Climate change mitigation opportunities through forestry carbon projects in Himalayan states of India: issues, requirements and gaps

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Abstract

Climate change is now undoubtedly a global phenomenon, effecting community and biodiversity worldwide. Forests are sinks as well as source of carbon emissions and estimated to store 1146 Petagrams (a Petagram is 1015 grams or a billion metric tons) of carbon in the world's forested ecosystems. Increasing this sink by even modest amounts could provide additional protection from future climate change. Carbon sequestration projects through land use, land-use change and forestry (LULUCF) activities could demonstrate a win-win situation from the point of view of climate change and sustainable development. If properly designed these projects can conserve and increase carbon stock and at the same time improve rural livelihoods. International efforts on climate change mitigation under Kyoto Protocol offers for three market based mechanisms among which Clean Development mechanism (CDM) is of particular importance to the developing world and can be very well utilized to provide impetus to the efforts of the local communities in conservation of biodiversity. These initiatives can now be utilized as opportunity. Himalayan region of India is particularly vulnerable to climate change (NATCOM 2007). This region is also rich in forest resources and unfortunately also has a significant amount of wasteland. Therefore there exists a huge potential to mitigate climate change in this region by addressing both forests and wastelands.

Key words: CDM, Afforestation, reforestation. EU-ETS, carbon credit.

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Introduction

Carbon exists in everything that is living or has ever lived. There is a perpetual cycle of carbon being sequestered on earth and emitted back into the atmosphere. Humankind increasingly influences this carbon cycle through the burning of ever-greater quantities of oil, gasoline and coal and the cutting down of forests. It is argued that the human-induced accumulation of carbon dioxide (CO_2) and other greenhouse gases in the atmosphere is driving climate change. It is likely that current atmospheric concentrations are at a 20-million-year high and that current rates of accumulation are unprecedented

Emissions of CO_2 from land use and land-use change represent up to 20 per cent of current CO_2 (Pearson et.al 2006)[3] emissions from burning fossil fuels. Changes in land-use can positively impact atmospheric CO_2 concentrations by either: i) decreasing emissions that would occur without intervention, or ii) sequestering CO_2 from the atmosphere into vegetation and the associated soil. Preventing deforestation, decreasing the impact of logging or preventing the drainage of wetlands or peat lands are the practices that decrease emissions. In contrast, planting trees, changing agricultural tillage or cropping practices, or re-establishing grasslands sequester carbon.

The Kyoto Protocol recognized the role that changes in the use of land and forests have on the global carbon cycle. Parties to the Protocol can use credits generated either by sequestering carbon or by reducing carbon emissions from land use to help them reach their reduction targets. International efforts on climate change mitigation under Kyoto Protocol offers for three market based mechanisms among which Clean Development mechanism (CDM) is of particular importance to the developing world. Afforestation and reforestation are as such an important way of mitigation of climate change recognized by the Kyoto Protocol. Of all the CDM projects till date registered through the UNFCCC, only three is classified as Afforestation Reforestation project till April 2009. It is surprising to know that so little progress has been made in this sector which offers enormous option to cut down CO_2 emissions; and helps the host country attain sustainable development through community participation The possible reasons for the poor performance of the forestry sector can be lack of knowledge and technical resource of the local communities to accommodate current rules of CDM. Also procedures and methodology and complex registration process makes it very difficult for such projects to push through. Again the ex- post credits issued by A/R CDM are of limited life span, and the biggest market platform of the compliance market – the EU ETS has not included forestry credits in its regime. These projects have such high transaction costs that it is not economically feasible for an individual to take it up

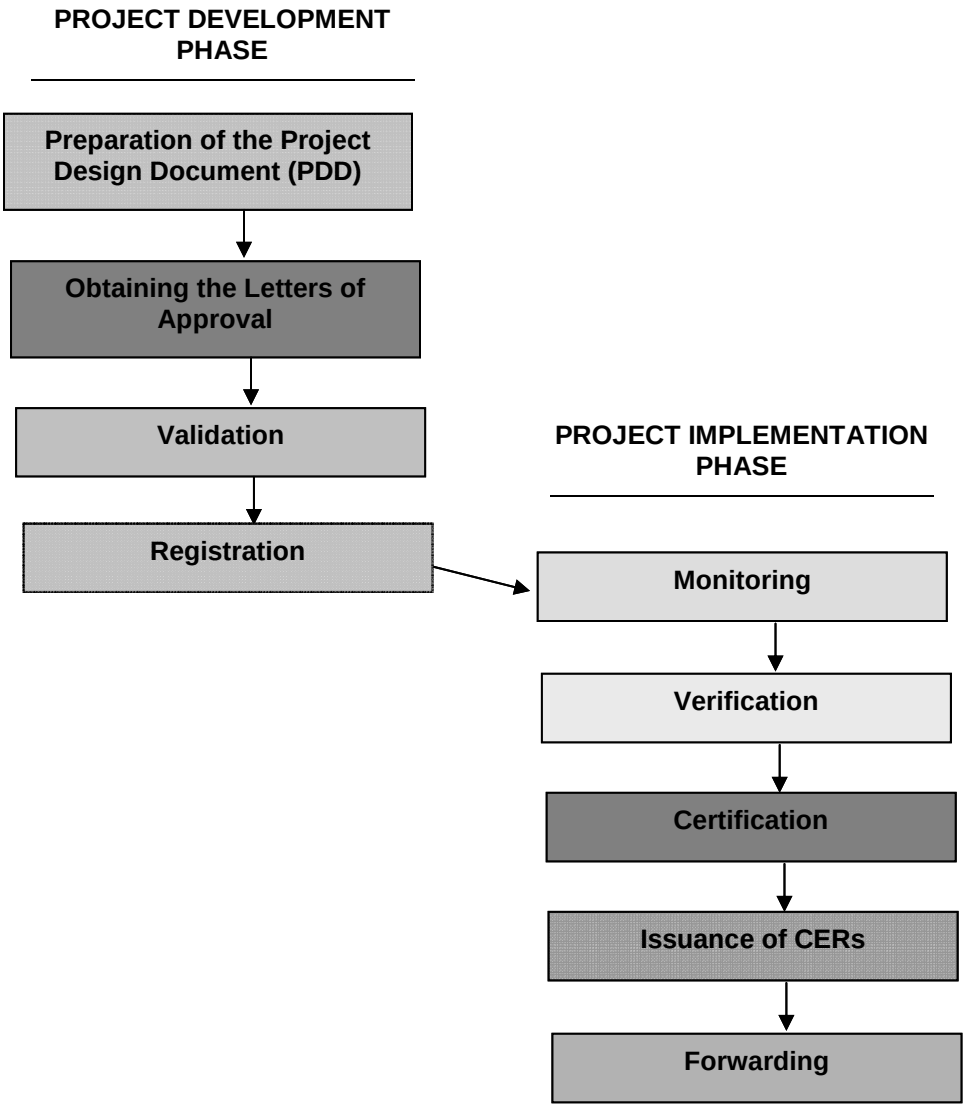
Clean development mechanism

The Clean Development Mechanism (CDM) is one of the three flexible mechanisms contained in the Kyoto Protocol. It allows entities from Annex I (developed) Parties to develop emission-reducing projects in non-Annex I (developing) countries, and generate

[3] **Timothy Pearson, Sarah Walker and Sandra brown (2006);** Sourcebook for land use, land-use change and forestry projects.

tradable credits corresponding to the volume of emission reductions achieved by that project.

The CDM rules govern a number of stages and entities in the CDM, which can be divided into two phases - the development phase and the implementation phase. The typical CDM project cycle is as follows:



Flow Diagram for CDM Project Cycle

The Voluntary Carbon Market:
Running in parallel with the Kyoto Protocol compliant schemes are a number of voluntary schemes that also generate tradable carbon credits.

The voluntary offset market in particular has been promoted for the following reasons:

Possibility of Broad Participation
The voluntary carbon market enables those in unregulated sectors or countries that have not ratified Kyoto, such as the US, to offset their emissions.

Preparation for Future Participation
The voluntary carbon market enables companies to gain experience with carbon inventories, emissions reductions and carbon markets. This may facilitate future participation in a regulated cap-and-trade system.

Innovation and Experimentation
Because the voluntary market is not subject to the same level of oversight, management, and regulation as the compliance market, project developers are more flexible to implement projects that might otherwise not be viable (eg projects that are too small or too disaggregated or too complex and costly to get approved under Kyoto rules)

Corporate Goodwill
Corporations can benefit from the positive public relations associated with the voluntary reduction of emissions.

Most importantly, voluntary and compliance offset mechanisms have the potential to strengthen climate policies and address equity concerns:

Cost-effectiveness that allows for deeper caps or voluntary commitments.
By decreasing the costs of reductions, offsets can in principle make a compulsory mandate more politically feasible and a voluntary target more attractive, thereby accelerating the pace at which nations, companies, and individuals commit to reductions.

Higher overall reductions without compromising equity concerns.
One of the greatest challenges of climate protection is how to achieve the deep global emissions reductions required while also addressing the development needs of the poor. Historically, developed nations have been responsible for a much larger share of the increase in atmospheric GHG concentrations than developing countries But to achieve climate stabilization, emissions must be curbed in all countries, both rich and poor Offsets may be one way out of the conundrum of needing to achieve steep global emissions reductions while at the same time allowing poor nations to develop This has not been the case thus far because the emissions reductions undertaken have been too small to be significant. People who do not have a capped carbon emission target regulated under the Kyoto Protocol but wish to offset GHG emissions for CSR reasons would tend to be looking for VCM. While taking on considerable domestic emissions reductions, industrialized countries could, through offsets, help finance the transition to low-carbon economies in developing nations. In other words, offsets might allow equity to be decoupled from efficiency, and thus enable a burden-sharing arrangement that involves wealthier countries facilitating mitigation efforts in poorer countries .

To address these shortcomings, over a dozen voluntary offset standards have been developed in the last few years. Each standard has a slightly different focus and none has so far managed to establish itself as the industry standard. Some closely mirror compliance market (Kyoto Protocol) standards, while others take a more lenient approach in order to lessen the administrative burden and enable as many credits as possible to enter the market. Certain standards are limited to particular project types (eg forestry) while others exclude some project types in order to focus on the social benefits of carbon projects. It is important to note that the vast majority of voluntary offsets are currently not certified by any third-party standard, though there is a growing premium for those that have. This is likely to change over the coming years

Special considerations for CDM forestry projects:

The projects involving forestry activities have been treated specially by Kyoto Protocol, as described below.

Currently acceptable Land use land use change and forestry (LULUCF) Projects

During the first commitment period (2008-2012), the only LULUCF project types that are eligible for the CDM are Afforestation and reforestation.

Afforestation is the direct human-induced conversion of land that has not been forested for a period of at least 50 years, to forested land through planting, seeding and/or the human-induced promotion of natural seed sources.

Reforestation is the direct human-induced conversion of non-forested land to forested land through planting, seeding and/or human-induced promotion of natural seed sources, on land that was forested but has been converted to non-forest land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December, 1989 (UNFCCC 2005)[4] .

The eligibility of Lands

31 December 1989 Rule

The criterion that all projects must meet is for no forest to be present within the project boundaries between 31 December 1989 and the start of the project activity. Proof of forest absence could take the form of aerial photographs or satellite imagery from 1989 or before, or official government documentation confirming the lack of forests. Where proof of these types does not exist, multiple independent, officially witnessed statements by local community members should suffice.

[4] Modalities and Procedures for Clean Development Mechanism Projects, UNFCCC 2005)

Definitions of Forest

The decision of what constitutes a forest has implications for what lands are available for Afforestation and Reforestation activities. National presiding authorities in non-Annex I countries, known as Designated National Authorities, have the role of deciding for their country where to lay the thresholds from a range determined at COP9, namely: Minimum tree crown cover value between 10 and 30 per cent; Minimum land area value between 0.05 and 1 hectare; Minimum tree height value between 2 and 5 metres. The National CDM authority (NCDMA) for India i.e the Ministry of Environment and Forest (MOEF) has put forth the following minimum values for definition of forest for all CDM A/R projects in India.

- Minimum tree crown cover of 15 per cent;
- Minimum land area value 0.05 hectare;
- Minimum tree height of 2 meters.

Additionality

The CDM is a carbon-neutral process. It allows an Annex I Party and a non-Annex I Party to co-operate and carry out a project in the non-Annex I Party that will sequester carbon (or reduce emissions). Certified emission reduction credits (CERs) are created through the project and transferred to the Annex I Party, which is now able to emit an equivalent number of units of carbon while meeting its targets. Thus, the atmospheric concentration of greenhouse gases remains unchanged as a result of the transaction. The Annex I Party is assisted in meeting its commitments cost-effectively while, in well-designed projects, the non-Annex I Party benefits in meeting sustainable development goals (Pearson et.al 2006)[5]

However, if the project that sequesters the carbon (or reduces emissions) would have taken place without the CDM transaction, then greenhouse gases in the atmosphere will increase as a result of the transfer of CERs. For example, if an area would have been reforested, either through deliberate management action or through natural processes, irrespective of the CDM transaction, then the CDM transaction simply allows the Annex I Party to emit more greenhouse gases and the atmosphere is worse off than it would have been without the transaction.

Thus the project participant has to demonstrate that the proposed Afforestation/Reforestation project would not have taken place without the CDM transaction. This is the test of additionality. The UNFCCC prescribes tools for testing additionality. Additionality is thus an essential element needed to ensure the integrity of any baseline-and-credit scheme (UNFCCC 2005)[6]. Yet additionality is very difficult to

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[5] **Timothy Pearson, Sarah Walker and Sandra brown (2006);** Sourcebook for land use, land-use change and forestry projects.

[6] Modalities and Procedures for Clean Development Mechanism Projects, UNFCCC 2005)

determine in practice. Many different tools have been developed to maximize the accuracy of additionality testing and to minimize the administrative burden for the project developer.

Leakage

Some projects will be successful in sequestering more carbon within the project area, but the project activities may change activities or behaviour elsewhere. These changes may lead to reduced sequestration or increased emissions outside the project boundary, negating some of the benefits of the project. This is called leakage. A simple example is a project that reforests an area of poor quality grazing land, but leads to the owners of the displaced livestock to clear land outside the project boundaries to establish new pastures. The types of activities that might result in leakage vary with the type of projects, but both LULUCF and non-LULUCF projects are subject to leakage. Leakage can often be minimized by good project design – such as in the example above by including improved pasture management around the plantation so that displaced livestock can be accommodated without further clearing (IPCC 2005)[7] .

Source of Funding

Official development assistance

Official development assistance (ODA) is defined in the *OECD Glossary of Statistical Terms* as follows:

Flows of official financing administered with the promotion of the economic development and welfare of developing countries as the main objective, and which are concessional in character with a grant element of at least 25 percent (using a fixed 10 percent rate of discount). By convention, ODA flows comprise contributions of donor government agencies, at all levels, to developing countries ("bilateral ODA") and to multilateral institutions. ODA receipts comprise disbursements by bilateral donors and multilateral institutions (*OECD Glossary of Statistical Terms*).

ODA is a category of development aid which flows from members of the OECD's Development Assistance Committee (developed countries) to countries on the Part I List of Aid Recipients (developing countries).

The Conference of the Parties (COP) has emphasized that projects funded by official development assistance are not eligible to be registered under the CDM:

[7] IPCC Good Practice Guidance for Land Use, Land –Use Change and Forestry 2005

Box 1: What are Approved Methodologies

There are two types of methodologies for afforestation and reforestation (A/R) the baseline methodology and the monitoring methodology. The baseline methodology used in a CDM project (including an A/R (forestry) project) represents the means by which the baseline scenario for that project is defined.

Thus, A/R (forestry) baseline methodologies are the tools used to define the changes in carbon stocks in the carbon pools within the project boundary that would occur in the absence of the project activity.

Monitoring methodology is the means by which the net anthropogenic GHG removals by sinks achieved by the A/R project are calculated, taking into account any emissions from sources within the project boundary. A monitoring methodology sets out how project proponents should develop and implement a monitoring plan for a project in order to gather the data required to calculate emission removals generated.

Both the baseline methodology and the monitoring methodology must be specified in the project design document (PDD). Project participants may use existing baseline and monitoring methodologies (called the **approved methodologies**) if methodologies appropriate to the project already exist. In this event, the PDD need only state the baseline and monitoring methodologies to be used (by reference number). If no baseline or monitoring methodologies appropriate to the project have yet been developed, a new methodology must be developed.

Each methodology (Baseline and monitoring) is described by its name lets say for example "Restoration of degraded lands through afforestation/reforestation" follwed by its reference number. Each methodology has been assigned an unique reference number like AR-AM0002, where AR refers to Afforestation –Reforestation- AM refers to Approved methodology, and 0002 is the reference number. Again A/R projects are either large scale which is projected to sequestered more than 16000 kilo tons of CO2 in the project period, or the small scale projects which projects to sequester up to or less than 16000 kilo tons of CO2.

In case there is no approved methodology resembling the proposed project activity a new methodology can be developed and approved. There is detailed procedure for that and not dealt with in this document.

List of Large scale approved methodologies (see web link below)

http://cdm.unfccc.int/methodologies/ARmethodologies/index.html

1. Reforestation of degraded land --- Version 3 AR-AM0001
2. Restoration of degraded lands through afforestation/reforestation --- Version 2 AR-AM0002
3. Reforestation or afforestation of land currently under agricultural use --- Version 3 AR-AM 0003
4. Reforestation or afforestation of land currently under agricultural use --- Version 3 AR-AM0004
5. Afforestation and reforestation project activities implemented for industrial and/or commercial uses --- Version 3 AR-AM0005
6. Afforestation/Reforestation with Trees Supported by Shrubs on Degraded Land --- Version 2 AR-AM0006
7. Afforestation and Reforestation of Land Currently Under Agricultural or Pastoral Use --- Version 4, AR-AM0007
8. Afforestation or reforestation on degraded land for sustainable wood production --- Version 3, AR-AM0008
9. Afforestation or reforestation on degraded land allowing for silvopastoral activities --- Version 3 AR-AM0009
10. Afforestation and reforestation project activities implemented on unmanaged grassland in reserve/protected areas --- Version 3 AR-AM0010
11. Afforestation and reforestation of degraded land --- Version 2 AR-ACM0001

Small scale methodologies

1. Simplified baseline and monitoring methodologies for small-scale afforestation and reforestation project activities under the clean development mechanism implemented on grasslands or croplands AR-AMS0001
2. Simplified baseline and monitoring methodologies for small-scale afforestation and reforestation project activities under the CDM implemented on settlements AR-AMS0002
3. Simplified baseline and monitoring methodology for small scale CDM afforestation and reforestation project activities implemented on wetlands AR-AMS0003
4. Simplified baseline and monitoring methodology for small-scale agroforestry - afforestation and reforestation project activities under the clean development mechanism AR- AMS 0004
5. Simplified baseline and monitoring methodology for small-scale afforestation and reforestation project activities under the clean development mechanism implemented on lands having low inherent potential to support living biomass AR-AMS0005

Challenges and uncertainties of carbon forestry projects

Since the genesis of CDM huge revenue in tune of $450 million (Point Carbon 2008) has been generated in various sectors, like energy, fossil fuel replacement etc. Of all the CDM projects till date registered through the UNFCCC, only eight is classified as Afforestation Reforestation project. It is surprising to know that so little progress has been made in this sector which offers enormous option to cut down CO_2 emissions; and helps the host country attain sustainable development through community participation The possible reasons for the poor performance of the forestry sector can be lack of knowledge and technical resource of the local communities to accommodate current rules of CDM. Also procedures and methodology and complex registration process makes it very difficult for such projects to push through. These projects have such high transaction costs that it is not economically feasible for an individual to take it up.

Track record of approval

Track record of approval is a key consideration for some in selecting between CDM and VCM standard. CDM has a very poor record for forestry projects approval. There many projects in the validation stage; a number have been there for some years.

Table 1. CDM forestry Projects under validation

Project Title	Host Country
Nerquihue Small-Scale CDM Afforestation Project using Mycorrhizal Inoculation in Chile	Chile
Afforestation and Reforestation on Degraded Lands in Northwest Sichuan, China	China
Reforestation of croplands and grasslands, in low income communities of Paraguarí Department, Paraguay	Paraguay
The International Small Group and Tree Planting Program (TIST), Tamil Nadu, India	India
Reforestation on Degraded Lands in Northwest Guangxi	China
CARBON SEQUESTRATION THROUGH REFORESTATION IN THE BOLIVIAN TROPICS BY SMALLHOLDERS OF "The Federacion de Comunidades Agropecuarias de Rurrenabaque (FECAR)"	Bolivia
Argos CO2 Offset Project, through reforestation activities for commercial use	Colombia
Reforestation of grazing Lands in Santo Domingo, Argentina	Argentina
Uganda Nile Basin Reforestation Project No.1	Uganda
Assisted Natural Regeneration of Degraded Lands in Albania	Albania
Uganda Nile Basin Reforestation Project No.4	Uganda
Uganda Nile Basin Reforestation Project No.2	Uganda
Forestry Project for the Chinchiná River Basin, an Environmental and Productive Alternative for the City and the Region	Colombia
AES Tiete Afforestation/Reforestation Project in the State of Sao Paulo, Brazil	Brazil

Source UNFCCC

VCM forestry projects have a slightly better track record for approval than CDM. There are at least six approved projects in the CCBA (Climate Community and Biodiversity Alliance) standard alone. See: http://www.climate-standards.org/projects/index.html and 15% of the VCM trades in 2007 were forestry related. Therefore the Voluntary market seems to be a good alternative for forestry carbon projects.

Biomass estimation and monitoring

Estimation of biomass needs to be very precise in case of CDM. Biomass estimation has always been a challenging task for scientists across the world and there are several debates regarding the methodology for its precise estimation. According to IPCC Good Practice guidance for LULUCF it is better to have local allometric equations for determining volume of trees. The challenge often faced by project developers that growth/yield statistics of non timber species are often not found in any literature, be it scientific study or forestry departments records. Therefore information on biomass should be made available in the forest working plans and management plans. This step would provide a tremendous boost for the development of forestry projects in India. Field foresters should be trained on the carbon credits component as well when they estimate the growing stocks in their areas.

Geographic identification of the lands

The CDM methodology requires that every parcel of land should have a distinct geographic location that can be plotted in GIS domain. This is a daunting task as the project had may have hundreds of discrete parcels of land and that to spread across the project area. In this regard the concern departments should include GPS marking of the land areas. This is initially a time consuming task, but once done it can prove to be a ready reference for many different types of development projects.

The **Price of carbon credits**

Price of CDM credits

Clean Development Mechanism (CDM) projects under LULUCF produces temporary credits. There are two types of temporary credits lCER or Long-term CER and tCER or temporary CERs. The choice of type of CERs depends on the stream of credits generated by the project, the market for each type of CER and the project's financial needs.

• tCERs – temporary certified emission reductions are the total amount of carbon sequestered (net baseline) since the project began and expire at the end of the commitment period subsequent to the period in which they were issued. They can be used in the commitment period for which they were issued. tCERs must be replaced in the commitment period that follows the one in which they were used they must be replaced.

• lCERs – long-term certified emission reductions are the amount of carbon sequestered (net baseline) since the last issuance of an lCER. They can be used in the commitment period for which they were issued and expire at the end of the crediting period (20, 30, 40 or 60 years) for which they were issued. They cannot be carried over to subsequent periods. If carbon is lost, lCERs must be replaced. When expired regularly, they need to be replaced by credit types other than lCERs or tCERs.

The market has no experience of expired credits from CDM forestry projects but there is general consensus that CER prices from forestry projects would be higher than VERs

Price of credits for VCM projects
Voluntary markets are exchanges of offsets by entities not subject to emissions caps. In contrast to compliance markets, forestry-related and other land use projects have played a much larger role in voluntary markets.

It is expected that with increasing effort to reduce carbon levels the price of carbon credits will rise for all schemes.

Prices of forestry CER/VERs (Voluntary Emission reduction) depend on number of factors discussed in the above sections. In general, CER's are expected to have a higher value than VERs because of the confidence that Kyoto Protocol certification attracts from buyers. However, it is unclear how big this divide will be for forestry credits since under CERs they are only temporary credits and currently there is no trade in those to establish a value. There is a trade in VERs and in 2007 forestry projects constituted 15% of the volume of trade in VERs, and credits from afforestation projects such as this one traded at a weighted average of $8.2/tonne. This was the third highest of 15 categories of project type (Hamilton et.al 2008)[8]

Even on the wider market, it is possible that the price differential will reduce as demand rises. This may particularly be the case for VER standard Voluntary Carbon Scheme (VCS. Now its standards are being proposed by the new US President as the domestic carbon sequestration standard for the USA. If this happens, the demand for VCS credits will rise sharply since the US regulations are likely to be backed by measures to cap and trade carbon emissions with VCS as the trading standard. This is likely to reduce the gap between VCS and CDM prices.

Transaction cost

Cost of project development
Project development expenditure is also very important in deciding between CDM and VCM. Following is the indicated figures for project development for a CDM project.

[8] Forging a Frontier: State of the Voluntary Carbon Markets 2008, A re p o r t by Ecosystem Mar k et pl ac e & New Car b o n Finance; Katherine Hamilton, Milo Sjardin, Thomas Marcello, Gordon Xu

Table 2

Cost	Estimated Financial requirements
Project Development and Establishment	US $ 25,000 – 75,000
Validation by DOE	US $ 10,000 – 15,000
CDM registration	US$ 0.10/CER for the first 15000tCO2 e/year, US$ 0.20/CER for any additional credit up to an annual maximum of us$ 35,0000
Adaptation fund	2% of CERs issued under project levied for fund to help vulnerable countries adapt to climate change (not for Small scale projects)
Host country tax	Sometimes the host country will tax CERs using either a standard sale tax or at a CDM-specific rate

Source: Forest Carbon Markets: Potential and Drawbacks; Ross W. Gorte and Jonathan L. Ramseur; CSR report for Congress, July 2008.

VCM projects have lower project development costs as there are ample scope of cost cutting at validation and verification stage; also consultancy fees for VCM projects are lower than that of the CDM projects. Moreover VCM projects do not require registration fees and host country taxation. These factors make VCM projects more attractive for small project proponents like farmers and small scale land owners.

Transaction cost is a big hurdle for development of forestry carbon projects. Funds in the form of subsidies and loan/grants etc should be specially earmarked for such project activities. The initial transaction cost if met can help generate profits many times of the cost incurred.

Potential of carbon sequestration projects in the Western Himalayan states.

The Western Himalayan states of India comprising of Jammu and Kashmir, Uttarakhand and Himachal Pradesh houses some of the old growth forests of high conservation value. The forest cover in these states put together is 61402 sq km (SFR 2005). On the other hand wastelands also comprise a significant proportion of land in theses states amounting to a total of 114781.15 sqkm of area.Therefore there exists a of potential of rehabilitating these lands through carbon forestry projects.These projects can in addition to socio economic and biodiversity benefits add to the upliftment of livelihood of the local communites of the region thereby promoting adaptation to climate change. A mixed model of compliance and voluntary market forestry projects can be developed depending on the aspects and conditionalities discussed elsewhere in this paper.

Table 3

State	Total geographic area km sq	Wasteland Km sq	% of Total wasteland area
Jammu & Kashmir	101387	70356.52	69.39
Himachal Pradesh	55673	28327.17	50.88
Uttarakhand	53483	16097.46	30.10
Total	210543	114781.15	

Source: Wasteland Atlas of India, 2005

Research needs in forestry

Carbon credits project is a complicated process and the complicacies get enormous in case of forestry projects. Therefore there is an urgent need to direct scientific research in this direction. Some areas that need immediate attention are identifying areas suitable for CDM forestry projects. Having local Volume tables and allometric equations is most important in the biomass estimation therefore dedicated research in this area would be very useful. Research should also address the local economy regarding forest and forest based industries. There is general lack of awareness regarding carbon credits and carbon market in the forestry sector, this need to be addressed through training and awareness campaigns. Capacity building of the forest department can provide real impetus to the formulation of CDM forestry projects; therefore there is an urgent need of training the forest officers regarding formulation and designing of carbon forestry projects. Moreover to gear up for upcoming REDD or REDD+ projects India should start landscape level research on carbon flux.

Conclusion

Forestry offers one of the best options to mitigate climate change. It is the single such sector where the local communities can be involved right from conception of the project till final registration. Moreover forestry offers ways for sustainable development and biodiversity conservation. Though CDM is a complicated process, it offers a unique opportunity for the local community to preserve and promote greenery and get paid for its initiative. Involvement of carbon credits provides greater vision and attracts international attention to the conservation and sustainable development initiative. If properly and meticulously designed the CDM forestry projects can prove to be a really boost to the local economy in a sustainable manner. Parallel non compliance markets like Voluntary Carbon Market (VCM) and the Chicago Climate exchange (CCX) are equally important and can provide cost efficient project development for sustainable management of forest resources. Current rules regarding working plan of forest has to be modified to accommodate the carbon sequestration potential of the forests in India. Data collection dedicated for forestry carbon offset projects should find emphasis in our working plan code. In the post Kyoto regime REDD or essentially REDD+ is expected to get a clearer vision and market direction. It is therefore a right time now to gear up for this opportunity as well and make our baseline inventory strong and meticulous so that this market can also be tapped to get compensated for our efforts and efficient policies that has helped India maintain and increase its forest cover in contrary to other developing nations.

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