Carbon for People - Developing a case for CFM communities in Andhra Pradesh

P. Raghuveer IFS

Chief Conservator of Forests (Environment Cell), Andhra Pradesh Forest Department, Hyderabad Email : praghuveer84@gmail.com

Verghese Paul

Fellow Forestry & Biodiversity, TERI, New Delhi Email : vpaul@teri.res.in

&

Soumitri Das

The Energy and Resources Institute, New Delhi Email : sdas@teri.res.in

Abstract

In the context of climate change, forests are unique in that they are both a source and a sink of carbon dioxide, the most abundant greenhouse gas. In the quest for reducing the carbon dioxide concentration in the atmosphere to combat climate change, reducing deforestation and degradation, and increasing carbon sequestration through afforestation and rejuvenation of degraded forests are considered very pertinent. In addition to providing timber, NTFP and bioenergy, forestry activities also provide the added co-benefits of environmental services such as soil and water conservation and biodiversity conservation. A majority of forest-dependent communities derive sustenance and livelihood benefits from the forests.

It is important to diversify the **livelihood** base of forest dependent communities and at the same time strengthen the incentives provided to them in *lieu of* their efforts in protecting and managing forests. Revenue from the sale of **carbon credits**, in both mandatory and voluntary markets, is an important, additional step in this direction. The paper describes the efforts by Andhra Pradesh Forest Department in co-managing the forests in collaboration with forest dependent communities through Andhra Pradesh Community Forest Management

(APCFM) Project, and builds a case for linking forest dependent communities to the existing carbon markets.

Under the APCFM project, **Eucalyptus** clonal plantations have been raised in various districts of the state. Also degraded natural **teak forests** in some districts have been regenerated naturally by carrying out coppicing and singling activities. An existing Eucalyptus plantation project in Nellore forest division and a teak rejuvenation project in Karimnagar (West) forest division are presently being assessed for their carbon sequestration (GHG removal) **potential** and possible sale of carbon credits in the **voluntary market**. The paper describes the approach in these two cases and also provides a description of a potential **institutional mechanism** for trading and channeling the benefits to the communities.

The Genesis

The National Forest Policy of 1988 stressed on the importance of participatory approaches to forest management as a means of rejuvenating the fast depleting forest resources. It envisaged a win-win situation with the local communities immensely benefiting from the improved management of forests. The process of Joint Forest Management gained momentum under the World Bank Assisted AP Forestry Project (1995-2001) (APFP) and in the process exploded several misconceptions and myths that were aired during the pre-project period about the merits of involving local people in forest management. The forest cover improved appreciably as a result of these efforts. However there was a limited emphasis on value addition, marketing and development of forest resource based enterprises during this phase. There was some support under village development fund as well as tribal development plan, but it was not adequate to meet the needs of the villagers to full extent. However valuable experience was gained in taking up several additional income generating activities on a small scale.

APCFM Project[1]

The Andhra Pradesh Forest Department launched the Andhra Pradesh Community Forest Management Project (APCFM) in the year 2003 with the objective of "reducing rural poverty through improved forest management with community participation". This was to be achieved by leveraging on the existing system of participatory forest management whereby poor, forest-dependent communities generate additional incomes from the development and maintenance of forest entrusted to them for management.

The core principle in achieving this objective is the empowerment and improving capacity of forest fringe communities to fully undertake enhanced management and protection of adjacent forests. The adoption of CFM under the project represents an advance over the concept of JFM followed in the APFP. Communities would be empowered to become more autonomous and self-reliant regarding the management of forest resources assigned to them. Under JFM, the APFD took lead on both forest planning and forest-related decision making. Under CFM, the Forest Department acts more as a facilitator, regulator, and provider of technical support, while the community takes the lead in forest planning and decision making, subject to conservation and sustainable management regulations, various legal provisions under both State and Central Acts apart from the guidelines issued by APFD.

All benefits flow to communities and usufruct shift to community control. The state's policy is to provide 100% benefit accruing from harvest of NTFPs (Non Timber Forest Produce) and incremental growth of various existing plantations to the communities. The communities have the harvesting and selling rights of the above commodities under the overall regulation of the existing forest laws. While the communities have the option to utilize the above produce to meet their domestic needs and market the surplus, they are required to set apart a portion of the sale proceeds and recycle it for forest development as per the provisions of the approved microplan.

In addition, the communities are also entitled to a 50% share in the amount of penalty levied and realized from those involved in commission of forest offences, as a measure of incentive to encourage their participation in forest protection. They also get a 100% share of net revenue from the sale of beedi leaf collected by them.

The APCFM project focuses geographically on districts with significant forest areas and high concentrations of forest fringe households. The project targets vulnerable groups (women, scheduled tribes and scheduled castes and landless) who would benefit from the enhanced forest asset base being developed and managed by communities under the project.

The project objective would be achieved through the implementation of three inter-linked components of (i) Creating enabling environment for CFM, (ii) Forest management and (iii) Community development. The earlier investments in JFM have ensured the establishment of a solid village institutional base for protection and management of forest areas in the form of Vana Samrakshana Samithies (VSS).

Carbon markets and carbon credits

Parallely there was growing interest in exploring the possibilities of tapping additional revenue through the carbon market. Forests act both as a source and as well as a sink for the greenhouse gases responsible for global warming. The process got launched in Kagaznagar Division of Adilabad district when the World Bank purchased carbon credits. The equivalent of 200 Tons of Carbon dioxide in emission reduction was purchased by the World Bank from Chedwai VSS. The emission reduction is based on the oil extracted from *Kanuga* (*Pongamia pinnata*) plants planted by the VSS members of the village. It is estimated that **0.00286 tons** of Carbon dioxide emission reduction in atmosphere would take place per 1 kg use of Pongamia oil. Thus the 4000 Pongamia seedlings planted in 2004 are expected to yield 35,700 tonnes of oil (85% survival) till 2014 with seed production anticipated from 2009 onwards.

The Forest Protection Committee (VSS) of Chedwai village in Kaghaznagar Forest Division of Adialabad District became the pioneering VSS in Andhra Pradesh to sell carbon to the World Bank. A cheque for Rs. 24000/- and Environment Leaders ship certificate was handed over to Sri Shaik Babu VSS President on 1st December-2004 at Chedwai village itself by the World Bank Officials. The certificate was signed by Mr. Kevin M. Cleaver, Sector Manger, Agriculture and Rural Development Department of the World Bank. This has inspired several other neighboring VSS to plant biofuel tree species on a large scale in Kaghaznagar division. As many as 37 VSS have protected the Pongamia trees planted in VSS areas and received CARBON Seed money from various buyers to offset Carbon emission to clean climate.

Thus in Kaghaznagar Division, from 2004 to 2008 37 No. VSS in clusters have realised an amount of Rs. 395799/- through sale of carbon credits from 161 Ha of Pongamia plantations (64315 no of seedlings) contributing to reduction of 1552 MTs of CO_2 The seed money received in some VSS through Carbon sale was utilized by the communities for awarding scholarships for higher education to the girl students securing Maximum marks 10th class. The buyers of carbon credits in Kagaznagar Division include Mr.O.P. Nambiar, Chemical Construction International (CCI) New Delhi, Zenith Corporate services (Private) Limited Hyderabad and several individuals from Australia, Britain, Germany, and the United States.

Carbon Markets

The carbon market can be compliance based such as the one created under Kyoto protocol or some voluntary market wherein companies/countries take up proactive steps out of their responsibility towards environment. The Kyoto protocol provides three mechanisms namely: Clean Development Mechanism (**CDM**), Joint Implementation (**JI**) and Emission Trading (**ET**) using which developed countries can meet their target. Of these, the CDM is the only one in which developing countries can participate.

The CDM has the dual objective of helping developing countries in achieving sustainable development and assisting developed countries in achieving compliance with their quantified emission limitation and reduction commitments. CDM activities have to be 'supplemental' to domestic actions of developed countries.

Forestry and community-based projects have not been able to make a mark in the current CDM portfolio across the country. This phenomenon is mainly due to small scale and large number of independent developers involved, which makes monitoring and benefit sharing difficult. The transaction cost increases due to multiple location of monitoring. However with advent of voluntary carbon markets (such as the Chicago Climate Exchange) the possibility of taking up such kind of project in India will increase. Under the voluntary carbon markets the project developer need not face the stringent terms and conditions of CDM. The norms are much softer but the price offered is also lower than the CDM market.

The Chicago Climate Exchange (CCX) is North America's only and the world's first legally binding, yet voluntary, multi sectoral, rule based and integrated greenhouse gas reduction and trading system. CCX members include corporations such as Ford, Dupont; utilities such as American Electric Power; universities such as University of Tuft and University of Minnesota; non-governmental organizations such as World Resources Institute and the Rocky Mountain Institute; cities like Chicago, Illinois and Oakland, California. CCX members make voluntary commitment to reduce GHG emissions by 1% per year from 2003-2006, for a total of 4%, below a baseline average of 1998-2001 and to further reduce up to 6% below baseline by 2010. A member who joins later than 2003 is also expected to reduce a total of 6% by 2010 with respect to its baseline emission levels. A member whose emissions exceed its commitment can reduce emissions directly, purchase emission allowances from other CCX members who are below their commitment targets, or purchase offsets from third parties[2].

Forestry sector is one of the eight key areas under CCX. Eligible forestry offset projects include:

- Afforestation
- Managed forestry
- Carbon stored in long lived wood products
- Reduced emission from deforestation and degradation
- Urban tree planting

Under the Afforestation category, plantations raised on or after 1st Jan 1990 on unforested **or degraded forestlands** are eligible for carbon credits. Such projects can earn carbon offset benefits at a rate based on the annual increase in carbon stocks of above-ground during 2003-2010 over the baseline of the carbon pools as on 31st December 2002 or 31st December of the year **preceding registration** with CCX (Chicago Climate Exchange, 2008). Under this category no harvest is allowed during the contract period with CCX. In general, the innovation, flexibility and lower transaction costs associated with CCX carbon offset projects can benefit buyers as well as suppliers. Under the Managed forests category harvest is allowed and needs to be deducted from the carbon stock. For Managed projects, no land eligibility criteria have been mentioned. However, for the project mentioned, below the land eligibility has been assessed based on the criteria mentioned for Afforestation project.

Forest improvement in Andhra Pradesh

The forest cover of Andhra Pradesh is around 4 million ha (which is around 16% of its geographical area)[3]. Various management techniques that were practiced in Andhra Pradesh can be categorized into those dealing with natural re-generation and those dealing with artificial regeneration. Management of natural regeneration has been practiced since the beginning of the scientific management of forests. Initially this was done through canopy manipulations wherein the canopies were opened to encourage establishment of natural regeneration. Further silvicultural systems like the selection system, the coppice with standards and the coppice with reserves also encouraged natural regeneration. These systems were highly cost effective but they invariably resulted in crop comprising mostly of predominant and dominant species to the disadvantage of a number of other species that were suppressed. The species that dominated were not necessarily the most valuable and desired ones.

This phenomenon necessitated the intervention of artificial regeneration where in the existing natural stand was either supplemented with or replaced by one or a combination of desired species. Clear felling coupled with artificial regeneration system was widely practiced for conversion of mixed and miscellaneous forests into pure stands of desired species. However the results of such conversion were mixed. The tendency was to regenerate only a few species like Teak, Eucalyptus, Acacias etc. More often the regeneration from the rootstock of the native species that remained, dominated the seedlings that were introduced and the result was not always the one that was desired. Though techniques have been evolved with experience over time in uprooting of the existing rootstock, breaking the soil, deep ploughing and planting with seedlings of desired species, the economics of such practices are not all that encouraging.

It was against this backdrop that the A. P. Forest Department in the past one-decade evolved appropriate cost effective techniques of rejuvenation of forests. The technique involves seedling coppicing of viable rootstock in the forests under treatment by cutting back flush to the ground and coppicing the high stumps and repeatedly clipping the resultant coppice shoots retaining the most promising ones. Coupled with this, repeated cutting back of rank growth and thorny bushes encourages the establishment and healthy growth of the coppice shoots that are retained. Fire and grazing management, and soil and moisture conservation works are the essential subsidiary silvicultural operations. Areas rich in bamboo are treated for decongestion, saucer weeding and mounding operations for the bamboo clumps, fire and grazing management, soil and moisture conservation works. The results of these practices are quite encouraging. They are cost effective too[1].

This paper shows an example each from artificial regeneration area and natural regeneration area in Nellore Division and Karimnagar West Division respectively for developing carbon projects for submission to CCX.

Case study 1: Potential CCX project in Nellore Division[i]

Under the APCFM project, Eucalyptus clonal plantations have been raised in various districts of the state. In Nellore district, about 477 individual plantations covering various years of plantations under 137 VSS have been raised since 2003. The year wise plantation details are given in table 1

Table 1. Area wise Eucalyptus clonal plantations in Nellore District

Year of planting	2003	2004	2005	2006	2007	Total
Age of Plantation (Years)	5	4	3	2	1	
Area (ha)	394.97	1197.25	943.5	984.5	716.5	4236.72

Source. APFD

These plantations are managed on a seven year rotation and coppice crops are raised after first and second rotation. After the third rotation (harvest), the area would be replanted with Eucalyptus or some other forest species; the area would continuously under forestry use. This provides an excellent opportunity to participate in the global carbon market to realize carbon credits for the forest-dependent communities.

Land eligibility

The land eligibility has been established based on satellite imagery for years 1988 and 1996.

Baseline carbon stock

As the project area had only scanty shrubby growth prior to plantations, for all practical purposes, the above ground carbon stock is assumed to be minimal. Further, as the plantation activity started only in

November/December, 2003, the baseline carbon stock as on December 31st, 2002 is assumed to be zero and therefore not considered for calculations.

Sampling strategy for estimating carbon sequestration under the project

For estimating the standing biomass, and subsequently the carbon store, stratified random sampling based on year of planting and soil type was employed. For soil information, soil type map developed by NBSS&LUP (National Bureau of Soil Survey & Land Use Planning) was used. Based on discussion with officials of NBSS&LUP, the traditional soil classes were merged into 8 classes. The soil in the plantation area were found to fall under four classes: red clayey soil, red loamy soil, black soil, and rocky and gravelly land/soils (table 2)

Table 2. Area under various strata

Age of Plantation	Black	Red Loamy	Red Clayey	Rocky And Gravelly	Total
1	123.5	442	122	29	716.5
2	171.5	556.5	200.5	56	984.5
3	208	550	116	69.5	943.5
4	258.25	682	150	107	1197.25
5	96.75	224.72	48.5	25	394.97
Total	**858**	**2455.22**	**637**	**286.5**	**4236.72**

Quadrats of size 25m x 20m (500 sq.m.) were randomly laid out. The minimum sample size was determined as per the criterion approved by CDM Executive Board[5]. Following 10% level of precision and 95% confidence level for standing biomass (t/ha), the minimum number of plots, and the number of plots actually laid down are given in table 3. However, a total of 112 plots were laid down to achieve a sampling intensity of 0.15%. A minimum of 3 plots was laid for each stratum.

Table 3. Number of plots sampled

Stratum	Area (ha)	No. of required samples	Plots sampled
Black (2)	171.5	1	5
Red Clayey (2)	556.5	3	17
Red Loamy (2)	200.5	0.3	6
Rock Land (2)	56	1	3
Black (3)	208	1	6

Stratum	Area (ha)	No. of required samples	Plots sampled
Red Clayey (3)	550	3	17
Red Loamy (3)	116	1	3
Rock Land (3)	69.5	0.2	3
Black (4)	258.25	4	8
Red Clayey (4)	682	7	20
Red Loamy (4)	150	3	5
Rock Land (4)	107	1	3
Black (5)	96.75	1	3
Red Clayey (5)	224.72	4	7
Red Loamy (5)	48.5	1	3
Rock Land (5)	25	0.0	3
Total Area	**3520.22**	**33**	**112**

Note. The values shown in parenthesis in column one represent the age of plantation

In the laid down sample plots, GBH (Girth at Breast Height) of all the trees were measured and the height of 25% of trees was recorded, starting from the first line.

Data Analysis

In order to estimate the crop height, Lorey's mean height equations were used and the mean height of a quadrat was used to calculate the standing biomass of a quadrats. The standing biomass was calculated using biomass equation developed for Eucalyptus hybrid by Ravindranath *et al* (1991):

$B = 9.109 + (162.6706 \times D^2H)$ *[Where B = biomass in kgs, D = diameter in m, H = height in m]*

Carbon pools

As per the CCX guidelines for managed forestry projects, amongst the various carbon pools, only above ground biomass (AGB) and below ground biomass (BGB) are considered. For converting biomass into carbon, the default value of 0.5 as per IPCC Good Practice Guidance has been used. For estimating the GHG removals and the number of Verified Emission Reductions (VERs), **TARAM** (Version 1.2)[1] tool was used. The tool accounts for loss of carbon due to harvest, while estimating the net GHG removals.

Estimates of Net GHG removals

The growth performance under various strata is summarized in table 4. As expected the growth performance (MAI and annual carbon increment) was found to be poor in rocky and gravelly soil compared to other classes.

Table 4. Annual biomass and carbon increment under various project strata.

S. No.	Stratum	Biomass			Annual carbon increment (tC/ha/yr)	Annual CO_2 increment (tCO2/ha/yr)
		Average t/ha	MAI (t/ha/yr	Average MAI for soil type		
1	Black (2)	12.7	6.34	5.82	2.91	10.67
2	Black (3)	18.6	6.21			
3	Black (4)	24.5	6.13			
4	Black (5)	23.0	4.60			
5	Red Clayey (2)	12.9	6.45	5.80	2.90	10.62
6	Red Clayey (3)	14.7	4.89			
7	Red Clayey (4)	23.7	5.92			
8	Red Clayey (5)	29.6	5.92			
9	Red Loamy (2)	14.8	7.39	6.70	3.35	12.28
10	Red Loamy (3)	16.6	5.55			
11	Red Loamy (4)	24.3	6.07			
12	Red Loamy (5)	39.0	7.80			
13	Rock Land (2)	14.3	7.17	4.77	2.39	8.75
14	Rock Land (3)	11.9	3.95			
15	Rock Land (4)	19.2	4.79			
16	Rock Land (5)	15.9	3.17			

The result of this analysis, especially the average MAI for soil type, along with the area planted each year were the main inputs into the TARAM model. The net anthropogenic GHG removal by the project (after deducting harvest amount) has been worked out using the tool and is given in table 5.

Table 5. Net GHG removal by the project

Project year	Net GHG removals by project (tCO_2eq)
1	6,813
2	27,982
3	61,906
4	109,958
5	169,488
6	229,020
7	240,853

A perusal of table 5 reveals that, the total GHG removals from 2003-2010 (year 1 to year 7) is 240,853 t CO_2 eq. The annual GHG removal, thus works out to 33,408 t CO_2 eq.

Case study 2: Potential CCX project in Karimnagar West Division[2]

The land in Karimnagar West Division varies from flat to undulating, with a number of streams that join either river Godavari or river Manair. The Division is made up of four ranges: Jagtial, Karimnagar, Sircilla and Raikal. Of the total geographical area (825,000 ha) of the Division, forests cover 11.66 % (96,202 ha). The present study is restricted to Jagtial Range.

Forest type

The majority of teak bearing forest of Karimnagar West Division falls under Dry Teak Forest type (72,017 ha) of the Champion and Seth classification system. The associate species of Teak are *Anogeissus latifolia, Terminalia alata* and *Diospyros melanoxylon*. These forests are normally of III and IV quality. The proportion of Teak in the forest varies and that is classified according to the following sub-types: Teak forest (60-70 %), mixed teak forest (10-30 %), miscellaneous forest (<10 %).

Improvement of degraded teak forests

The forests of Karimnagar West Division vary considerably with respect to the density and proportion of the species within the same forest type and at different locations. Natural regeneration is sparse because of various biotic and abiotic factors (such and fire, soil erosion and cattle damage).

There are vast areas of degraded teak forests of density less than 0.4 with good viable rootstock. In the past these areas were managed under the silvicultural systems of Coppice with Standards, Coppice

with Reserves, Improvement of natural stands through selection System and Conversion of Miscellaneous crop by clear felling the existing crop supplemented with artificial regeneration of desired species. Though they were scientifically managed in the past, due to biotic interference like excessive grazing, repeated fires, removal of fuel and small timber by the local villagers for their own needs etc. they are degraded. Since teak which is the flag species in these forests is a very strong coppicer and since there is copious availability of viable rootstock these forests can be rejuvenated by coppicing the viable rootstock while ensuring adequate protection from grazing, fire and other biotic factors. Further the element of 'negative selection', which has crept in almost as a natural sequel to the events that have resulted in degradation of these forests, needs to be set right by selective thinning operations once the regeneration establishes.

Because of consistent over cutting and opening of the canopy teak has tended to increase in dominance from a low of some 30% under previous conditions to between 60 to 70%. The regeneration consists of a combination of coppice of previous trees together with coppice from rootstock and suppressed seedlings. Continual cutting of the tree coppice, usually in a poorly managed way has probably degraded this stocks growth and yield potential, while the stand may, overall have suffered from negative selection. However, short of converting the forest to plantations, care will be taken with silvicultural treatments to obtain the optimum yield potential. Consideration will be given to amending the thinning regimes, based on the dynamics of stand growth following protection and initial treatments to rid the stand of unwanted vegetation and trees and to promote coppice and seedling regeneration. At the same time the silvicultural prescriptions will have to take into account the promotion of desirable NTFPs with the adaptation of such practices as pruning and soil cultivation being applied as needed, while thinning of tree species may have to take into account the light demanding nature of some NTFPs and provide for suitable gaps. Following matrix details tentative treatment and harvesting schedule in teak forests.

Table 7. Treatment and harvest schedule in teak forests

Year	Operation	Remarks
1	Advance Works	Clearance of undesirable growth, stump cutting, soil & moisture conservation
2	Creation fire management	Coppice singling, clearing unwanted growth, soil & moisture conservation,
3	Maintenance management	Further singling, clearing unwanted growth, weeding & soil working, fire
4 to 32	Fire protection and watching	Rehabilitation of water conservation structures will be done periodically as required.
7	First thinning	50% stems removed, silvicultural selective thinning, yielding mainly poles plus limited bajus & vasams
12	Second thinning	Reduced to approx. 300 stems/ha. Mainly *vasams* and *bajus* with some *dulam* (small timber).
22	Third thinning	Reduced to 100 stems/ha., yielding bajus and dulams
32	Final felling	50 stems left as seed trees. Timber logs to 120 cm mid girth and firewood

Source: APFD, undated

In the present project, area taken up for treatment in Jagtial range of the Division is being assessed for their carbon sequestration potential.

Land eligibility

The land eligibility has been established based on satellite imagery for years 1988 and 1996.

Baseline carbon stock

Forest improvement activities in the project area have been carried out in the period 1995-96 to 2005-06. Therefore, for the purpose of this study, incremental carbon stock after 2003-04 is being considered.

Sampling strategy for estimating carbon sequestration under the project

For estimating the standing biomass, stratified random sampling based on year of treatment was employed.

Table 8. Area taken up for treatment in various years

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Area(ha)	12	485.26	634.23	814.15	632	336.64	425	100	1420	828	265

Source: APFD

Quadrats of size 25m x 25m (625 sq.m.) were randomly laid out in a total of 111 plots covering all the years.

Data Analysis

This is a work in progress and for the purpose of this paper, the areas treated till 2002 (3,429 ha) has been taken into consideration, so as not to complicate the calculations by including tending removals.

Carbon pools

As in the case of calculations in the case of Nellore Division, only above ground biomass (AGB) and below ground biomass (BGB) are considered. Similarly, for converting biomass into carbon, the default value of 0.5 as per IPCC Good Practice Guidance has been used. For estimating the GHG removals and the number of Verified Emission Reductions (VERs), TARAM (Version 1.2)[3] tool was used. The tool accounts for loss of carbon due to harvest, while estimating the net GHG removals.

Estimates of Net GHG removals

The growth performance under various strata is summarized in table 9.

Table 9. Annual biomass and carbon increment under various project year

S No	Years	Standing biomass	MAI	Average of MAI	Annual carbon Increment (tC/ha/yr)	Annual CO_2 Increment (tCO_2/ha/yr)
1	2002(6)	27.4	4.6	4.6	2.3	8.4
2	2001(7)	27.2	19.4	3.9	1.9	7.1
3	2000(8)	37.2	27.9	4.6	2.3	8.5
4	1999(9)	45.0	40.0	5.0	2.5	9.2
5	1998(10)	38.2	49.7	3.8	1.9	7.0
6	1997(11)	57.1	31.1	5.2	2.6	9.5
7	1996(12)	39.7	16.5	3.3	1.7	6.1

Like in the case of steps carried out for the Nellore Division, the result of this analysis was the main inputs into the TARAM model. The net anthropogenic GHG removal by the project for a 7 year period is given below.

Table 10. Net GHG removal by project

Project year *t**	1	2	3	4	5	6	7
Actual net greenhouse gas removals by sinks (tCO_2e)	34,377	68,754	103,131	137,508	171,885	206,263	240,640

The total GHG removals from 2003-10 (year 1 to year 7) is 240,640 tCO_2eq. The annual GHG removal works out to 34,377 tCO_2eq.

Institutional Mechanism

For trading on the CCX platform, one has to go through an Aggregator (an entity that serves as the administrative representative of multiple offset-generating projects and undertakes carbon trade on behalf of project proponents). In the present circumstances, APFD can either go through the registered Aggregators in India or register itself (or one of its associate organizations) as an Aggregator. The Centre for Forest and Natural Resources Management' (CEFNARM) a registered Society under the Andhra Pradesh Forest Academy (APFA) is ideally poised to become a socially responsible link between the communities and the CCX, and act as an Aggregator.

At the field level, a two-tier structure is suggested for management of these plantations. The first tier consists of Vana Samrakshana Samithies (VSS) participating in the programme. The second tier consists

of a federation of all the participating VSS at the divisional level, known as the Divisional Committee (DC). President of each participating VSS represents the respective VSS at the DC. The DC in turn would elect a Chairman for operational purpose (this has no legal validity at the moment). The DC will act as an interface between CEFNARM and participating VSS. They would be responsible for organizing participative monitoring of the carbon stock along with the local forest officers. The trading would be facilitated by CEFNARM.

The CEFNARM, as the Aggregator, will be responsible for undertaking all transactions on behalf of VSS at the CCX platform. For this purpose, the CEFNARM will have an MoU with the DC, clearly defining the terms of the business relationship between CEFNARM and DC/VSS. The business relationship would include CEFNARM retaining a certain amount (percentage) out the revenue from the sale of each VER for meeting their operational costs and for conducting monitoring and third party verification, capacity building of DC/VSS.

CEFNARM will be responsible for interaction with all third party organizations like project developers, project verifiers, institutes who can undertake capacity building activities, etc.

Next Steps

Once the data analysis and computations are completed, APFD has to send the forest offset project questionnaire to CCX (through project aggregator). On acceptance of the same we have to furnish detailed report "Project Registration Filings". The next phase is obtaining an independent project verification report. APFD has to register as an offset provider or aggregator. After the due process, finally CCX issues the CFI contracts in a quantity equal to the project's net GHG sequestration or reduction. As a precaution 20 % the CFI contracts are withheld and kept in a reserve pool (to replace any lost carbon)

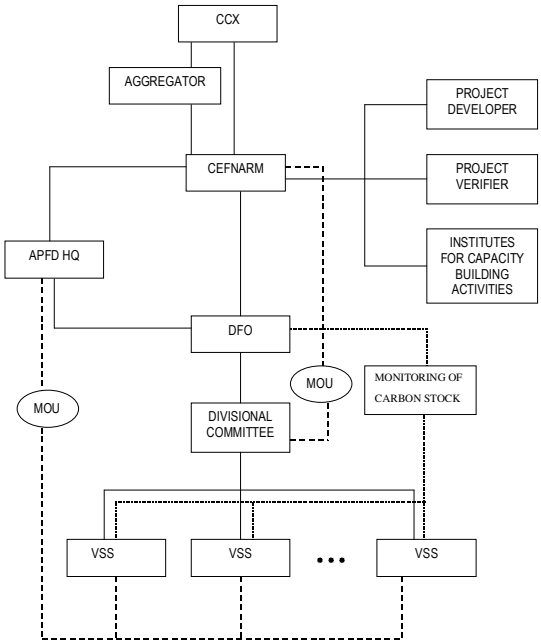

Figure 1. Institutional Structure

Conclusion

Carbon sequestration (GHG removal) is an environmental service performed by forests like other services such as biodiversity conservation and soil and water conservation. Forest-dependent communities play a very important role in protecting the forests, thus facilitating the flow of these services from the forests, and should be compensated for their efforts. Carbon revenue offers an opportunity for diversifying their livelihood base, and at the same time works as a compensation mechanism for the bigger global environmental service they are providing. However, in addition to developing technical-know how in developing project briefs and project development documents, what is required is a clear cut mechanism for distribution of benefits to the communities, on the lines of CFM mandate. If successful, the learning from this pioneering effort would go a long way in scaling up the activities at the state level or even at the national level.

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(Footnotes)

[1] TARAM -Tool for
Afforestation and Reforestation Approved Methodologies Developed by BioCF and CATIE (see
http://wbcarbonfinance.org/Router.cfm?Page=BioCF&FID=9708&ItemID=9708&ft=DocLib&CatalogID=31252
for latest version of the model)

[2] This is a work in progress; the preliminary estimates given in this paper is subject to revision.

[3] TARAM -Tool for
Afforestation and Reforestation Approved Methodologies Developed by BioCF and CATIE (see
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for latest version of the model)

"The issue of climate change is one that we ignore at our own peril. There may still be disputes about exactly how much we're contributing to the warming of the earth's atmosphere and how much is naturally occurring, but what we can be scientifically certain of is that our continued use of fossil fuels is pushing us to a point of no return. And unless we free ourselves from a dependence on these fossil fuels and chart a new course on energy in this country, we are condemning future generations to global catastrophe."

- Barack Obama
President, USA