reached out through word of mouth and direct contact to two more villages, Jambodai and Andiseruvallur. As also documented in the January 2003 "Chezhimai," this resulted in favourable comments from villagers, agricultural officers, the postmaster of Vedal, Panchayat Head of Vedal and other private citizens.

Since January 2003, TIST India has published 54 newsletters that document an ongoing dialogue and support with members of the community, both inside and outside the program. These documents are available to the public in a transparent form on the internet at tist.org.

At the Small Group level, member farmers meet with TIST representatives regularly where they have an opportunity to ask more questions and make more comments. Since one of TIST's main focuses is adopting best practices, these are forums to review what is working about the program and how it can be improved. Changes to the program are announced in the "Chezhimai."

The result of this stakeholder process has led to numerous invitations for TIST to come to new villages and numerous positive comments about TIST. The following section will summarise written comments.

TIST has not received any negative comments.

Stakeholder comments have been received from:

1. Numerous Small Groups participants.

2. Eight members of the Tamil Nadu Forest Department including the Principle Chief Conservator, Conservator (Vellore District) & Deputy Conservator (Tiruvannamalai District) and the District Forest Officer of Thiruvallur.
3. Nineteen Village Administrative Officers from villages in Kancheepuram, Tiruvannamalai, and Thiruvallur.
4. Forty-six Village Panchayat Heads (village council).
5. Eighteen Women's organisations.
6. Two Men's Groups.
7. Six other organizations.

Specifically, letters from the following people have been received and are available from TIST:

Letter issued by	Panchayat / Village	District
Village Panchayat Head	Semboondy	Kanchipuram
Village Panchayat Head	L Endathur	Kanchipuram
Village Panchayat Head	Achirapakkam	Kanchipuram
Village Panchayat Head	Kadambur	Kanchipuram
Village Panchayat Head	Keeranallur	Kanchipuram
Councilor	Pallipattu	Thiruvallur
Village Panchayat Head	Samanthavada	Thiruvallur
Village Panchayat Head	Nedungal	Thiruvallur
Village Panchayat Head	Pettai Kandigai	Thiruvallur
Village Panchayat Head	Placepalayam	Thiruvallur
Village Panchayat Head	Timmabubalapuram	Thiruvallur
Village Panchayat Head	Poondi	Thiruvallur
Village Panchayat Head	Katchur	Thiruvallur
Village Panchayat Head	Ambakkam	Thiruvallur
Village Panchayat Head	Gunipalayam	Thiruvallur
Village Panchayat Head	Allikuzhi	Thiruvallur
Village Panchayat Head	Perunchery	Thiruvallur
Village Panchayat Head	Vellathukottai	Thiruvallur
Village Panchayat Head	Keelnarma	Tiruvannamallai
Village Panchayat Head	Narmapallam	Tiruvannamallai
Village Panchayat Head	Sengaadu	Tiruvannamallai
Village Panchayat Head	Ilangadu	Tiruvannamallai
Village Panchayat Head	Pazhanchur	Tiruvannamallai
Village Panchayat Head	Esakolathur	Tiruvannamallai
Village Panchayat Head	Kolipuliyur	Tiruvannamallai
Village Panchayat Head	Mangalam	Tiruvannamallai
Village Panchayat Head	Thurinjapuram	Tiruvannamallai
Village Panchayat Head	Velungnanthal	Tiruvannamallai
Village Panchayat Head	Kadambai	Tiruvannamallai
Village Panchayat Head	Karippur	Tiruvannamallai

Village Panchayat Head	Ragunathasamuthiram	Tiruvannamallai
Village Panchayat Head	Nadukuppam	Tiruvannamallai
Village Panchayat Head	Mel Kodungalur	Tiruvannamallai
Village Panchayat Head	Ulundhai	Tiruvannamallai
Village Panchayat Head	Marudadu	Tiruvannamallai
Village Panchayat Head	Badhur	Tiruvannamallai
Village Panchayat Head	Punnai	Tiruvannamallai
Village Panchayat Head	Kallankuthu	Tiruvannamallai
Village Panchayat Head	Vazhur	Tiruvannamallai
Village Panchayat Head	Kil Kodungalur	Tiruvannamallai
Village Panchayat Head	Irumbedu	Tiruvannamallai
Village Panchayat Head	Ariyathur	Tiruvannamallai
Village Panchayat Head	Vizhudhupattu	Tiruvannamallai
Village Panchayat Head	Koyilkuppam	Tiruvannamallai

Invitation letter from the Principal Chief Conservator of Forests, Tamilnadu
District Forest Officer, Thiruvallur, Thiruvallur District
Forester, Allikuli, Thiruvallur District
Forest Range Officer, Thiruvallur Range, Thiruvallur District
Forest Range Officer, Forest Station, Thiruvallur District
Forest Range Officer, TAP Range, Thiruvallur District

Letter issued by	**Organisation**
Head Placepalayam Village	Roja Womens Organization
President	Inner Wheel Club of Adyar (Rotary Club)
Branch Manager	Indian Overseas Bank, L Endathur

Summary Forest Department Comments

- TIST has wide knowledge and experience in the area of tree planting. This will help the objectives of Tamil Nadu Forest Department outside the state forests.
- TIST members have planted species like Mango, Jack, Teak, Lemon, Cashew, Red sanders, Rose Wood, Teak, etc. in their own land dry lands. These trees are maintained well.
- TIST is forming Small Groups and enabling them to generate additional revenue.
- TIST program is useful for the environment.
- We participated in TIST meetings and explained Forest Department tree planting plans to TIST members.
- TIST India is helping Tamilnadu Forest Department in "Tree Culture (Cultivation) in Private Land" project
- We wish all the best for TIST program and would like this program to spread all over Tamil Nadu – congratulations.

Summary of Village Administrative Officers Comments

- TIST has formed several Small Groups in our village area.
- TIST is encouraging the villagers (TIST members) to plant trees in those lands where agricultural activities are not possible due to less rain fall/no water.
- TIST program is healing the ecology.
- Our village is looking good because of TIST.
- Our area villagers have a lot of wastelands. We feel that if tree-planting activities are carried out in these wastelands, it will be very useful for the villagers. Since these villagers are very poor, the revenue from TIST tree planting activity would be helpful.
- The socio-economic situation of the region will improve due to TIST program.
- We hope that this program grows more and more.
- Villagers are getting good revenue in this program.
- This program helps in sustainable development.
- We request that the Indian Government help TIST to spread and grow.

Summary on Village Panchayat Head Comments

- TIST has formed several Small Groups in our village area.
- TIST is encouraging the villagers (TIST members) to plant trees in those lands where agricultural activities are not possible due to less rainfall.
- Due to TIST program, our village is turning green.
- This program will reduce global warming.
- TIST helps achieve local forestry goals.
- TIST is making payments to the Small Groups for their trees.
- Poor and rich are treated equally in this program.
- Our blessing and thanks to their encouraging tree planting activity.

Summary on TIST Small Groups Comments

- We have joined TIST as Small Groups and are planting trees in the program.
- Our land was kept idle for more than 10 years. Now after joining TIST, we see vegetation in our land.
- We are planting trees in our own land where we are not able to do agriculture due to less rain fall / no water.
- We are following the best practices of TIST. We have planted trees like, teak, eucalyptus, mango, and guava.
- We are improving our environment in this program.
- TIST is helping to improve the socio-economic situation in our area.
- We are getting income from trees and our economy is growing.
- We have planted long-standing trees; moreover, TIST will be with us for decades.
- TIST pays regular incentive once in three months, which is beneficial to us.
- Government should give necessary approval to TIST to expand more.
- Poor people have and will benefit from TIST.

Other Stakeholders Comments

- Several hundred families have voluntarily joined in TIST program.
- We see a large number of enthusiastic, well-informed women members in TIST program who were being encouraged.
- The members are maintaining the trees well.
- TIST program is very useful to the small farmers and villagers.
- We have distributed free seedlings to TIST members. We will contribute more in the coming years.

Women's Association / Women Self Help Group Comments

- By planting trees, the farmer's socio-economic situation is improving.
- The trees are helping the environment. More trees should be planted in all barren lands.
- Women and men work together in this tree planting activity.
- We believe this will help improve personal financial needs.
- TIST provides financial, agricultural and social benefits.
- If we get free seedlings, it will be of great help for small villagers.
- We receive voucher payments from TIST program.
- Mango, Team, Gooseberry trees have been planted by TIST members.
- We have participated in several TIST node meetings. This program is of great help to villagers.

Non Governmental Organization Comments

- Villagers who are not able to do agriculture due to low rainfall are organised in Small Groups and are encouraged to participate in tree planting activities.
- Groups have planted longstanding trees like, mango, jack, teak, sandalwood, team, and guava in this program.
- TIST is making stipend payment for the trees every three months and encouraging the groups.
- Members of our women's self help group joined in TIST program and benefited.
- Our agriculture experts are helping by giving good ideas for TIST program.
- TIST is taking good suggestions and advice from other social service organisation.
- We wish the TIST program would spread throughout Tamil Nadu

Some examples of specific comments are:

- The President of Vedal Panchayat, V. S. Sagalagunam, wrote an article for TIST's Chezhumai newsletter sent to Small Groups. The article entitled "Your Panchayat Head Supports TIST" included the following:[35]

[35] http://www.tist.org/moreinfo.php, p. 1, Chezhumai newsletter - February 2003 Issue, Documents to Download, "9. Newsletters Published in India," TIST India.

"For growing and maintaining these trees, TIST provides incentives to the members of the Small Groups. I strongly encourage the public of Vedal Panchayat to avail from this wonderful opportunity of cultivating these trees to beautify our area and also obtain the incentives provided by TIST for your economic benefit. As your Panchayat leader, I humbly request everyone to join and support the TIST program in our area…"

- Support from Mr. Narayanan, Postmaster of the Vedal Post Office, was also carried in the same issue:[36]

  "This program is helping the people who live below the poverty line by providing Small Groups that plant and maintain trees with cash incentives. Small Groups are also opening savings accounts in our post office through which they will receive payments for their plantings from TIST. I encourage all Small Groups to approach me at the post office to open their savings accounts…"

- The Assistant Agricultural officer, Elumalai Arumugam, also provided information and encouragement to the TIST Small Group program members:[37]

  "TIST brings to our deforested and drought prone area an opportunity and potential to bring about tremendous benefits and development through reforestation, conservation farming, community education, new technology and most importantly bringing people together by working in Small Groups for a common goal. I request you all to join and support TIST and plant lots of trees to improve our land cover and bring rains back to this once fertile and prosperous part of Tamil Nadu."

- The Deputy Conservator of Forest, Tiruvannamalai District has mentioned through TIST Chezhumai July 2008 that "The Major activity of TIST India is same as Forest Department, to increase the green cover and to benefit the villagers with additional revenue, and ultimately increase the carbon sequestering:[38]

Written comments are maintained by TIST India and are available for review.

There have been no negative comments received suggesting that TIST should not exist. Based on the comments and responses above, no changes are necessary for the project.

G3.9 Publicizing the CCBA public comment period

Public comments for CCBA were solicited two ways. A public hearing was held in Tiruvannamalai District, Tamil Nadu, India. Second, a series of emails were sent to stakeholders.

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[36] Ibid., p. 3.
[37] http://www.tist.org/moreinfo.php, p. 4, Chezhumai newsletter – September 2003 Issue, Documents to Download, "9. Newsletters Published in India," TIST India.
[38] http://www.tist.org/moreinfo.php, p. 4, Chezhumai newsletter – September 2003 Issue, Documents to Download, "9. Newsletters Published in India," TIST India.

Public Meeting

The Public Meeting was held between 11:00 AM and 12:00 AM on 28 December, 2012 at the Sri Lakshmi Balaji Marriage Hall, No 2/1, Bharathiyar Street, Pazhampettai, Chetpet, Polur Taluk, Tiruvannamalai District, Tamil Nadu 606801. Notice was given in a leading Tamil Nadu papers as follows:

- Dinakaran Daily News Papers in Chennai, Tiruvallur, Vellore, Tiruvannamalai, Villupuram, Kanchipiuram on 27th December 2012.

An email announcement was sent to 28 stakeholders on 4 January 2013.

Specifics regarding the announcements, public meeting, emails and email recipients are in support document "TIST IN PD-VCS-Ex 29a Public Comments CCB-001.doc." There were no negative comments.

G3.10 Handling unresolved conflicts and grievances

TIST has already gone through this process and there have been no grievances, or conflicts. This is because the program is voluntary, participants use their own land and it is considered environmentally and socially beneficial.

All grievances are first brought to the attention of the India Staff, where the issues are compared to standard TIST policy, TIST values[39] and/or the Greenhouse Gas agreement among the Small Group members and CAAC. The policies and values are the subject of training at seminars, in the field and are published in the newsletter. Unresolved issues are presented to TIST Management. Where precedence or policy exists, they are used in final decision-making. Where new issues arise that are outside the existing precedence, or policy, decisions are made by India Staff and TIST Management. If these cannot be resolved within TIST, a qualified mediator, such as Mr. Sriram Panchu of the Indian Centre for Mediation and Dispute Resolution[40], will serve as a third-party mediator.

G3.11 Project Financial Support

TIST began, in late 1999, on the expectation that once the trees were large enough, the project would be self-funding. A series of financial projections were developed that showed that after six to ten years (depending on different financial cases regarding market price, growth rate, tree mortality, etc.) the project would be sustainable based solely on carbon revenues. The key to success was very low costs. TIST has designed the program to minimize cost, developing an award winning monitoring system, building Host Country capacity and relying on voluntary effort. Still, there is a cash shortfall in the early years of the project. This is made up by external sources. CAAC has provided funding to make up this shortfall on the carbon side, through its own

[39] TIST Values: We are Honest. We are Accurate. We are Mutually Accountable. We are Transparent. We are Servants to each other.
[40] http://www.gettingthedealthrough.com/organisations/21570/indian-centre-mediation-dispute-resolution/

profits and advanced sales of credits. The fact that TIST is in its 13th year demonstrates its longevity.

TIST's financial plan and projections demonstrating financial support are available (confidential) as Supporting Exhibit 07.[41]

G4. Management Capacity and Best Practices

G4.1 Project Proponent

The project proponent is Clean Air Action Corporation (CAAC). The role of CAAC and other parties involved with TIST are summarized:

- **Clean Air Action Corporation (CAAC)** is a for-profit US corporation that manages the GhG component of TIST. CAAC is TIST's largest contributor, provides technical assistance and uses its host country subsidiaries to manage operations.
- **TIST Tree Planting India Private Limited (TIST India)**, an India subsidiary of CAAC. It is the operator of TIST India and the contractor with the Small Groups for greenhouse gas credits.
- **Thousands of TIST Farmers** make up the Small Groups, plant the trees on their lands, manage their own trees and make up the core or TIST.

G4.2 Document key technical skills for successful implementation

The two founders of CAAC have almost 75 years combined experience in energy, natural resources, monitoring, quality control, transportation, biofuels, pollution control technologies, emission trading, trading program development, third party due diligence, computer technology and management. They began CAAC in 1993 and helped develop emission trading programs in the US and Canada and were responsible for many firsts in innovative emission control (See CAAC website).

TIST was established in direct response to the needs developed and expressed by Small Groups of Tanzanian subsistence farmers in 1999 and 2000. Attending a Small Group training seminar organized by the Anglican Diocese of Mpwapwa in July 1999, one of CAAC's founders participated in a visioning exercise with local subsistence farmers. They expressed deep concern about recurrent famine, poor crops, lack of shade and firewood, declining rainfall, declining soil fertility, poor access to water for personal and agricultural use, poor diet, regular health problems including TB and Malaria, lack of economic opportunity, poor cattle forage on eroded lands, and the decline of wildlife due to over hunting and lack of forests. The Small Group seminar, however, did not stop with identifying the local problems; participants established the goals of starting hundreds of Small Groups to plant trees, reduce poverty, improve health, and prevent famine. They decided the groups should work together with each other, and with resources in the US and the UK, to share "njia bora" (best practices) and to start achieving the goals.

[41] See TIST IN PD-VCS-Ex 07 Financial Plan.xls

With CAAC's involvement with nascent GhG trading in Canada, there was an obvious way to bring these improvements to the farmers using carbon credits as a financial tool.

TIST has been operating successfully for over 13 years and has expanded to four countries, 64,000 farmers and planted over 11,000,000 documented trees. The monitoring system they developed won a Computerworld Honors Laureate in 2007.

The following summarizes CAAC carbon project development experience:

- **TIST Program, Tanzania**, a small-hold farmer A/R project. It began in 1999, with the first tree planting in 2000. The project is centered around Mpwapwa and Morogoro and includes over 2,000 farmers.

- **TIST Program, India**, a small-hold farmer A/R project. Training began in 2002 in the rural area outside of Chennai, Tamil Nadu. Tree planting in India began in 2003. Tree planting under this PD began in 2004. There are over 4,000 farmers. CAAC took a subset of TIST India through the successful validation and registration for CDM.

- **TIST Program, Uganda**, a small-hold farmer A/R project. It began in 2003 and is centered around three towns in southwest Uganda (Bushenyi, Kabale and Kanungu). There are over 5,000 farmers and almost five million trees. The DNA approved the project contingent on submitting a PDD based on an approved methodology. They also approved the EIA. TIST Uganda has four validated and verified VCS projects, all of which were also validated and verified under CCB, with Gold Level for exceptional community benefits.

- **TIST Program, Kenya**, a series of small-hold farmer A/R projects. The project started in 2004 and is centered around Mt Kenya. There are over 52,000 farmers involved. The project has been accepted by the forest department and DNA for CDM. An EIA was accepted by the National Environmental Management Authority (NEMA). TIST Kenya has six validated and verified VCS projects, all of which were also validated and verified under CCB, with Gold Level for exceptional community benefits.

- **Sulfur Hexafluoride Emission Reductions** from electric power equipment in substations of Duquesne Light Company. Reductions were made at numerous locations in Pennsylvania from 1996 through 1999. The reductions were approved as credits under the Pilot Emissions Reduction Trading Program (PERT) in Ontario Canada. CAAC managed the project.

- **Methane emission reductions** through the recovery of landfill gas from the Lancaster Landfill in Lancaster, New York. Reductions were made 1995 through 1998. The reductions were approved as credits under the Pilot Emissions Reduction Trading Program (PERT) in Ontario Canada. CAAC managed the project.

G4.3 Developing Local Capacity

TIST begins in an area with a series of orientation seminars such as identified in G3.8. TIST members are introduced to the program and participate in the customization of the program to the locale. Most of the local staff is hired from the TIST membership. All Quantifiers and trainers are from the local membership. Staff and Quantifiers are hired based on ability, not gender, tribe, cultural background, or level of education. However, all effort is made to ensure a balance in gender and tribal affiliation. Training is passed on to new workers through the seminars and working with an experienced TIST member. As needed, the US team holds seminars to provide new information.

Quantifiers receive ongoing training as needed and will attend a training seminar, at least once per year. During this seminar, they will be trained on the TIST monitoring plan, which includes use of the PDAs and GPS, use of the custom data collection software, how to maintain their data, synchronizing their data with the TIST server, the importance of good data, taking tracks of the project area perimeters, taking secondary track of the project area perimeters, counting trees, the importance of proper tree counts, identifying tree species and tree ages, taking proper circumference measurements, keeping accurate expenses, GhG contracts and any new program initiated.

Small Groups training is ongoing. Small Groups are encouraged to meet weekly to plan how to work together, share training and share best practices. Groups also receive training when they receive payments (usually twice each year). Additional training is carried out in the field, on-site by Quantifiers and volunteer Trainers, and through a monthly newsletter. Training includes conservation farming, biodiversity, improved cook stoves, the GhG contract, climate change, selecting tree species, the benefits of different species, preparing nurseries, tree management, HIV/AIDS, malaria and other subjects of interest to the members.

G4.4 Equal Opportunity Employment

TIST does not have an expatriate staff. Although the main management staff and computer development are in the US, Indians run the India program from project areas. The Quantifiers are TIST farmers trained to use the monitoring system. The land and trees planted belong to the TIST farmers. The TIST farmers work together to establish the best practices for their area (whereas the Kenyan and Ugandan farmers establish their own best practices more suitable to their areas). TIST farmers are trained as trainers. Indians run payment and training meetings and Small Group meetings. All TIST members have an opportunity to be group leaders, regardless of education or gender. TIST members are utilized as volunteers, independent contractors and employees based on achievement, not gender, education or social status. TIST holds regular training seminars for Quantifiers and conducts regular audits to make sure their skills are honed.

G4.5 Relevant workers right laws

The employment laws are listed below. CAAC uses Indian counsel to advise on issues relating to employment. CAAC is not in violation of these laws.

- Workmen's Compensation Act 1923
- Minimum Wages Act 1948
- Payment of Wages Act 1936
- Industrial Disputes Act 1947
- Employees Provident Fund and Miscellaneous Provisions Act 1952
- Payment of Bonus Act 1965 Payment of Gratuity Act 1972
- Maternity Benefit Act 1961
- Industrial Employment (Standing orders) Act 1946

All employees are given an overview of their rights when hired or at training meetings. The contents of Exhibit 36,[42] "TIST India: Employee Rights" are provided to them either verbally or in writing.

G4.6 Occupational Safety

TIST members are conducting activities that they normally do, i.e. farming using manual labor. TIST workers walk or use public transportation. They do not engage in activities that are inherently unsafe. The risks facing TIST workers are minimal and no different than those affecting anyone living in the area. Such risks include:

- riding in public transport where there is risk of crash or robbery;
- venomous or constricting snakes, which, although have been mostly eradicated from the farmlands, still can be encountered.

TIST has a Standard Operating Procedure to address safety. To ensure that safety policy and safety issues are understood, each Quantifier will be briefed on the following safety policy annually.[43]

G4.7 Financial health of CAAC

CAAC has been in business since 1993 and has operated TIST for over 13 years. CAAC is profitable after all TIST expenses. Financial statements and a financial plan have been made available to the Validator.

G5. Legal Status and Property Rights

G5.1 List of all relevant local, national and international laws

As a tree-planting program that takes place voluntarily on existing farmland, there are few laws that are relevant to TIST. They are, however:

[42] See TIST IN PD-VCS-Ex 36 Employee Rights.doc
[43] See Exhibit 37: TIST IN PD-VCS-Ex 37 Quantifier Safety 110110.doc

- National Forest Policy for India, 1988 sets a target of 33.33% forest cover. The policy suggests that afforestation on degraded wastelands could be an important component of achieving this goal.
- Other policies regarding forests and land include The Tamil Nadu State Forest Act of 1882, The Wildlife Protection Act of 1972, and the Forest Conservation Act of 1980.

There is no law/regulation specific to reforestation of privately owned degraded lands. However, the continued deforestation and forest degradation despite these policies show that they will continue as unrealized aspirations without additional funding and support. Without the project activity, the project area will not be reforested, and with the project activity the goals of the ongoing reforestation programs or policies will not be reduced.

G5.2 Project Approvals

There are no approvals necessary for a farmer to plant trees on his/her lands. However, TIST has engaged local forest and environmental offices to seek their approval and received broad approval and support, as seen in section G3.8.

The A/R project activity does not have any negative environmental impact because the project activity is highly environmental friendly. This is supported by the India domestic national authority (DNA) for CDM. A subset of TIST India was validated and registered under CDM[44] and the CDM approval indicates the DNA believes the TIST program meets the necessary environmental threshold.

In addition, TIST India has been recognized by the Tamil Nadu Forest Department for its work, and was awarded "Best Planting in Private Lands" under Institutional Category for "The International Year of Forests 2011."[45] TIST India farmers in Tiruvallur District received three additional awards for forestry outreach and awareness creation.

G5.3 Document project will not encroach on other lands

CAAC and TIST do not own or lease any of the project lands. TIST takes place on the existing land of farmers and their families. CAAC enters into contracts with the Small Group members. In the contract, the members attest in that they have the rights to plant on these lands.

G5.4 Involuntary relocation

CAAC and TIST do not own or lease any of the project lands. TIST takes place on the existing land of farmers and their families. Participation is strictly voluntary. CAAC has no authority to relocate any of the members or landowners.

G5.5 Illegal Activities

[44] See Exhibit 21. CDM Approval.
[45] See Exhibit 23. Award for Best Tree Planting

Illegal harvesting of trees and charcoal making exist in the protected forests of the project zone. This is an ongoing problem for Indian forestry and is not related to TIST or caused by TIST. TIST, through its development of on-farm, sustainable, wood lots, will have a positive impact on these activities by providing an alternate, sustainable source of fuel to some of the population.

G5.6 Title to carbon rights

Greenhouse Gas Agreements among all the Small Groups, with each member as a signatory, and TIST India exist. Under the terms of the contract, all rights and title to the carbon is transferred to TIST India. The members retain the land and trees. There is not a national law that governs carbon, per se. However, the ownership of tree and tree products can be subject to contract and transferred to others.

Under a contract between TIST India and CAAC, TIST India transfers the right to the carbon to CAAC. Furthermore, CAAC takes on the obligation to fund TIST India and the tree payments to the Small Groups.

Climate Section

CL1. Net Positive Climate Impacts

CL1.1 Change in carbon stock due to project activity

The change in carbon stocks due to project activities are based on AR-AMS0001 Version 06: *Simplified baseline and monitoring methodologies for small-scale A/R CDM project activities implemented on grasslands or croplands with limited displacement of pre-project activities* as adopted by the Voluntary Carbon Standard.

Change with the project. The change with the project is based on the ex-ante estimation required of the methodology. The trees to be planted are stratified by major species and year planted and each strata is grown over time, based on accepted annual volume increments. The following lists the major species and the factors used to estimate the carbon that will result from TIST trees.

Tectona grandis

I_v = 12 m^3/ha/yr.[46]
Where: I_v = annual increment in volume based on over the bark log volumes.
BEF = 1.5.[47]
WD = 0.5 t.d.m/m^3.[48]
R = 0.27[49]

Gmelina arborea

I_v = 31 m^3/ha/yr.[50]
Where: I_v = annual increment in volume based on over the bark log volumes.
BEF = 1.5.[51]
WD = 0.41 t.d.m/m^3.[52]
R = 0.27[53]

[46] GPG-LULUCF, Table 3A.1.7. Average Annual Above Ground Net Increment in Volume in Plantations By Species, *Tectona grandis*.
[47] GPG-LULUCF, Table 3A.1.10, Default Values Of Biomass Expansion Factors (BEF), Tropical, Broadleaf.
[48] GPG-LULUCF, Table 3A.1.9-2, Basic Wood Densities (D) of Stemwood (Tonnes Dry Matter/M3 Fresh Volume) for Tropical Tree Species, Tropical Asia, *Tectona grandis*.
[49] GPG-LULUCF, Table 3A.1.8, Tropical/Sub-tropical dry forest.
[50] GPG-LULUCF, Table 3A.1.7. Average Annual Above Ground Net Increment in Volume in Plantations By Species, *Gmelina arborea*.
[51] GPG-LULUCF, Table 3A.1.10, Default Values Of Biomass Expansion Factors (BEF), Tropical, Broadleaf.
[52] GPG-LULUCF, Table 3A.1.9-2, Basic Wood Densities (D) of Stemwood (Tonnes Dry Matter/M3 Fresh Volume) for Tropical Tree Species, Tropical Asia, *Gmelina arborea*.
[53] GPG-LULUCF, Table 3A.1.8, Tropical/Sub-tropical dry forest.

Mangifera indica

I_v = 6.45 m^3/ha/yr.[54]
Where: I_v = annual increment in volume based on over the bark log volumes.
BEF = 1.5.[55]
WD = 0.52 t.d.m/m^3.[56]
R = 0.27[57]

Other Asia, Dry Tropical

N_A = 6.45 t.d.m/ha/yr.[58]
Where: N_A = annual increment of above ground biomass, t.d.m/ha/yr
BEF = 1.5.[59]
WD = 0.73 t.d.m/m^3.[60]
R = 0.27.[61]

The age class of the strata is based on the age of the trees already planted and listed in worksheet "Strata." The data is tabulated in worksheets "Ex-Ante Carbon Est" and "Ex-Ante Strata Est" and presented in worksheet "Table CL1.1."

Change without the Project. The methodology allows the change in baseline carbon without the project to be ignored, providing it is less than 10% of the change in carbon that results from the project. The existing trees were recorded and measured during the baseline study (worksheet "Baseline Strata"). The non-woody areas were stratified and the area estimated (worksheet "Grove Summary). A conservative case was used to estimate the increase in carbon overtime (worksheet "Baseline Growth"). The ex-ante estimate of the baseline without the project is 0.45% of the ex-ante estimate with the project and the baseline case is ignored in the calculations.

Net change in Carbon Stocks. Due to the methodology, the change in baseline carbon is ignored and the ex ante net change in carbon stocks is 331,410 tonnes of CO_2e or 11,047 tonnes per year.

CL1.2 Change in the emissions of non-CO_2 GHG emissions

The change in emissions of non-CO_2 carbon stocks is expected to be below 5% and is ignored.

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[54] GPG-LULUCF, Table 3A.1.6, Annual Average Above Ground Biomass Increment in Plantations By Broad Category, Asia, Other Species, Dry.
[55] GPG-LULUCF, Table 3A.1.10, Default Values Of Biomass Expansion Factors (BEF), Tropical, Broadleaf.
[56] GPG-LULUCF, Table 3A.1.9-2, Basic Wood Densities (D) of Stemwood (Tonnes Dry Matter/M3 Fresh Volume) for Tropical Tree Species, Tropical Asia, *Mangifera spp*.
[57] GPG-LULUCF, Table 3A.1.8, Tropical/Sub-tropical dry forest.
[58] GPG-LULUCF, Table 3A.1.6, Annual Average Above Ground Biomass Increment in Plantations By Broad Category, Asia, Other Species, Dry.
[59] GPG-LULUCF, Table 3A.1.10, Default Values Of Biomass Expansion Factors (BEF), Tropical, Broadleaf.
[60] A sample set of tree counts by species planted by TIST farmers in India was obtained from the TIST database. The wood densities were obtained and a weighted average was calculated. See Table 3.2.B.
[61] GPG-LULUCF, Table 3A.1.8, Tropical/Sub-tropical dry forest.

The potential source of methane is burning of biomass. Because the farmers planting the trees are subsistence farmers that rely on wood for cooking food, they are not expected to engage in widespread burning; available wood will be used for domestic fuel and would just offset fuel wood gathered from outside the project area. In addition, the burning of biomass is neither necessary for the project, nor promoted. Any methane emission will be de minimis and well below the 5% threshold.

N_2O is a potential source from chemical fertilizers. The policy of TIST is for the farmers to refrain from using chemical fertilizers, and instead, to rely on dung and plant material. Neither of these are the result of project activity and need not be considered.

CL1.3 GHG emissions resulting from project activities

In accordance with the conditions of the approved baseline and monitoring methodology AR-AMS0001, "project emissions are considered insignificant and therefore neglected."[62] While no test or analysis of project emissions are required, the following comments are provided:

Fertilizers. The policy of TIST is for the farmers to refrain from using chemical fertilizers and instead to rely on dung and plant material. Neither of these are the result of project activity and need not be considered. However, if considered, the nitrogen emissions from natural fertilizers are estimated to be less than 0.1% of the actual net greenhouse gas removal by sink and may be considered de minimis. See "Misc Calc" worksheet.

Nitrogen-fixing species. Emissions from nitrogen fixing species are also insignificant. Though present, the nitrogen-fixing trees are a minor component of the overall tree inventory. Because any deadwood will be used for domestic fuel, the trees will not be left to rot or decay. The lands where the trees are being planted are degraded and likely have a nitrogen deficit.

Fossils Fuels. There will be no burning of fossil fuels or biomass for site preparation, monitoring, tree harvesting, or wood transportation; nor does TIST involve any industrial processes, as all labor is manual. Thus, no other GHGs are expected to be emitted as a result of the implementation of the proposed project.

CL1.4 Demonstrate a positive net climate impact

The ex-ante estimate is that TIST trees will sequester 331,410 tonnes of CO_2e over the 30 years and will, therefore, have a net positive impact on the climate. In addition, planting the trees will benefit the overall ecosystem and, through the use of deadwood from the project, result in reduced deforestation outside the project boundaries.

[62] AR-AMS0001, Section I.3, Section II.26 and Section VI.47.

CL1.5 Double Counting

The project areas that make up this CCB PD are being validated and verified under VCS. If they are validated and verified, VCS will issue VERs that will be entered on one registry. The registry rules will prevent these VERs from being sold twice.

India is not subject to an emissions cap.

CL2. Offsite Climate Impacts (Leakage)

CL2.1 Potential Sources of Leakage

While no leakage is expected to result from the project, the potential sources of leakage are reviewed and the reasons why these don't apply to the project are presented.

- **Activity shifting or displacement:** The members of TIST are questioned, as part of the baseline survey, to determine if planting trees will cause shifting of activity or displacement. They have stated "no". In addition, the value of the carbon that the trees generate is very small compared to the value of the crops the land can provide. Since, by definition, these crops are the primary source of food for the farmers, the farmers will not displace their primary activity. Because membership is voluntary, there is no reason for any displacement to occur. While TIST farmers are encouraged to plant trees around their homes, they are never asked or encouraged to move from their residence.
- **Market effects (effect of reduced harvest):** The project areas are owned by the farmers and the trees are new sources of wood for them. The need for fuel wood is one of the main reasons India has been undergoing deforestation. Farmers, either directly or indirectly, take wood from gazetted forest. The project allows the farmers to use the deadwood produced by their project trees providing a more convenient and lower cost fuel source and reducing the pressure on the gazetted forests.

CL2.2 Leakage mitigation

Because no leakage sources have been identified, no mitigation is necessary.

CL2.3 Subtracting unmitigated leakage

Because there is no expected leakage, the amount to be subtracted from the net climate impact of the project is zero.

CL2.4 Non-CO_2 leakage in excess of 5%

None have been identified.

CL3. Climate Impacts Monitoring

CL3.1 Initial Monitoring Plan

Because TIST was designed as a climate change project and has been operational since 2004, the monitoring plan in this section is operational.

Each project area is owned and managed by a different group of people, which TIST calls Small Groups. The areas are discrete parcels of land spread out over many districts and villages. The Small Groups select the species of trees, the number of trees to plant and the planting schedule. They also own and maintain the trees and the tree products. While TIST works with the groups to develop best practices that can be shared and adopted by everyone in the organization, the fact remains that each project area is different. The difference is such that the monitoring system required is different than typical forest monitoring protocols.

TIST has met the challenge of obtaining accurate information from a multitude of small discrete project areas in remote areas, where roads are poor and infrastructure is minimal, by combining high-tech equipment and low-tech transportation within its administrative structure. The TIST Data System is an integrated monitoring and evaluation system currently deployed in India and three other countries. On the front end is a handheld computer-based platform supported by GPS technology, that is utilized by field personnel (Quantifiers, auditors, trainers and host country staff) to collect most project information. This includes data relating to registration, accounting, training, tree planting, baseline data, conservation farming, stoves, GPS plots, and photographs. The data is transferred to TIST's main database server via the Internet and a synchronization process, where it is incorporated with historical project data. The server provides information about each tree grove on a publicly available website, www.tist.org. In addition, the other data is available to TIST staff through a password-protected portal.

The handheld computers have been programmed with a series of custom databases that can temporarily store GPS data, photographs, and project data. The interface is designed to be a simple to use, checklist format that ensures collection of all of the necessary data. It is simple enough for those unskilled in computers and high tech equipment to be able to operate, after a short period of training. The interface can also be programmed for data collection not specific to the project. The handhelds are "off the shelf," keeping their costs relatively low.

The synchronization process takes place using a computer Internet connection. While office computers are used where available, field personnel commonly use cyber cafes, reducing travel time and improving data flow. Where available, cell phones using GPRS technology are now allowing synchronization from remote tree groves and project areas, providing near real-time data.

The TIST Data Server consists of a public side, accessible by anyone over the Internet and a private side only accessible through a password-protected portal. On the public side, a dynamic database is used to constantly update the displayed data. Changes can be seen daily, as new synchronizations come in. By mapping the project data with photos and GPS data, the results of each Small Group can be seen on a single page. The GPS data has been programmed with Google Maps to locate project activities anywhere in the world on satellite imagery.

On the private side, confidential accounting data, archive data and data not currently displayed is available. This is the source data for the custom reports and tables necessary for project managers.

The TIST database is off-site and has an off-site backup. The information collected and used for this monitoring program will be archived for at least two years, following the last crediting period.

Monitoring change in baseline carbon. The selected CDM/VCS methodology does not require monitoring of the baseline. As determined with the ex-ante calculation, the change in baseline carbons stocks is fixed at the value derived in Section G2.3.

Monitoring selected carbon pools. The selected carbon pools are above ground and below ground biomass. The following monitoring plan is being used and will continue to be used.

Step 1. Because of the difference in species and age of the trees and location, ownership and management of the project areas, each project area shall be monitored. They are documented in "Grove Summary" and "Strata" worksheets, Appendix 04. The boundary of the project area has been obtained with a GPS (Appendix 03), the area calculated and displayed in the "Grove Summary" worksheet.

Step 2. The strata for the ex post estimation of the actual net greenhouse gas removals will be by species and year. Stratification is done within each individual project areas. The area of a stratum in a project area ("area of a stratum (ha)") is determined by multiplying the area of project area (see Step 1) by the percentage of trees of that stratum in the respective project area.

Step 3. Where a tree species exceeds 10% of the total tree inventory, it will be assigned to a Major Strata. All other tree species will be assigned to an "Other" strata.

Step 4. Allometric equations will be used to convert DBH values to biomass. An allometric equation for each Major Strata will be identified. If a species specific equation for a Major Strata is unavailable, it will use the "Other" equation as a default. Based on research conducted for four previous TIST VCS projects in Kenya, the following are examples of the Major Strata and the allometric equations that may be used. The list will be updated as new, or more appropriate ones, become available.

Tectona grandis[63]: $Y = 0.153 \bullet DBH^{2.382}$
Gremlina arborea[64]: $Y = 0.153 \bullet DBH^{2.217}$

[63] GPG-LULUCF Annex 4A.2 Examples of allometric equations for estimating aboveground biomass and belowground biomass of trees, Table 4.A.3. Examples of Allometric Equations for Estimating Above Ground Biomass (kg of dry matter per tree) of some Individual Species Commonly Used in the Tropics, *Tectona grandis*. See Exhibit 18.

[64] Regina N. Banaticla, Renezita F. Sales and Rodel D. Lasco, Biomass Equations for Tropical Tree Plantation Species Using Secondary Data from the Philippines, Australian Centre for International Agricultural Research (ACIAR) Smallholder Forestry Project, ASEM 200/008 redevelopment of a timber industry following extensive land clearing: Proceedings from the end-of project workshop, Ormoc City, Philippines 19-21 August 2004, Table 5, page 122. See Exhibit 19.

Mangifer indica: no species specific equations, will use "Other" equation
Other (default)[65]: $Y = \exp[-2.289 + 2.649 \bullet \ln(DBH) - 0.021 \bullet (\ln(DBH))^2]$

Where:

Y= aboveground dry matter, kg (tree)-1
DBH = diameter at breast height, cm
ln = natural logarithm
exp = e raised to the power of

Step 5. The DBH of up to 20 trees per stratum, per project area, will be measured. Height will not be measured or used in the allometric equations. Each DBH value for each tree measured will be applied to the appropriate allometric equation and the biomass of each per tree in the stratum will be obtained and averaged to determine the "average above ground biomass per tree (kg)" of a stratum.

Step 6. For each stratum in each project area, the average above ground biomass per tree will be multiplied times the number of trees to yield the "above ground biomass in stratum (kg)." The results will be divided by 1,000 to obtain "above ground biomass in stratum (t)."

Step 7. The methodology requires the use of tons of biomass per hectare in a subsequent step. It is determined by dividing the "above ground biomass in stratum (t)" from Step 6 by the "area of the stratum" from Step 2.

$$\text{above ground biomass (t/ha)} = \frac{\text{above ground biomass in stratum (t)}}{\text{area of the stratum (ha)}}$$

Step 8. The above ground biomass of each stratum will be multiplied by 0.5 to convert biomass to carbon. The result is "above ground carbon" (t/ha).

Step 9. The carbon stocks of the below ground biomass of each stratum (t/ha) are calculated by multiplying the above ground biomass of each stratum (t/ha) by the appropriate roots to shoot ratio and by 0.5, the carbon fraction of the biomass. A root to shoot factor of 0.27 will be used.[66] The result is "below ground carbon" (t/ha).

Step 10. The total carbon stocks (CO2e) are determined by adding the above and below ground carbon (C) of each stratum in each project areas, multiplying each sum by the respective area of that stratum, converting the result to CO2e and summing the products. The following is the general equation required by the methodology.

[65] GPG-LULUCF Annex 4A.2 Examples of allometric equations for estimating aboveground biomass and belowground biomass of trees, Table 4.A.1. Allometric Equations for Estimating Aboveground Biomass (kg dry matter per tree) of Tropical and Temperate Hardwood and Pine Species, Tropical moist hardwoods. See Exhibit 18.
[66] GPG-LULUCF, Table 3.A.1.8. See Exhibit 17.

$$P(t) = \sum_{i-I}^{I} (PA(t)\ i + PB(t)\ i) * Ai*(44/12)$$

Where:

$P_{(t)}$ = carbon stocks within the project boundary at time *t* achieved by the project activity (t CO_2e)

$PA_{(t)}I$ = carbon stocks in aboveground biomass at time *t* of stratum *i* achieved by the project activity during the monitoring interval (t C/ha) from Step 8.

PB(t)I = carbon stocks in belowground biomass at time *t* of stratum *i* achieved by the project activity during the monitoring interval (t C/ha) from Step 9.

Ai = project activity area of stratum *i* (ha) from Step 2.

I = stratum *i* (*I* = total number of strata)

The data to be monitored for monitoring actual net GhG removals by sinks are the number of trees in each project area and representative circumference. Because of the potential difference among project areas, the tree count of each project area is monitored. TIST has a staff of trained Quantifiers that visit each and every project area periodically. When quantifying a project area, they:

- Identify or confirm identification of the project area by its unique name combination of Small Group name and grove name (grove is the vernacular used by the project for a project area).
- Determine the latitude and longitude of the approximate center point of the project area with a GPS. It is automatically logged into the hand-held computer database for temporary storage.
- Map the boundaries of the project area by walking the perimeter using a GPS. The data is stored in the hand-held computer database for temporary storage.
- Count each tree in the project area by age and species strata. The operator enters this data directly into the handheld computer database for temporary storage.
- Measure the circumference of up to 20 trees in the age and species strata of a project area. The operator enters this data into the handheld computer database for temporary storage.

The data on the handheld computer database is uploaded to the TIST server, through the Internet, for additional processing and permanent storage.

The confidence and precision levels will be assessed in future monitoring.

The following table summarizes the monitoring plan.

Data/ Para-meter	Data unit	Descrip-tion	Source of data	Value of Data[67]	Measure-ment Methods[68]	QA/QC	Comment
Location	Latitude and longitude	Single point location of the area where project activity has been implemented	GPS	See "Grove Summary" worksheet for each result	Go to each project area, take a single location point per area with GPS/PDA, up-load to server	SOP, audit and multiple visits	The location of each project area is obtained with a GPS
Project area	ha	Size of the areas where the project activity has been implemented	GPS	See "Grove Summary" worksheet for each result	Go to each project area, take a track of the perimeter with the GPS/PDA, up load to server. Software computes area inside track	SOP, audit and multiple visits	The area of each project area is obtained with a GPS by walking and mapping the boundary of the project area
DBH	cm	Diameter of tree at breast height (1.30 m)	Measur-ing tape	Multiple values specific to strata taken from selected project areas	Ongoing measurement taken by Quantifiers as they visit project areas	SOP, audit and multiple visits, multiple locations	TIST measures DBH of up to 20 representative trees of each age/species stratum in different project area
No of trees	trees	Number of trees in a project area by strata	Physical count	See "Grove Summary" worksheet for current results. This number will change over time for each project area based on replanting and mortality	Physical count by Quantifiers with each visit	SOP, audit and multiple visits	
Ownership	name	Ownership of land of project area	Project registra-tion data	See "Grove Summary" worksheet for each result	Ask members about changes in ownership. Record on PDA	SOP, audit and multiple visits	List of owners of each PA, their contract status and the status of their carbon rights will be reviewed with

[67] TBD means to be determined during quantification.

[68] PDA means personal digital assistant, the hand held computer and custom software used by TIST.

Data/ Para-meter	Data unit	Descrip-tion	Source of data	Value of Data[67]	Measure-ment Methods[68]	QA/QC	Comment
							each monitoring event to confirm ownership
Total CO2	Mg	Total CO2	Project activity	Changes over time based on tree count, strata and growth	Calculated using allometric equations and conversion factors	See above for tree count and circum-ference. Calculation subject to verification.	Based on data collected from all plots and carbon pools

Data will be maintained for at least two years following the end of the last crediting period.

TIST will use the following QA/QC procedures:

- **Quantifier Training:** Quantifiers receive explicit training in regard to TIST's Standard Operating Procedures so that quantifications are performed in a standard and regular fashion. The Quantifier field manual/handbook is available online at www.tist.org under "Documents to Download" and is updated to reflect changes in internal procedures. Quantifiers meet monthly to discuss questions or problems that they may have and receive training and software updates when necessary. Quantifiers are not dedicated to a grove for the life of that grove and may be rotated to other groves.
- **Staff Audits:** TIST staff members are trained to quantify groves and have handheld devices that are programmed to conduct audits. A requirement of their job is to periodically audit Quantifiers, including an independent sampling of tree counts and circumference measurement.
- **Multiple Quantifications:** TIST's internal goal is to quantify each project area once per year. Inaccurate data and errors are self-correcting with the subsequent visits. If trees have died or have been removed, a new count will reflect the current population. The growth of the trees, as indicated by increased DBH, is monitored with these subsequent visits. If a species is mislabeled, it will arise as a conflict when different Quantifiers attempt to perform tree counts for that grove that do not match the previous one. Comparisons are made over time to determine whether a particular quantification or tree count appears unrealistic.
- **Multiple Tracks:** In order to ensure that the location and perimeter of each discrete project area is accurate, each GPS track of the parcel is measured at least twice, or until two tracks that reliably define the project area are obtained. Quantifiers will be required to re-trace the tract with each quantification, to verify that they are at the correct project area and that they are counting the correct trees.
- **Double Counting:** To ensure that the same project area is not counted more than once, an overlap script is used that compares the outline of all project areas. If an overlap is

detected, the project areas are visually compared. If an overlap is determined, the overlapping project area is removed from the PD.

- **Data Quality:** TIST Quantifiers count every tree in each discrete project area. Counting each tree is 100% sampling and provides greater than 1% precision, at the 95% confidence level. Up to 20 circumference readings, for each stratum, in a project area, will be taken and archived to develop a localized database of growth data by strata. This data will provide the circumference data for each stratum. This sampling will exceed the 10% precision, at the 95% confidence level, required by the methodology.
- **TIST Data System:** The data system is an integral part of TIST's quality assurance and quality control plan. The handheld devices are programmed in a manner that requires the data to be collected in a step-by-step manner, increasing the likelihood that all the data will be collected. Data field characteristics are defined to force the use of numbers, text or special formats. Drop down menus are used to restrict answers to certain subsets (e.g. a TIST Small Group name comes from a drop down menu). Some data fields are restricted to a range of data (e.g. negative numbers are not allowed). The data is uploaded within a day to the main database, providing timely reporting and secure storage of the data.
- **Desk Audit:** TIST has developed analytical tools for reviewing data, as it comes in from the field, to look at track data, tree counts, and completeness of data.
- **Transparency:** By providing the quantification data online and available to anyone with an Internet connection, TIST is open to audit by anyone, at any time. By providing the location, boundaries, tree count by species and circumference, any interested party can field check TIST data. This transparency and the actual visits that have already taken place provide a further motive to make sure the field data is correct.

Monitoring Leakage. Leakage was monitored within five years of the start of the project, by surveying the members responsible for a discrete project area, on whether participation in the program caused leakage, in the form of displaced activity. The answers were universally no. Because no leakage has been identified, no further leakage monitoring is necessary.

CL3.2 Commit to developing a full monitoring plan

A full monitoring plan was developed and is available as Appendix 06.[69]

[69] Appendix 06 is "TIST IN PD-CCB-001g App06 Monitoring Plan 130208.doc"

Community Section

CM1. Net Positive Community Impacts

CM1.1 Impacts on community

The project will create a positive socio-economic impact. Some of the benefits that will be realized by the Small Group members and their families:

- **New job opportunities:** TIST requires a Host Country staff to operate. There are currently 17 staff employees. TIST personnel travel by public transportation and buy food and supplies from local merchants, bolstering the local economy. TIST uses Host Country professionals, such as accountants and lawyers. TIST staff is trained to use the handheld computers and GPS and how to collect data. They synchronize their devices in cyber cafés, requiring the use of personal computers.
- **Direct Effects to Small Groups:** TIST benefits thousands of Small Group members by providing a new source of income. Small Group members are paid for each tree they plant and maintain. When the project becomes self-funding from the sale of carbon credits, they will receive 70% of the net carbon revenues.
- **Small Group Structure:** Empowerment of Small Groups and creation of "best practices" improves farm production, health, and farmer life. Small Groups use "rotating leadership" which supports gender equality and develops the capacities of each member. The visible success of the TIST groups and the availability of wood, shade, lumber, fruit, and improved crop yields provides the entire community with positive examples.
- **Fruits and nuts from tree plantings:** The members select the trees to plant on their land and retain ownership of the trees and their products. To the extent that they plant fruit or nut trees, they will gain the food security and economic benefits the trees provide.
- **Wood products and limited timber from trees:** Besides owning the trees, the farmers have the rights to all dead wood. They may prune branches and collect fallen branches. The growth models used for extrapolating biomass includes up to 70% mortality over a 30-year period. The farmers can use this biomass for their own consumption without affecting the estimated carbon stocks. In addition, the farmers may thin their trees as part of the on-going management of the project area and sell the harvested stems as timber.
- **Natural medicines, insecticides and other benefits from trees:** Some of the trees, such as the Neem, provide other non-wood related benefits.
- **Capacity building on agricultural improvements, business skills, nursery development, and reforestation:** TIST has a well-developed capacity building program that promotes rotating leadership within the Small Groups, that focuses on gender equality and is made available to all members, regardless of education or social standing. TIST provides training in subjects such as conservation farming, nursery development reforestation, climate change, biodiversity, building and using more fuel-efficient stoves and runs the program like a business.
- **Improved beauty of the landscape:** This is a welcome attribute in an overused and degraded landscape.

The economic value to each member is dependent on which program elements they choose to adopt. More than 84% of TIST members interviewed in an effort to assess socioeconomic impacts indicated that they had received additional income as a result of TIST activities. Most commonly, they reported using this additional income for agricultural inputs to improve their farms. Other reported using the income for education or food.

TIST's goal is to surpass "sustainability," so that people meet their needs today, in ways that improve the next generation's ability to meet its needs in the future. When farmers have additional income to improve their farms, educate their children, and improve their nutrition, they achieve this goal and improve their future in ways of their choosing.

Comparison with "without project" scenario. Quite simply, none of these benefits would exist without the project. There would be no carbon revenues, no incentive to take farmland out of production to garner a long-term benefit, no new trees that can provide food and economic benefits from their products, no training in sustainable development activities and no new employment opportunities.

CM1.2 No High Conservation Values negatively affected

The project will not have a negative effect on HCV areas. The project takes place on private lands that have been under human habitation and agriculture for generations. The planting of trees for the program will not cause displacement or move activities to HCV areas. On the contrary, the two greatest threats to the HCV areas are deforestation and loss of biodiversity. The planting of new trees and availability of some of the biomass for use by the participants reduces deforestation pressure. The planting of woodlots on farms, especially where indigenous trees are planted, improves biodiversity and helps connect dispersed HCV areas with canopy.

CM2. Offsite Stakeholder Impacts

CM2.1 Identify potential negative offsite stakeholder impacts

Because the project takes place on private lands and the tree planting is by the landowners, and because the planting of trees is akin to the farming that has taken place on the lands for generations, there are few negative potential impacts to offsite stakeholders.

One that has been identified is the effect of eucalyptus trees on ground water and watercourses. As stated, the farmers get to choose the type of trees they plant on their own lands. During training, TIST has been clear about some of the negative effects of eucalyptus trees, and as a result there are no eucalyptus in this PD.

CM2.2 Mitigation of negative offsite stakeholder impacts

In order to reduce the number of eucalyptus trees, TIST has been training members and trainers on indigenous trees and their benefits, as well as the negative effects of eucalyptus in sensitive areas.

CM2.3 No net negative impact

The multitude of listed benefits to the community members and benefits to the environment compared with only one identified potential and mitigated impact means the project has a positive net impact.

CM3. Community Impact Monitoring

CM3.1 Initial monitoring plan of community variable

The following are the components of the initial Community Impact Monitoring plan.

1. Number of Small Group members in PD (male and female).
2. Number of Small Groups in PD.
3. Number of community members in TIST India (male and female).
4. Number of Small Groups in TIST India.
5. Number of community members active in TIST India.
6. Number of community members adopting natural resource management practices.
7. Number of community members with greenhouse gas agreements with TIST.
8. Total payments to community.
9. Number of live trees planted by TIST Small Groups.
10. Number of fruit or nut trees in TIST India.
11. Number of eucalyptus trees in TIST India.
12. Number of people employed by TIST or under contract to deliver services.

In addition, many more program components, such as GPS tracts of all the project areas, are being obtained in the climate change monitoring plan.

Monitoring will be done annually as part of the overall monitoring of TIST. TIST Quantifiers will collect data as they visit each Small Group to count trees by species. Contracts will be collected and recorded by the administrative staff. The number of people employed or under contract with TIST and the amount of GhG payments to Small Groups will be obtained from administrative records.

Field data will be recorded on custom programmed hand held computers and uploaded to the TIST database. Data will be kept at least three years from the end of the reporting period.

CM3.2 Initial monitoring plan of HCV impacts

Because the project takes place on private lands that have been under human habitation and agriculture for generations, there will be no direct monitoring of HCV areas. Instead, the impact will be addressed by the number of indigenous trees planted by the project and the numbers of hectares that contain indigenous trees.

CM3.3 Develop a full monitoring plan

A full monitoring plan was developed and is available as Appendix 06.

Biodiversity Section

B1: Net Positive Biodiversity Impacts

B1.1 Changes in biodiversity as a result of the project

As noted, the project areas are grasslands or croplands on private lands owned by subsistence farmers. They have a history of farming and as such, the baseline biodiversity is extremely low. Natural wildlife populations were eliminated or driven off long ago and are currently restricted to transient animals. As such, the approach to improving biodiversity in the project areas must start with the basics and, in this case, means planting indigenous trees. Isolated woodlots with indigenous trees will improve the connectivity of wildlife between natural forests.

Indigenous tree planting data are based on an evaluation of data provided from the monitoring plan, including tree counts by species and by project area. The results of indigenous tree planting to date are:

- Over 600,154 new indigenous trees
- 589.1 ha of indigenous trees

The Table B1.1 lists the indigenous species that may be planted by TIST in India.

Table B1.1 Indigenous Tree Species

Scientific Name	Common name	Height (m)	Indigenous
Azadirachta indica	Neem	20	yes
Mangifera indica	Mango	25	yes
Melia azedarach	Chinaberry, Bead Tree	7+	yes
Gmelina Arborea	beechwood	30	yes
Tectona grandis	Teak	30	yes
Phyllanthus emblica	Nelli	15	yes
Toona ciliata	Red Cedar	25	yes
Citrus limonum	Lemon	6	yes
Pterocarpus Marsupium Roxbo	Indian Kino Tree	30	yes
Pterocarpus santalinus	Red Sandalwood	10	yes
Bombax ceiba	Silk Cotton	30	yes
Tamarindus indica	Tamarind	20	yes

Additionally, increasing the forested area in the project area improves biodiversity indirectly, by providing a sustainable supply of wood that reduces pressure on the natural forest.

As noted in section G5.2, the project activity does not have any negative environmental impact because the project activity is highly environmental friendly. This is supported by the India

domestic national authority (DNA) for CDM. A subset of TIST India was validated and registered under CDM[70] and part of the process included:

> Environmental wellbeing: This should include a discussion of impact of the project activity on resource sustainability and resource degradation, if any, due to proposed activity; biodiversity friendliness; impact on human health; reduction of levels of pollution in general.[71]

CDM approval indicates the DNA believes the TIST program meets the necessary environmental threshold.

In addition, TIST India has been recognized by the Tamil Nadu Forest Department for its work, and was awarded "Best Planting in Private Lands" under Institutional Category for "The International Year of Forests 2011".[72] TIST India farmers in Tiruvallur District received three additional awards for forestry outreach and awareness creation.

Promotion of improved farming methods will further reduce pressure on forestland by increasing food productivity by, and consequently decreasing pressure for, land clearing for agriculture. Biodiversity is also enhanced directly through the planting of indigenous trees in homesteads and woodlots. Increases in tree biodiversity should also enhance diversity of associated species, including pollinators, and other beneficial species, while protection of riparian areas will improve water quality and provide other important ecosystem services.

Most Likely Scenario: baseline 'without project.' None of the tree planting would occur without the project. In the case of the indigenous trees, the biodiversity benefit is clearly positive.

The members of TIST also plant non-indigenous trees. While they would not have been planted without the project, and some lack the clear biodiversity benefit of the native species, they too have a net biodiversity benefit. Going back to the on-going deforestation affecting the entire country and the obvious continued need for fuel wood and timber by the expanding population, a fuel wood alternative is necessary. The non-native trees fill this niche, and by doing so, reduce deforestation and indirectly contribute to biodiversity. The "without project" scenario would mean more pressure on the natural forests and more loss of biodiversity. Therefore, even looking at the project from the vantage of the non-native species, the project has a net biodiversity benefit when compared to the "without project" case.

B1.2 No HCVs be negatively affected by the project

No HCVs are negatively affected by the project. The project areas provide vital resources that reduce pressure on these important areas, and through the planting of indigenous trees, expands the range of biodiversity in these forests.

[70] See Exhibit 21. CDM Approval.
[71] See Exhibit 22. CDM Approval Process
[72] See Exhibit 23. Award for Best Tree Planting

The project areas are on individual farms, with an extensive history of farming and land use, other than natural forest or long-term forestry. As such, any negative effect caused by human activity at the project sites has already happened. Project activity has had a positive affect on HCVs.

B1.3 All species to be used by the project

Because TIST does not provide seeds or seedlings, TIST farmers collect seeds from locally existing trees that have a history of being grown in the country and regionally. Farmers are trained on how to harvest seeds, from local trees, for their nurseries and tree planting, and on benefits of varied species. Because the farmers own the trees that they plant, the species are selected by the Small Groups based on their needs and the benefits, which they desire to obtain. As a result, numerous species and varieties have been selected. Table B1.3 lists the species present in the project areas and indicates whether they are indigenous to India. Additional species may be added over the life of the project as additional planting takes place.

Table B1.3

Table B1.3 Tree Species Selected			
Scientific Name	**Common name**	**Height (m)**	**Indigenous**
Anacardium occidentale	Cashew	15	no
Aniba rosaedora	Rosewood	30	no
Azadirachta indica	Neem	20	yes
Bombax ceiba	Silk Cotton	30	yes
Casuarina equisetifolia	Casuarina	30	yes
Citrus limonum	Lemon	6	yes
Citrus sinensis	Orange	13	no
Endiandra glauca	Endiandra glauca	0	no
Eucalyptus grandis	Flooded Gum	55	no
Gmelina arborea	Beechwood	30	yes
Grevillea robusta	Grevillea, River Oak, Silk Oak	25	no
Mangifera indica	Mango	25	yes
Melia azedarach	Chinaberry, Bead Tree	7+	yes
Olea europaea	Olive	10	no
Phyllanthus emblica	Nelli	15	yes
Pouteria sapota	Sapota	18	no
Psidium guajava	Guava	15	no
Pterocarpus Marsupium Roxbo	Indian Kino Tree	30	yes
Pterocarpus santalinus	Red Sandalwood	10	yes
Swietenia mahagoni	Mahogany	40	no
Tamarindus indica	Tamarind	20	yes
Tectona grandis	Teak	30	yes
Toona ciliata	Red Cedar	25	yes
Zanthoxylum spp.	East African Satinwood	35	yes

Invasive Species. All listed species have been screened against the global database of invasive species.[73] Of the species, only guava is identified as invasive. However, while guava is included in species invasive in India, they are high value trees in India and, according to the Forest Service, are not invasive.[74] *Psidium guajava* is a mainstay of the Indian diet and provides one of the most popular fruits. It is the fourth most important fruit in India after mango, banana and citrus.[75] Believed to be from Central America, it was introduced in India in the seventeen century, where it has become an important fruit that adds to the economic well-being and food security of Indians. It is being planted on agricultural lands and not in the natural forest. There are 16,830 guava trees, out of 658,377 project trees, or 2.6%.

B1.4 Adverse effects of non-native species

As stated in B1.3, TIST does not provide seeds or seedlings, so the trees planted by TIST farmers are locally sourced from existing trees with a history of being grown in the country and regionally. They choose both indigenous and non-native species for their varied benefits. Some species, notably eucalyptus, may have negative impacts if not managed with care. Eucalyptus, popular in India since its introduction in 1790, for its fast growth, is known to set deep roots that may deplete water resources without sustainable management. Eucalyptus is very common in many parts of the country and is planted and promoted by State Forest Departments and Forest Development Corporations for fuel wood, building poles and for timber.[76]

TIST farmers agree, as part of their contract, that trees that damage the environment will not be counted as TIST trees. Groups are trained on the benefits of alternative indigenous trees and how to grow these trees.

Training, monitoring, and incentives are all structured to encourage farmers to plant diverse trees with diverse benefits. Because of all of these active steps taken to safeguard against deleterious environmental effects, negative impacts are not expected.

The use of non-native species is justified in a number of ways. Farmers choose species that provide them with needed products and services. Project activities are on lands already impacted by long-term human habitation and agriculture. Many species, like orange, lemon, and guava, while not indigenous, have been naturalized over an extended period of time and provide much needed food. Others, like casuarina, are chosen for their fast growth. In a country with a high need for forest products, including fuel wood for cooking and timber for construction, sources of sustainable wood products must be developed to substitute natural forest being lost through deforestation. Many of these exotic species are valued, planted and promoted by State Forest Departments and Forest Development Corporations.

[73] International Union of Concerned Scientists, Global Invasive Species Database, Accessed 11 January, 2011 at http://www.issg.org/database.
[74] See Exhibit 37, TIST IN PD-VCS-Ex 38 TN Horticulture, Guava.jpg.
[75] http://nhb.gov.in/report_files/guava/GUAVA.htm
[76] http://www.fao.org/docrep/005/AC772E/ac772e06.htm

B1.5 No GMOs will be used for GhG removals

No GMOs will be used by the project to generate GHG emissions reductions or removals.

B2 Offsite Biodiversity Impacts

B2.1 Negative offsite biodiversity impacts

No negative offsite biodiversity impacts are expected. As pointed out in Section CL2.1, evidence that there has not been any displacement of members has been provided in the form of a survey of the landowners and project participants during baseline monitoring. They owned the land before the project and own the land during the project.

In addition, the program is designed to allow sustainable harvest within the project boundary by the members, which will reduce the need for fuel wood from external sources. The Small Group members own the trees and as the trees die, either naturally or through thinning, the members can use them as fuel wood. The project activity will have a beneficial effect on area deforestation; instead of causing it, it will ameliorate it.

B2.2 Mitigation of negative offsite biodiversity impacts

Not applicable, since no negative offsite biodiversity impacts are expected.

B2.3 Justify the net positives biodiversity impact

No negative offsite biodiversity impacts are anticipated. Therefore, net effect of the project on biodiversity is positive.

B3 Biodiversity Impact Monitoring

B3.1 Initial plan for biodiversity monitoring

TIST has been in operation in India, since 2004 and has deployed an award-winning monitoring system that collects data for, among other things, biodiversity. The monitoring plan described, herein, is the full monitoring plan required under B3.3, below.

The plan uses TIST's strength in gathering, verifying, and analyzing field data to measure critical biodiversity metrics in the farms and groves where TIST farmers work and live. Trees will be the main focus of biodiversity impact monitoring since they provide important habitat diversity and structural features for biodiversity. Tree biodiversity is expected to increase as a result of awareness raising, training and incentives. We will monitor and report on the TIST website the species planted, number of trees of each species planted in each area, and, as the trees grow, the age and circumference of these trees. Quantification is a constant process and, as a project area, is monitored, new data will populate the website. Annual monitoring of each site is expected and a minimum of every two years will be achieved.

At a landscape level, we will monitor the number of hectares of land improved, with indigenous tree planting by TIST farmers and their location.

Trends in landscape connectivity and forest fragmentation have been addressed, using the track data collected by the Quantifiers. The location, extent and area of each project area have been obtained. There are 671.8 hectares of new forest comprised of 924 individual parcels spread out over thousands of square kilometers. The location and perimeter of each project area are presented in Appendix 1 and 2. Although the rules of VCS allow additional project areas to be added to a grouped project PD, the rules of CCB do not. Though TIST will continue to add project areas, the areas in this PDD will be fixed for the life of the project and the above numbers are not expected to change.

B3.2 Plan to assess effectiveness of measuring effect on HCV

Because there is no direct interaction with the HCV, the monitoring will be indirect and based on monitoring direct project achievements per B3.1 and B3.3.

B3.3 Commit to developing a full monitoring plan

A full monitoring plan was developed and is available as Appendix 06.