

Vetiver: A Possible Initiator of Afforestation/Reforestation Projects

Under CDM^a

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1. Introduction

The **Khalsa Heritage Memorial** is a museum about Sikhism located on a 75-acre (300,000 m²) site in the holy city of Anand Pur Sahib, Punjab, India. The museum is intended to commemorate 500 years of Sikh history and the 300th anniversary of the Khalsa, the scriptures written by the 10th and last Guru of Sikhism, Gobind Singh.

The Foundation Stone was laid on Nov, 22, 1998, and the renowned Architect of Museums (Museum depicting the Jewish Holocaust in Jerusalem), Moshe Sefdie, was engaged for the Concept, Design and Overseeing the Project.

It is worthwhile reproducing the concept from a transcript of his video^c:

“My proposal was to flood the valley into a series of water gardens and to link it all to the fort. The structures rise from the Sand Cliffs. They are built in concrete and sandstones; the roofs are stainless Steel. They are facing the South and reflecting light towards the Temple itself. As you come from the North, it is all masonry growing out of sand cliffs, as you come from the Himalayas, evoking the tradition of the fortress.”

2. The Problem

The concept of Moshe Safdie was excellent and imaginative, but the sand cliffs could not be stabilized enough all these years. They eroded at every rainfall, thus,

1. Destroying vegetation on the cliffs themselves
2. Spreading silt all over, on roads etc.
3. Blocking the swales.
4. Filling up the water bodies with silt
5. Creating new Gullies and Rain cuts every time.

Many methods were tried, nothing succeeded. At the time of intervention some people were really suspicious of a Bio-Engineering solution via Vetiver.

3. Our Intervention

We started humbly. The Indian Architects (we were told that even Moshe Safdie was opposed) were not pleased with Vetiver. So we started in places where the aesthetics were not the prime consideration. We applied the usual methods, given in the Vetiver manuals for stabilizing the hillocks. We protected the swales from the migrating soil.

A steep slope of a filled up road batter was stabilized.

^a Clean Development Mechanism under Kyoto Protocol

^b Email: mpsingh@earthizenz.org

^c On one of TED's Shows

4. The Result

The results were excellent. The relatively bare hillocks became lush green and the hillocks seemed to be retaining moisture all year round.



It is then that we were asked to do something about the silt coming into the water body and all over on the inner roads. The comparative photos of the before and after scenarios of the Re-vegetation and Reforestation, are reproduced here. Similar comparison of the silt control is part of the oral presentation.

Not only did the Vetiver hold the cliffs together, it also caused the local species to flourish. It appeared that soon the local species will take over from Vetiver. But then the vetiver will be shaded out & die: like a true martyr it would have fought a lone

battle, initially and after vanquishing the enemy, would perish. Few years down the line, an onlooker will not even believe that a thing like Vetiver ever existed on these 'sand cliffs' as the architect called them. This was a true example of a re-vegetation & reforestation where the process begins with a species that vanishes after winning the battle for the local species.

A few years back (in 2006) the author had written a paper: "**VILLAGE EMPOWERED: Rural Bio-energy Production as a Bundled CDM Project**"**This paper revolved around the

** Paper presented in:

application of CDM^a under the Kyoto Protocol to the entire chain of production of bio-diesel; starting from the Afforestation & Reforestation with Jatropha to the actual usage of Bio-Diesel. The program in India was based on the premise that absolute wastelands could be used to grow



bio-diesel. This did not turn out to be exactly true.

This miracle of Vetiver has forced us to revisit forestation and re-forestation of degraded and useless land. We have with us a “martyr”(Vetiver) to lead the assault on the negativities that are troubling the land.

There are several instances of Vetiver improving various types of degraded soils.

The assumption is that over a span of several months, vetiver would have prepared the ground for the local species and some new desirable species to flourish on the same land.

Obviously there

will be a sharp rise in the quality of the land and the local Carbon Stock would increase manifold. Which further means that Vetiver can be the Champion of a GHG^b mitigating project,

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- i. The 3rd International Biofuels Conference, January 18-19 2006.
 - ii. UNCTAD ECOWAS Bank Biofuels Workshop, ACCRA, Ghana, 13–14 November 2006
 - iii. First International Conference in Asia on Agri Revolution, Mumbai 15-17 March, 2007

^a Clean development Mechanism. More details can be seen at www.unfccc.int

^b Green House Gas

under the Kyoto Protocol for now (upto2010) and under the same or some other arrangement that the COP^a might agree to.

5. Afforestation & Reforestation:

As per COP7 (2001) through COP 10 (Feb. 2005), afforestation and reforestation are the only eligible land use activities in the CDM. The definitions of forest for this purpose is:

- Forest is a minimum area of land of 0.05-1.0 hectares
- with tree crown cover of more than 10-30 per cent
- with trees with the potential to reach a minimum height of 2-5 ms. at maturity in situ.

Special provisions are provided for small scale afforestation & reforestation projects. Many small scale projects can also be bundled(UNFCCC^d), so that the fixed costs of registration can be spread out.

The CDM Impact On Afforestation & Reforestation

The first phase of CDM until the year 2012 is open to reforestation and afforestation projects in developing countries as defined in the CDM guidelines and modalities and procedures finalized at COP^e 9 & COP 10 for such projects. The main criteria to be met by projects include meeting benchmarks of additionality (ie on top of business as usual scenario), permanence of emission reductions achieved and no leakage (ie ensuring that emissions achieved at one location are not emitted elsewhere).

"Small-scale afforestation and reforestation project activities under the CDM" are those that are expected to result in net anthropogenic greenhouse gas removals by sinks of less than 8 kilotonnes of CO₂^f per year and are developed or implemented by low-income communities and individuals as determined by the host party. If a small-scale afforestation or reforestation project activity under the CDM results in net anthropogenic greenhouse gas removals by sinks greater than 8 kilotonnes of CO₂ per year, the excess removals will not be eligible for the issuance of tCERs^g or ICERs^h ". (UNFCCC).

The key features as per the definition are:

- The projects should sequester upto 16 kilotonnes of carbon annually.
- They are implemented by low income communities.
- There is scope for bundling of projects of similar nature so that cumulatively the units sequester upto 16 kilotonnes of carbon.

Assuming an average productivity of 5 tons/haⁱ, the area required for bundled small scale CDM projects would range between 250 to 400 ha, varying with species and plant density. The energy plantations of *Jatropha* would be principally eligible under this category of CDM projects. **(Hooda & Rawat, 2004)**. At the current rate of exchange of CERs (As per trading figures of

^a Conference of Parties

^b Direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land.

^c Direct human-induced conversion of non-forested land to forested land. Land was forested earlier but had to be converted to non-forested land. The land should not have contained forest on December 31, 1989.

^d United Nations Framework Convention on Climate Change

^e Conference of Parties

^f Carbon Dioxide

^g Temporary Certified Emissions Reduction

^h Long term Certified Emissions Reduction

ⁱ Hectare

June, 2008, the rate is Euro 20 or US \$ 30/tCO₂e^a) this translates into \$ 2,40,000 per annum, which means \$ 24,00,000 (Rs. 10.32 Crore @ Rs.43/USD) over a 10 year period. Taking the worst case scenario, that is size of project as 400 Ha, we have CDM credit amounting to \$6000/ha or Rs.2,58,000/ha. This is nearly 10 times the total cost of cultivation on one Ha of wasteland.

The above is a broad example, however, each project would be calculated as per its 'Net anthropogenic GHG removals by sinks^b', which would be 'Actual net GHG removals by sinks^c' minus 'Baseline net GHG removals by sinks^d', minus 'Leakage^e'.

This means that the Government needs to:

- Facilitate the bundling of small forestation projects so that the total net GHG removal is just under 16 kilotonnes per annum (definition given above).
- Finalize the carbon stocks of the areas at the time in the past arrived at by definitions of afforestation and reforestation and estimate the baseline net removals.

Ensure that the credits accruing thus, are transferred to the small farmer via the guarantee of pay back of loan refinanced by banks like World Bank etc.

This was just a sample calculation. However the actual calculations will depend on the methodology selected. The existing Approved Methodologies do not provide for a step before the actual start of the process of planting. However, the least amount disturbance to Pre-project activity is preferred in all cases. Vetiver, if preceding the actual Planting would involve minimal disturbance to the pre-project Activity.

6. Some Existing Approved Methodologies^f Source: UNFCCC

1. **AR-ACM0001:** Afforestation and Reforestation of degraded land.
2. **AR-ACM0002:** Afforestation or reforestation of degraded land without displacement of pre-project activities
3. **AR-AMS0005:** 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
4. **AR-AM0002:** Restoration of degraded lands through afforestation/reforestation
5. **AR-AM0006:** Afforestation/reforestation with trees supported by shrubs on degraded land

^a Ton Carbon Dioxide equivalent

^b Actual net GHG removals by sinks minus the baseline net GHG removals by sinks minus leakage

^c Sum of the verifiable changes in carbon stocks in the carbon pools within the project boundary, minus the increase in emissions of the GHGs measured in CO₂ equivalents by the sources that are increased as a result of the implementation of the AR project activity, while avoiding double counting, within the project boundary, attributable to the AR project activity under CDM.

^d Sum of Changes in Carbon stocks in the carbon pools within the project boundary that would have occurred in absence of AR project activity under CDM.

^e Increase in GHG emissions by sources which occurs outside the boundary of an AR project activity under CDM which is measurable and attributable to AR project activity.

^f Under Clean Development Mechanism as it exists till 2012

7. **Conclusion:** AR projects only took off in the last couple of years. Looking at the unique quality of Vetiver of surviving on degraded soils, coupled with its property of being shaded out, after the local species have taken over; it seems to be a good candidate for initiating these tricky projects.

The above methodologies can be a basis of developing a methodology that includes Vetiver as the initiator. Without such initiated some lands will never improve. It is for all of us in the Vetiver Network to take this forward.

REFERENCES

1. Earthizen: www.earthizenz.org
2. Galinski W.; Project Based Mechanisms, UNFCCC Secretariat; Presentation made at the UNCTAD & ECOWAS Bank Regional Workshop Financing Biofuels and Jatropha Plantation Projects with Special Emphasis on Clean Development Mechanisms (CDM), Accra, Ghana Nov 13-14, 2006
3. Hooda N. and Rawat V.R.S., Role of Bio-Energy plantations for carbon-di-oxide mitigation with special reference to India, 2004. Paper presented at International Conference on, 'Greenhouse Gas Emissions and Abrupt Climate Change: Positive Options & Robust Policy' at Paris.
4. Intergovernmental Panel on Climate Change (IPCC). www.ipcc.ch
5. Karmakar, K.G. and M. S. Haque, Economics of Cultivation of Bio-Diesel Tree, Jatropha Curcus in Wastelands, Paper presented at International Conference on Biofuels, New Delhi, Sept. 16-17, 2004.
6. Singh M.P. & Kalha G.; Presentation made at the UNCTAD & ECOWAS Bank Regional Workshop Financing Biofuels and Jatropha Plantation Projects with Special Emphasis on Clean Development Mechanisms (CDM), Accra, Ghana Nov 13-14, 2006
7. UNFCCC, (United Nations Framework Convention for Climate Change)
www.cdm.unfccc.int