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Feasibility and Impact Assessment for a CDM reforestation project in the region of Parque Nacional Santa Fe, Veraguas

Evaluación de la factibilidad y de los impactos de un Proyecto MDL de Reforestación en la región del Parque Nacional Santa Fe, Veraguas

Final Report

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Acronyms

ANAM	Autoridad Nacional del Ambiente
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
GHG	Greenhouse Gas
PDD	Project Design Document
PNCC	Programa Nacional de Cambio Climático
MIDA	Ministerio de Desarrollo Agropecuario
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UNPF	United Nations Population Fund

Time Investments

The research presented in this document was principally achieved in the City of Panamá. We additionally spent over a week in the region of Santa Fe to conduct interviews with landholders in the area.

Number of full days spent on the project in Panamá:

280 hours = 35 days of 8 hours

Number of full days spent in the Field (Santa Fé, El Pantano, Vueltas Largas, Bajo San Juan, Las Quebradas):

40 hours = 5 days of 8 hours

Feasibility and Impact Assessment for a CDM reforestation project in the region of Parque Nacional Santa Fe, Veraguas

Geri Blinick and Caroline Belair

Host: ANAM (Programa Nacional de Cambio Climático)

Executive Summary

General context

Article 12 of the Kyoto Protocol provides for the clean development mechanism (CDM), in which Annex-1 countries can meet their carbon emissions reduction quotas by purchasing emission reductions from developing countries. Such purchases can serve to support sustainable development projects in developing countries, such as reforestation initiatives that sequester carbon. The Autoridad Nacional del Ambiente (ANAM), specifically its climate change sector, has for some time envisioned a CDM reforestation project in the region of the Parque Nacional Santa Fe, which is situated in the upper region of the Santa Maria Watershed, in the province of Veraguas. A CDM reforestation project would serve to re-establish forest cover in an area marked by increasing levels of deforestation and would generate alternative, sustainable sources of income to improve local livelihoods.

Goals

This study investigates the feasibility of a CDM reforestation in the region. It seeks to outline the major obstacles to such an initiative. The ability of such a project to contribute to sustainable development in the region will be discussed. Future steps for ANAM to undertake and suggestions will be addressed.

Methods and approaches

Forty-one personal interviews were conducted in the region from March 10th 2005 to March 18th 2005. The interviews assessed general knowledge of the benefits of reforestation, knowledge of the possibility of CDM and interest of landholders in reforesting their land. For those interested, current land use tendencies, amount of land available for reforestation, as well as the suitability of their land for CDM reforestation was recorded. Organizations and cooperatives in the area were investigated as sources of administrative and financial resources in the development of such a project. Additionally, research was conducted from Panama City in the form of reading material and interviews with experts concerning the intricacies of the CDM process and possible sources of funding for a CDM initiative.

Results

It was clear from the interviews that the sampled population was well aware of the environmental benefits of reforestation, particularly in respect to global warming and protection of the Santa Maria River. It appeared that a reforestation project would be received positively. Additionally, amongst the landholders willing to reforest their own lands, enough land was suitable for a CDM reforestation project, that is, land that held an official land title and has been deforested since 1989. The presence of multiple cooperatives in the area indicated experience with community projects. Additionally, organizations in the area such as MIDA and Fundación Hector Gallego were identified as potential organizations to help coordinate such a project.

While the above creates a suitable environment for CDM reforestation, obstacles to successful CDM reforestation success include obtaining initial funding, lack of an umbrella organization

with the time and money to coordinate the project, and the inability of CDM to favour smaller landholders, which are less cost-efficient, in a competitive carbon market and to better promote sustainable development objectives.

Conclusions

It appears that a CDM reforestation project could be possible in the region but that considerations must be taken to overcome the obstacles. Suggestions include a CDM presentation for ANAM in region to introduce the idea and the creation of a tree nursery to provide trees for those interested in reforesting in the region, employment, and education for children.

Evaluación de la factibilidad y de los impactos de un Proyecto MDL de Reforestación en la región del Parque Nacional Santa Fe, Veraguas

Geri Blinick and Caroline Belair
Anfitrión: ANAM (Programa Nacional de Cambio Climático)

Resumen Ejecutivo

Contexto General

El Mecanismo de Desarrollo Limpio (MDL) está establecido en el Protocolo de Kyoto. El MDL permite a los gobiernos o entidades privadas de países industrializados a suportar proyectos sostenibles de reducción de emisiones en países en desarrollo, y a recibir créditos en la forma de "reducciones certificadas de las emisiones", o CERs, las cuáles pueden ser contabilizadas dentro de sus objetivos nacionales de reducción. La Autoridad Nacional del Ambiente (ANAM) y su sector cambio climático, identifica la región dentro y alrededor del Parque Nacional Santa Fe, en la provincia de Veraguas, como una posibilidad para un proyecto MDL de reforestación.

Objetivos

Este estudio establece si un proyecto de reforestación MDL hace sentido para la región de Santa Fe y identifica los obstáculos mayores a ese tipo de desarrollo en la región. Sugiere opciones para el desarrollo de ese tipo de proyecto en la región. También, examina la capacidad de MDL a entregar beneficios de desarrollo sostenible en la región.

Metodología

A través de entrevistas en los pueblos de El Pantano, Santa Fe, Vueltas Largas, Bajo San Juan, y Las Quebradas, del 10 de Marzo al 18 de Marzo 2005, establecimos el sentimiento de una parte de la población sobre reforestación. También, investigamos si hay tierra para reforestación y si esa tierra está apropiada para MDL. Buscamos organizaciones en la región que podrían ayudar al proyecto. De la ciudad de Panamá, conducimos un estudio sobre MDL, lo que es importante para su desarrollo, y lo que se necesita en la región. También, compilamos las posibilidades para financiamiento de ese tipo de proyecto.

Resultados

Las entrevistas indicaron que a los dueños de la tierra les importa mucho la reforestación y la mitad de los dueños con quien hablamos querían reforestar sus tierras. También, había bastante tierra que se podría usar por un proyecto MDL, que era deforestada desde 1989 y con título oficial de propiedad. Había organizaciones en la región que podrían ayudar con el proyecto.

Obstáculos del proyecto incluyen financiamiento para iniciar el proyecto, falta de organizaciones en la región que tienen los recursos para coordinar ese tipo de proyecto, y hacer que el proyecto sea sostenible y disminuye ilegalidad.

Conclusiones y sugerencias

Un proyecto de reforestación de MDL sería posible en la región pero hay obstáculos que se deben resolver. También es difícil de desarrollar el proyecto de una manera sostenible porque los que tienen mucha tierra están preferidos. Sugerencias incluyen una presentación para las comunidades sobre la opción de MDL. También se podría crear un vivero de árboles para crear empleos, educar niños y apropiar árboles para los que quieren reforestar sin MDL.

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A. INTRODUCTION AND CONTEXT OF STUDY

GLOBAL WARMING AND CARBON DIOXIDE

There has been a marked, anthropogenic rise in atmospheric carbon dioxide (CO₂) levels since the industrial revolution. Climate modeling projections and historical ice core analyses have permitted scientists to infer the effects of this increase (Kump et al., 1998). Rising sea levels, notable differences in precipitation, temperature, and other climatic factors, have been identified and accepted as likely possibilities (Kump et al., 1998). Such changes in climate are projected to have adverse effects on both human and environmental well-being, and the poorest regions have been identified as most vulnerable. Panama, with such a high coastal to inland ratio, is projected to be severely affected by such changes in climate.

THE INTERNATIONAL RESPONSE: THE KYOTO PROTOCOL AND THE CLEAN DEVELOPMENT MECHANISM (CDM)

In order to tackle the rise in greenhouse gases such as carbon dioxide, the **Kyoto Protocol** commits industrialized countries “to individual, legally-binding targets to limit or reduce their greenhouse gas emissions...to a total cut in greenhouse-gas emissions of at least 5% from 1990 levels in the commitment period 2008-2012.” (UNFCCC, 2005). Thus every country that has ratified the protocol is committed to decrease total emissions to the targeted level. These reductions can take place either through domestic policies and measures or through emissions trading on the international market.

Article 12 of the Kyoto Protocol helps industrialized countries achieve their reduction targets by introducing the Clean Development Mechanism (CDM). Through CDM, developed countries can purchase Certified Emissions Reductions (CERs) from developing countries while financially supporting sustainable development in these countries:

The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention [to decrease GHG emissions], and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments (UNFCCC (1998), Article 12).

Thus CDM aims to aid developed countries meet their emissions reductions targets while simultaneously helping to finance economically and environmentally sustainable projects that generate CERs in developing countries.

Possible CDM project types include energy efficiency, methane recovery, industrial process change, cogeneration, transport, agricultural, and land use projects (Energy & Environment Group, 2003). Land use changes are limited to reforestation and afforestation, as reforested areas sequester carbon through tree growth to generate Certified Emission Reductions. Afforestation differs from reforestation only in that it takes place on land that has not been forested for at least 50 years, while reforestation takes place on lands that did not contain forest before 1990 (Smith and Scherr, 2002). Most CDM projects under consideration at the present are large-scale renewable energy or

energy efficiency projects (CDM Watch, 2005). As of March 2004, more than 75 CDM were underway, however, none had been officially approved.

THE NATIONAL RESPONSE AND OUR HOST, THE PNCC OF ANAM:

Autoridad Nacional del Ambiente (ANAM)

The Autoridad Nacional del Ambiente was created in 1998 as an autonomous entity affiliated to the Government of Panamá whose mission is to promote the valuation, protection, conservation and recuperation of the environment and the sustainable use of the natural resources.

Programa Nacional de Cambio Climático (PNCC)

The climate change sector of ANAM, the PNCC, is responsible for elaborating and executing the national policy for climate change. Responsibilities of the PNCC include providing institutional and legal mechanisms to fulfill Panamá's engagements with the Kyoto Protocol. One of the ways is through the elaboration of processes such as the Clean Development Mechanism (CDM). CDM projects fit under the PNCC subprogram of mitigation, which strives to prevent the anticipated climate change by increasing the size of existing carbon dioxide pools. In respect to CDM, the PNCC's tasks include identifying suitability of potential projects, assisting investors in designing their projects, seeking financial support from interested investors to enable CDM projects, and keeping stakeholders informed about CDM. (ANAM, 2005)

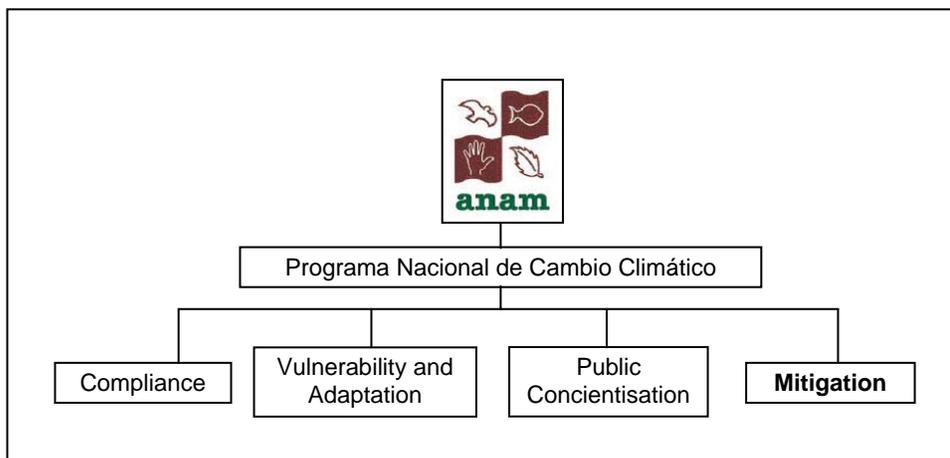


Figure 1: ANAM and PNCC institutional configuration

CDM IN PANAMA

Thus far, only projects in the energy sector have fully developed in Panama. These consist of hydroelectric projects, specifically with the companies Esti, Bayano, and Fortuna (CDM Watch, 2005). The Dutch Government has selected all three projects as suppliers of carbon credits. Panama has concluded a memorandum of Understanding with both the Netherlands and Spain on joint efforts aimed at reducing greenhouse gas emissions (CDM Watch, 2005). In the forestry sector, several areas have been identified as potential project areas. It has been calculated that Panama has a total of 826,051 hectares available for reforestation under CDM. These lands

qualify for Kyoto in that they have been deforested since 1989 and are biophysically adequate for reforestation. Of these lands, 141,748 hectares could be used for plantations and 684,313 hectares for assisted reforestation. The provinces identified as having the best potential for the development of CDM forestry projects are the Darien, Chiriqui, and Veraguas (Hughes, 2003).

POTENTIAL FOR CDM IN THE SANTA FE DISTRICT

ANAM has identified the upper region of the Santa Maria Watershed, near the Parque Nacional Santa Fe, as a possible site for the development of a CDM reforestation project.

McGill Panama Field Study Semester students from the 2004 program, Maxime Rivet and Veronique Roy-Bouliane, established the first step of the CDM process by creating a baseline, which entails identifying the present land use tendencies in the region and most likely future land uses. They identified cattle ranching as the economic activity most likely to be further explored in the region of Santa Fe. Their study highlighted the likelihood of continued reduction of forest cover in the region, due to the likely expansion of cattle ranching and agriculture as an economic activities and land uses.

The residents in Santa Fe were identified as very poor and vulnerable, with little economic opportunity and strong dependence on the land. Very little of the land is under legal land title. 80% of the households are reported to cook using firewood adding to the high pressure on the land and forests. A lack of financial assistance in the area was noted to be severely lacking, hindering large-scale agricultural development away from slash and burn subsistence agriculture.

In addition the continual pressures of cattle ranching and subsistence agriculture on the forests of the region, few barriers to deforestation were identified. (Rivet and Roy-Bouliane, 2004)

The potential benefits of CDM reforestation or afforestation projects in the region are numerous. Although carbon sequestration is the ultimate goal of CDM reforestation projects, reforestation projects can have other local environmental benefits such as decreased land salinity, decreased erosion, an alleviation of future pressures on native forests, and improved water quality (Herbohna, 2000). These benefits would be ideal in the region of Santa Fe due to the presence of the watershed of the Santa Maria River. The Santa Maria River is the main river in the area and the largest river in Panama. It provides water for the provinces of Veraguas, Cocolé, and Herrera (Rivet and Roy-Bouliane, 2004). Of equal importance, CDM reforestation projects have the potential to contribute economically to local livelihoods, by providing an additional, sustainable source of income via compensation for carbon credits. Such a project could potentially help alleviate the widespread poverty in the region.

Despite the incredible potential benefits CDM reforestation project can offer communities or individuals, its ability to improve local livelihoods is highly contingent on numerous factors, including characteristics of the region. When we first began communicating with the supervisors at ANAM it became very obvious that CDM projects are highly constrained by limiting economic and social factors. Costly projects such as CDM reforestation initiatives are contingent upon obtaining adequate funding. Small-scale projects are especially problematic because many transaction costs, such as consultant costs, are fixed regardless of project size (Energy & Environment Group, 2003). Availability of enough land to reforest and to generate enough

carbon credits to overcome these transaction costs is therefore important. The presence of strong commitment to the project, as well as institutions and organizations in the region to help organize individuals, can also significantly facilitate the process and reduce costs (Smith and Scherr, 2002). Social factors, such as strong local participation, have been identified by experts on the CDM process as key to the success of CDM projects in terms of improving local livelihoods (Smith and Scherr, 2002). There are many factors that must be considered when selecting a location for the project. As Smith and Scherr note: "...projects are likely to be successful only in well-targeted sites" ... "Investors are advised to seek sites where potential risks to local livelihoods are low" (37).

While it is important to examine the suitability of the region for CDM reforestation, it is also vital to address the ability of CDM reforestation projects to benefit the region and promote sustainable development. Recently, there has been recognition that development projects have a tendency to perpetuate inequality that exists between urban and rural areas, as well as between elites and the poor. When development projects do focus on rural areas, they tend to benefit the rural elites. Michael Lipton argues that: rural poor are triply disadvantaged by development trends: "because countryfolk start poorer; because rural resources [are] largely [allotted] to the rural rich (who sell food to the cities); and because the great inequality of power within the towns renders urban resources especially likely to go the resident elites" (Lipton, 375).

Panama has an extremely high GINI index (56.4), indicating severe inequality throughout the Republic (World Resources Institute, 2004). The possibility of perpetuating, or increasing the severe inequality that currently exists needs to be examined and evaluated, prior to beginning a project. Handelman (2003) defines economic underdevelopment as: "poverty [which] can be measured by two economic phenomena: a low level of national production (per capita GDP) and an inequitable distribution of national income" (3). Thus a sustainable development project that, in reality, increases inequality, fails its own stated purpose. Therefore it is important to evaluate both the feasibility and likely impacts of a project prior to its implementation.

B. OBJECTIVES OF STUDY:

The steps of the CDM process accomplished prior to our study were the beginning of the baseline by McGill students. An assessment of whether a CDM reforestation project is feasible, profitable and logical for the area was deemed necessary before more time and resources are spent continuing with the next steps of the CDM process. The assessment would serve to explore:

1. The **suitability of the region of Santa Fe** for a CDM reforestation project and the major obstacles to overcome for successful CDM reforestation project implementation.
2. The ability of a CDM reforestation project **to benefit** local landholders and the region and **provide sustainable development benefits** for Panama.
3. **Future directions for the project**, such as local organizations that could potentially help and individuals with interest in such a project.
4. **Recommendations** and options for the development of a CDM reforestation project

This assessment would be useful for ANAM in determining the next steps to undertake in the region.

A key factor to the feasibility of a CDM reforestation initiative in the area is the availability of funds to cover initial costs. Therefore, additional research was conducted from Panama City in the form of reading material and interviews with experts regarding possible sources of funding appropriate for the region that could be available for a CDM initiative.

Finally, in order to share our results with the communities in the area, a short report in Spanish was written to describe CDM, outline our results, and discuss possible sources of funding for reforestation projects in the region. This report will be handed in to the mayor of Santa Fe.

C. METHODOLOGY:

The suitability of the region of Santa Fe for a CDM reforestation project:

As the first part of our methodology, a preliminary analysis was conducted to establish characteristics of an area that are necessary to develop successful CDM reforestation projects. The analysis included literature searches, examinations of past case studies, and interviews with experts on the subject.

From this preliminary research, we established the major factors are critical to our study:

1. Whether landholders have an interest and would be willing to commit to a reforestation project.
2. Whether there is enough land amongst interested landholder to reforest and merit the transaction costs of the CDM process.
3. Whether the land available is suitable for CDM reforestation purposes, that is, whether it has been deforested since 1989 and whether landowners hold an official land title.
4. Whether institutional capacity exists in the area to provide organizational services and/or funding to cover initial costs of such a project. Particularly, whether there is infrastructure present that could serve as umbrella organizations for such a project.

In order to assess these factors, personal interviews were conducted with landowners in the towns of El Pantano, Santa Fe, Vueltas Largas, Bajo San Juan, and Las Quebradas, from March 10th 2005 to March 18th 2005. Interviews were conducted from door to door in a randomly chosen manner. The interviews assessed:

1. General knowledge of the benefits of reforestation and knowledge of the possibility of CDM
2. Current land use
3. Interest of landholders in reforesting their land
4. Whether enough land is available for reforestation in the area to merit the transaction costs of such a process (greater than 800 hectares – see appendix 2)
5. Whether landowners possessed land titles

6. Whether their land was cleared prior to 1990

During this time we also met with organizations and cooperatives in the area to discuss their roles and interest in reforestation.

The ability of a CDM reforestation project to provide sustainable development benefits for Panama:

In order to help assure that CDM projects fulfill their role as a sustainable development initiative, Olhoff et. al. have created a procedure for sustainability assessment which should be applied to all CDM projects. The first two steps “**set the background by establishing an overview of national development goals and basing the selection of SD criteria on this overview**”. Step 3 is the initial screening for potential CDM projects. Step 4 defines indicators and procedure for assessing SD impacts. **Step 5 involves “broader decision-making on CDM project selection seen in context of national SD contribution as a part of more general activities to develop CDM project portfolios”.** It involves detailed assessment of CDM project impacts on SD priorities and “**may eventually involve redesigning (some) projects in order to incorporate SD policy priorities**”. In Step 6 the performance of the implemented project is evaluated. (Olhoff et. al., 16)

Using Olhoff et al’s model for project sustainability assessment, the potential consequences of CDM reforestation in Santa Fe were explored in light of Panama’s development goals.

Possible Sources of Funding:

Research was conducted through interviews and Internet searches to establish a list of possible sources of funding for such a project in the region.

D. RESULTS

a. FACTORS FROM THE LITERATURE UPON WHICH THE SUCCESS OF A CDM REFORESTATION PROJECT IS CONTINGENT:

1. Willingness and interest of landholders in reforestation:

Logically, the development of a CDM reforestation project is contingent on the willingness and commitment of landowners to reforest their lands. Furthermore, the ability of CDM reforestation projects to benefit local communities is highly dependent on local participation and commitment (Cacho et al, 2002). Scherr and Smith 2002 also emphasize the importance of strong local participation in order to reduce poverty and empower local people. Public participation, strongly influenced by the level of commitment to reforestation, increases the likelihood that all the objectives of CDM, including carbon sequestration and sustainable development, will be met (Milne, 1999).

2. Organizational capabilities:

The administrative procedures and complexities of the CDM process require a strong organizational infrastructure on the part of the applicants (Scherr and Smith, 2002). Local organizations are needed for an array of services. These include management support, financial advice, legal services, mediation, technical assistance, marketing support and market information. Scherr and Smith (2002) state that “conservation and development assistance organizations can play a strategic and pivotal role as brokers, intermediaries and service providers for community-based forest carbon projects”(36) Community organizations may also be important from the point of view of attracting investors: “Investors are advised to seek sites where community organization is already fairly well developed” (Scherr and Smith, 2002, 37)

An examination of successful CDM case studies also illustrates the importance of institutional capacity to provide umbrella organizations for the process. Case studies such as Scoler Te in Mexico and PROFAFOR in Ecuador relied on umbrella organizations to head the project and provide indispensable services. The Sociedad Inversora Forestal served this role in a reforestation projects in Chile and reforestation projects in Virilla and Klinki, Costa Rica, were also managed by strong and resourceful organizations.(Milne, 1999)

3. Capacity to reduce transaction costs and surmount these costs

The Clean Development Mechanism adopts a realistic approach to environmental protection: the need for financial incentives to encourage conservationist behavior and the need for financial support to allow for sustainable development in poverty stricken regions. A discussion with the mayor of the Santa Fe district, Sra. de Castellón, highlighted the same issue for the Santa Fe region: rare are those who can act purely out of environmental intentions, and people’s behavior therefore remains influenced mainly by economic incentives (Personal Conversation, March 15 2005).

The CDM procedure is costly in itself, and it is therefore imperative to assess the economic profitability and feasibility of a CDM initiative in the region. According to Cacho et al. (2002), transaction costs for the CDM procedure include search costs, negotiation costs, verification and certification costs, implementation costs, monitoring costs, legal costs, enforcement costs, and insurance costs. A large part of the economic feasibility of a CDM reforestation project stems from having enough land available to reforest to cover the costs of the project itself. Transaction costs are key to examine as they have been identified as a potential impediment to the CDM process for small landholders, which cannot generate as many CERs, throughout the literature. (Baumert et al, 2000, McCarthy et al, 2001, Smith and Scherr, 2002)

In the context of CDM, transaction costs are “expenses spent on measuring what is being exchanged and enforcing agreements associated with a CER purchase” (Energy & Environment Group, 2003, A-34). These costs are explored in table 1. Of these costs, legal work, validation and verification are highly fixed.(Energy & Environment Group, 2003)

Table 1. Financial Estimates for costs according to the Energy & Environment group of the UNDP (2003) . Note¹

Up Front (pre-operational) Transaction Costs	Amount
Feasibility Assessment	\$5,000-20,000
Preparation of PDD	\$25,000-40,000
Registration	\$5,000-30,000
Validation	\$10,000-15,000
Legal Work	\$20,000-25,000
Total Up Front Transaction Costs	\$70,000-110,000
Operational Costs	
Sales of CERs	5-10% of CER value
Risk Mitigation	1-3% of CER values yearly
Monitoring and Verification	\$3,000-15,000

Overcoming Transaction Costs:

a. Availability of larger amounts of land to reforest will allow project to be profitable.

Transaction costs lend themselves well to large-scale reforestation initiatives as many costs tend to be fixed regardless of project size. There must therefore be enough land reforested, carbon sequestered, and CERs generated to surpass the cost of the transactions. As Scherr and Smith (2002) explain, “transaction costs are characterized by economies of scale... The bigger the area, the more tons of carbon involved and the lower the unit costs of items like project design, management and certification” (40). Calculations have shown that a minimum of 800 hectares is necessary to cover transaction costs. See Appendix 1 for more details.

b. Develop projects with groups of smallholders rather than with them individually.

It is unlikely that one landholder in the region would possess enough land to merit such transaction costs. The option of bundling therefore exists, where projects can be developed as a group of multiple landholders. Through bundling, the costs of baseline development, monitoring, host country approval and validation will apply to all projects in the bundle (Energy & Environment Group, 2003). Scherr and Smith (2002) explain that, however, transaction costs will be much higher for projects involving smallholders and communities that must be coordinated. Some transaction costs can be reduced through careful selection of participants.

¹ **The CDM executive board has taken action to reduce transaction costs. Small-scale projects,** which reduce anthropogenic emissions by sources and directly emit less than 15,000 kilotons of carbon dioxide per year, **have different procedural guidelines that were created to help reduce transaction costs.** (Source: http://cdm.unfccc.int/projects/pac/pac_ssc.html). These include a simplified PDD, simplified baseline determination, the possibility of bundling, simplified environmental impact analysis, lower registration fee, shorter review period, and the possibility of using the same DOE to validate and verify /certify emissions. Therefore it is possible that total transaction costs could be lower.

For example, De John et al.(2000) estimated that the costs of achieving a high level of local participation varied from 52\$/ha for communities with positive past experiences with projects, to as much as 325\$/ha for communities characterized by a high degree of conflict. In this case, the capacity for collective action and organization is essential to the success of the project.

c. Institutional mechanisms

Institutions, such as NGOs, multilateral or national institutions play a key role in minimizing transaction costs (Milne, 1999). Local institutions may also be important, as these are already involved in community projects and their experience can be drawn upon. These organizations must be in close proximity to the participants and be able to receive feedback regularly.

4. Suitability of Land available.

An important aspect of land eligibility of CDM reforestation initiatives is that these lands must have been deforested before 1989. Additionally, lands with official land titles can greatly ease the development of bundling projects and avoid conflict. Scherr and Smith (2002) explain: “Where land rights provide only weak protection for local people, CDM projects should not be approved lest they trigger ‘land grabs’ by more powerful constituents (private or governmental), in order to obtain carbon payments.”(27) The cost of obtaining land titles should a project develop should be included in total costs.

Additionally, current land use tendencies are important to establish. Land that is already being used for coffee, banana, plantain, or other tree plantations and on which can only be added a small number of trees is not cost-efficient. Projects that fix less than two or three tons of carbon per hectare per year cannot be monitored in a cost-effective way, as they are equal to the costs of measuring 10 to 15 tons of carbon per hectare per year (though the return on investment is much higher in the latter) (MacDicken, 1997).

5. Funding

The availability of funding internationally, nationally, or locally is extremely important for two major reasons.

Firstly, funds are needed to initiate the project and cover initial transaction costs. A look at Table 1 demonstrates the magnitude of pre-operational transaction costs; total costs will be augmented even further by production costs. Given the poverty of the region, the purchasing of emission reductions (CERs) solely after they are certified would be inadequate. Initial sources of funding would be necessary. The Klinki project exemplifies the problems associated with establishing projects without initial funding for research and development, where planting had to be delayed for two years due to lack of funding (Milne, 1999).

Secondly, small-scale initiatives may not be as attractive to investors as large-scale plantations, for reasons of cost-effectiveness. This issue has been described as the “small-scale CDM dilemma”: in which projects are characterized by “a high potential to contribute to sustainability with the inability to attract private CDM investments”(Sutter et al., 5). Therefore, a project in the Santa Fe area may require types of funding that favor sustainable development initiatives.

The issue of possible sources of funding will be tackled in appendix 2.

b. RESULTS FROM FIELD STUDY IN SANTA FE

Table 2. General characteristics of Each Town visited

Source: Censo de Poblacion y Vivienda 2000, Contraloria General				
Town	Number of Households	Population size	Population for 18 and over	People involved in agricultural activities
El Pantano	30	95	69	33
Santa Fe	197	877	565	117
Bajo San Juan	19	69	46	10
Vueltas Largas	67	285	164	54
Las Quebradas	8	32	18	11

LAND-USE

Generally, most interviewed farmers are small-scale farmers with subsistence crops of vegetables (such as yucca, cabbage, tomatoes) and treed produce (such as oranges, mandarins and coffee). Most also participate in small-scale market activity where they sell their produce.

Of the 41 people interviewed 22 people reported to be either subsistence or small-scale farmers (ranging from less than 1 ha to 30 ha), 4 reported to be large-scale farmers, 6 were not agriculturalists, and 7 did not specify their land-use.

Treed crops were reported to be in use in 19 different properties, vegetables on 15 farms, cattle-raising on 8; 2 families reported to have land in fallow, 4 families owned recently reforested land, and 2 people did not specify their land use. Often producers reported to have both vegetable and tree crops, though some had one of either. Cattle ranching occurred most frequently on large-tracts of land ranging from 170 ha to 525 ha, and most were large-scale market oriented producers. However, one small-scale cooperative (with 5 ha) mentioned they owned a few cows, but that their farming is small-scale.

18 landholders reportedly had land that currently is not treed. 4 of these landholders also reported to be cattle-ranchers each with properties ranging from 220 ha to 525 ha.

LAND SIZE

Of the 35 individuals involved in agricultural production, the majority of those interviewed (20 individuals) could not (or would not) specify the extension of their property precisely. This is likely because they did not know it (because it is not owned officially) or because they did not want to share such information with us. However most of these individuals did report to be engaged in small-scale or subsistence production and often estimated to hold under 2 hectares of land.

15 individuals did specify the extent of their property. 3 individuals reported to own 1 ha of land, 8 individuals reported to have 5 ha up to 30 ha, and 5 individuals reported to own 150 ha up to 525 ha (large-scale landholders).

4 of the 5 large-scale landholders live in Santa Fe, while the other lives in Vueltas Largas. 5 of the 8 medium-scale landholders live in Vueltas Largas, 2 live in El Pantano and 1 lives in Santa Fe.

OPINION OF THE IMPORTANCE OF REFORESTATION

After conducting 41 interviews throughout the region, it becomes clear that the sampled population would receive a reforestation project positively. When asked about his or her general opinion on reforestation in the area, most respondents answered that it was a good thing to do, and of importance to the area.

Responses explaining why reforestation is important can be summarized in 6 general categories: (1) a change in climate in recent years, including hotter temperatures and less rain; (2) the adverse effects on the rivers (lowering water levels, or contamination); (3) the need to counter the rapid deforestation in the area; (4) the importance of soil protection (erosion, loss of moisture or fertility); (5) the spiritual, emotional or aesthetic importance of forests; (6) the need to conserve the environment for future generations. Some respondents did not provide a reason why deforestation is important, but underscored that there is value in reforestation. Finally, some interviewees did not respond to this question.

Out of 41 interviewees, 19 interviewees mentioned water, 14 mentioned climate change, 12 mentioned general importance, 5 mentioned spiritual value, 4 mentioned soil, 3 mentioned countering deforestation and 7 people had no response.

Interviewees varied in how they responded: 4 people mentioned 4 or more reasons why reforestation is valuable, 29 people answered with 2 reasons or less, and 7 people did not respond.

Throughout the interviewing process it was very clear that reforestation is important to community members in the region, and that many people are quite knowledgeable about the adverse effects of deforestation, and the potential benefits of reforestation.

KYOTO 1989 CRITERIA (LAND MUST NOT HAVE BEEN DEFORESTED SINCE 1989)

Of all respondents, only 1 individual did not satisfy the 1989 criteria, however, they did express interest in reforestation.

INTEREST IN REFORESTING ONE'S OWN LAND

Generally, there was an interest in reforesting land. It was often mentioned, however, that the land was too small, used only for subsistence and minimal market activity, as such

reforestation would be impossible there. Such responses were subsequently categorized as uninterested.

The case of expressed desire, but lack of available land, was expressed most strongly in El Pantano, where most interviewees reported to have less than two hectares of land. The largest landholders interviewed in El Pantano (owning 15 hectares and 7 hectares), each expressed interest in reforesting their own land.

17 people expressed active interest in reforesting their property in the sampled population (See Appendix 2 for these individuals). One interviewee actively reported that he was not interested in reforesting his land, as he had already undertaken the pine reforestation project and considers it to be a failure.

The 17 individuals interested in reforesting their land include: large scale cattle-ranchers (*ganaderos*) (4 families owning 170 ha up to 525 ha), one family with 150 ha of deforested unproductive land (150 ha), and small-scale farmers (families and cooperatives owning 5 ha up to 30 ha). Farmers owning less than 5 hectares generally did not express interest in reforestation, explaining that there was not enough land for planted trees if they were to continue to support their own subsistence.

Interest in reforesting land was expressed by: 5 families in Santa Fe (with 30 ha, 220 ha, 265 ha, 525 ha, and an unspecified amount), 2 cooperatives (with 9 ha each) and 2 families in Vueltas Largas (with 150 ha and unspecified amounts), 4 families in Bajo San Juan (each unspecified), 3 families in El Pantano (with 7 ha, 15 ha, and an unspecified amount), 1 cooperative in Las Quebradas (with 9 ha).

INTEREST AND LAND TITLE

Of the 17 individuals interested in reforesting their land, 6 owned an official land title, 6 did not own a property title, 5 did not specify whether they owned a title or not.

The 6 interested individuals or cooperatives, that possess an official property title each own, 9 ha, 15 ha, 30 ha, 220 ha, 525 ha, respectively (and one family did not specify their total property extension).

CONCERN FOR CHOICE OF PLANTED SPECIES

When discussing reforestation, a past reforestation project in the area was brought up quite frequently. The project, funded by international initiative, featured reforestation with a non-native species of pine because of the low quality of soils in the area (Personal conversation with Sr. Cariso, March 10 2005). 7 of 41 interviewees mentioned a dislike of the project. Such sentiments were explained with reasons varying from the increased aridness of the earth due to the plantation, to the decreased value of pine in the international market.

Often, when introducing the idea of a reforestation project in the area, the immediate response was to ask what kind of wood would be planted. The expressed concern was frequently

related to the perceived failure of the pine plantation by some interviewees. It was underlined by 4 respondents (all of which expressed interest in reforesting their own land) that the choice of tree was of utmost importance.

ORGANIZATIONAL CAPACITY OF AREA

The Fundacion Hector Gallego is a non-profit Christian organization with a seemingly strong presence in the area. They offer consultation services, technical courses, are involved in organic agriculture, qualification and education, financial management, and environmental protection.

The Ministerio de Desarrollo Agropecuario (MIDA) in Santa Fe also has great knowledge regarding individual landholders in the region. The organization would be useful in terms of organizing farmer meetings, knowing who has land, and who to contact. Additionally, several of the technicians from MIDA, in particular Sr. Isaura Peralta, have shown great interest in reforestation of the region.

There is an ANAM office present in the town of Santa Fe as well, which has experience in pine reforestation and educational services.

EXPERIENCE IN COMMUNAL PROJECTS

During our interviews we encountered members of several cooperatives and local organizations. Albeit small, they indicate a capacity to work communally.

Table 3. Various organizations and Cooperatives encountered during our stay.

Organization	Location	Purpose/Description
San Isidro Labrador	Vueltas Largas	A group of women who communally take turns cultivating a 9 hectare plot with rice and beans. They also have a few cows. Some parts of their land could be reforested but very little.
Asociación de Pequeño y Mediano productores	Vueltas Largas	Have 9 hectares of communal land for agriculture. Belongs to Church. Want to reforest 1.5 hectare.
Madres Maestras	Vueltas Largas	Provide alternative education to children, why may or may not focus on environmental issues.
Cooperativa de Las Esperanzas	Santa Fe	Technical and social assistance: micro-credit lending programs, product promotion, expanding market production, and industrialization. Contact: Francisco Atencio (gerente): 954-0914
Asociación de Productores Dos de Junio	Las Quebradas	Organic farming. Would want to reforest about 4-5 hectares.

CAPACITY TO REDUCE OTHER TRANSACTION COSTS

Table 4. Transaction Costs according to Cacho et al (2002) and the potential for the reduction in the Santa Fe region.

Transaction Cost	Description	Potential reduction of cost in Santa Fe region
Search	Broker's fees, charges for info services, costs of advertising, gathering agricultural social, and economic information about the region, contacting and establishing relationship with individual small holders, establishing baseline	<ul style="list-style-type: none"> - ANAM has already conducted extensive studies and vulnerability assessments on the region. - The MIDA office in the region would be extremely helpful with contacting landholders - McGill PFSS students from last year have already initiated the first part of the baseline.
Negotiation	Costs of interested partners coming to an agreement, costs of deciding the details of project design, responsibilities of each partner, assignment of benefits, schedule, may include legal costs, contacting all landowners.	<ul style="list-style-type: none"> - Again, the MIDA office in the region may be extremely helpful with contacting landholders.
Verification and Certification	Carried out by designated operational entity (DOE)	
Implementation	Keeping records of project participants, administration of payments, and dealing with problems and disagreements.	<ul style="list-style-type: none"> “These activities may require the establishment of a project office in close proximity to the site” (Milne, 1999) - ANAM office is not enough for this. Office and organization would need to be established. - McGill students are not present year-round. - Fundacion Hector Gallego?
Monitoring	Verify compliance to agreed terms.	
Enforcement	Expenses of insisting on compliance if monitoring detects divergences from the agreed terms of the transaction.	<ul style="list-style-type: none"> “Enforcement of contracts is possibly one of the most important transaction costs.” (Cacho et al., 2002) - Project must provide sufficient incentive to prevent abandonment. In the face of poverty in the region this may be difficult to accomplish.
Insurance	Purchase of financial insurance policy in case of failure.	

E. DISCUSSION

a. IS THE IMPLEMENTATION OF A CDM REFORESTATION PROJECT IN THE SANTA FE REGION POSSIBLE?

The expressed concern for, and awareness of, the adverse effects of deforestation, in addition to the desire for reforestation to mitigate these effects, indicates that a reforestation project would be well accepted in the region. The number of parties interested in reforesting their own land, have significant property extensions (well over 800 hectares in total), satisfy the Kyoto 1989 criteria, and many have official property title. Thus based only on the results of surveying the region for 5 days in 5 different towns, **it appears that it would be possible to implement a CDM project in the region.**

b. IS SANTA FE A SUITABLE LOCATION FOR A CDM REFORESTATION PROJECT?

YES

Not only is support and interest in reforestation expressed by the local people, but the property extension of those interested in reforesting their own land have led to the conclusion that **there is enough land in the Santa Fe region to create a project that can be profitable.** That is, an economy of scale exists which may justify the transaction costs and may create a return on investment.

The socio-economic situation of the area makes Santa Fe especially suitable to CDM as it can be argued that it is a vulnerable area in Panama. According to the Marrakesh Accords a region particularly vulnerable to the effects of climate change is characterized by: high population pressure, low income, a weak economy, lack of foreign investment, land degradation, and inadequate food security (Annex, 9). Last year's report identified all of the above factors as characteristic of Santa Fe. Thus Santa Fe is an ideal target for CDM in Panama in which the most vulnerable regions are a priority for sustainable development.

As noted by Smith and Scherr (2002), organization of the communities is incredibly important to the success of a CDM project. The Santa Fe region is a center of organization. Cooperatives and associations exist throughout the region as presented above. There is an ANAM office present in the town of Santa Fe, as well as a MIDA office. Both of these organizations can play a role in the project as ANAM has experience with reforestation, and MIDA is a good contact point and an agricultural organization which may be interested in helping with agroforestry.

An important aspect of CDM initiatives is that they must be additional, meaning that without the CDM incentive or funding, they would not occur. Additionality in the area can be investigated in terms of the likelihood that these projects would occur normally (without CDM). The baseline last year established a land use barriers matrix, which showed that cattle ranching and agriculture are the most likely land uses for the future, and therefore forestry initiatives would be less likely. As such, additionality, the concept that CO₂ sinks would not increase at the same level without the project, could likely be proven easily.

While the above indicate characteristics of the Santa Fe region which make it ideal for the implementation of a CDM reforestation project, there are other characteristics of the region which may render such a project inappropriate.

MAYBE NOT...

Despite all of the organization that exists in the region, when involvement in the potential project was discussed, **most organizations expressed interest, but like the local residents, expressed a lack of resources and funding capabilities.** Thus the organizations may not have the ability to contribute the time and human resources that are required to undertake a CDM project on their own.

The CDM project is also currently in a pilot phase. It has been indicated by our ANAM supervisors that this project will not be undertaken by ANAM. Currently it is given to McGill students to investigate. It is important to ask whether there is enough self-motivation within Santa Fe or Panamanian organizations to initiate the long processes inherent in CDM. The general feeling from the interviews was that the people would support a reforestation project, however, initiating and funding it was something they were not willing to commit to.

The Santa Fe region is characterized by low incidence of land titling, though the few large-scale landholders do own official property title. If legal institutions are not strong enough, conflict could arise over ownership of carbon credits (Smith and Scherr, 2002). Otherwise, obtaining land titles would be an additional cost to consider.

The Santa Fe region also seems to be limited to reforestation projects such as agroforestry and silvipastoralism, which simultaneously continue to support other land uses such as subsistence agriculture or cattle-ranching. As such, total reforestation of land is not possible, except on one 150 ha property of abandoned land. This limits reforestation options. "Experience of other agro-forestry projects indicates [that risk of project failure] is quite high... This arises from failure in maintaining the trees and generating the fruit output" (Energy & Environment Group, 77). Agroforestry is not the most profitable form of reforestation. Industrial plantations generally have lower financial costs and the highest return on investment, though the social risks and costs are often high. Simon and Sherr (2002) note that "activities that include a substantial component of assisted natural regeneration... generally have lower costs than systems based purely on tree planting... and have fewer social risks... offering significant community benefits and biodiversity benefits" (24). Therefore the possible projects in the region may not be the most profitable possible in Panama, however, the social benefits may be high.

Finally the land quality in the region is low. It is uncertain whether the area can support the growth of certain trees without substantial fertility inputs. This may again increase costs. The plantation of pine trees (chosen for their ability to grow in low fertility conditions) is not well accepted in the area based on the interview data.

c. WOULD A CDM REFORESTATION PROJECT BENEFICIAL TO THE PEOPLE AND ENVIRONMENT OF SANTA FE?

YES...

When asked why reforestation is important, concerns for water and climate change were mentioned far more often than any other given responses. **Thus a reforestation project that is designed both to protect the watershed of the Rio Santa Maria, and mitigate climate change, appears to be ideal according to the expressed desires and concerns of the local people.** The rates of deforestation within the area are very high and again, concern about deforestation was expressed by most interviewees. Additionally, the current environmental status of the Santa Fe region indicates that reforestation is of vital importance. It then becomes obvious that a reforestation project in general (whether through CDM or locally-initiated) is desirable.

Depending on how the project proceeds, reforestation projects have the potential to create employment and income generation, diversify land-use and production, while providing many local environmental benefits. Simon and Sherr (2002) note that “Non-Timber Forestry Products [such as fruit] for home consumption are especially attractive for poor households, as they are usually derived from common areas, collected using unskilled labour, help offset agricultural production risks, improve nutrition, and can easily fit into diversified activity portfolio of the poor” (13). Given the results of last year’s project, reforestation may provide the sound economic input and diversification of production that is needed in the region.

Throughout the interviewing process, it was mentioned numerous times that people need economic incentive to change behavior or to perform environmentally-beneficial activities such as reforestation. Additionally, it was mentioned that if people reforest there is a high risk that shortly thereafter they will cut down the trees and consequently the entire process is futile. CDM addresses this issue quite effectively by providing incentive to keep the trees sequestering carbon for as long as the contract period (at least 25 years). Additionally, older trees sequester more carbon, generating more income, consequently creating greater incentive for keeping the trees in the earth. CDM also allows extraction of forestry products, therefore Non-Timber Forestry Products (such as fruit), or thinnings (which can provide timber for market, building materials or firewood) can be used to contribute to household production and income.

The fact that CDM is a project based on carbon sequestration designed with flexibility towards local desires is valuable to the communities interviewed. By the nature of carbon sequestration, the type of tree planted is inconsequential to the environmental benefits. Thus the expressed concern for choice of tree in the plantation can be adequately addressed through local participation in final decision-making.

MAYBE NOT...

In addition to the above benefits CDM can contribute to the Santa Fe region, there are other aspects of CDM which may render it less valuable to the communities.

As outlined, CDM is extremely resource intensive in terms of time, administration, documentation and legal work: “even with supportive governance, the process of getting emissions reductions to the point of certification may be lengthy and cumbersome, and the

associated transaction costs may often be high” (Energy & Environment Group, 56). These high costs may result in the project being unprofitable.

The risk of project failure exists, potentially indebting the participants. If the project does not meet the predicted and guaranteed CERs, established through CER Ownership Contracts between the investor and the project entity, the local project participants are responsible for the repercussions (though these can be covered by insurance). It is possible to have technical failures and failures due to natural disasters. It is possible that insurance is inadequate to cover all costs associated with failure. Faulty predictions and inaccurate certification and verification are additional risks. Leakage is defined as “the unexpected loss of net carbon sequestered...result[ing] from a number of unforeseen circumstances, including improperly defined baseline, incorrectly described project lifetime and/or project boundaries and/or inappropriate project design” (Energy & Environment, A-31). It can also result in project failure to achieve agreed number of CERs.

The carbon market can be volatile. Changes in legislation, taxes or trade rules may have adverse effects on the carbon market. There is also the risk that there will be an influx of CERs into the market, without sufficient demand, resulting in reduced prices. Currently the carbon market is based on forecasting, therefore predicted value of carbon credits in the initiating phases may not be the reality in later years. Consequently the return on investment may not be as high as predicted, while the transaction costs remain fixed in the initial stages.

It is also possible that the incentive to maximize carbon sequestration will result in monoculture tree plantations of the fastest-growing trees. It is currently the case in Panama that much reforestation is done with non-native monocultures (such as teak and pine plantations). “Faster growing tree plantations cause rapid depletion of groundwater and desertification of soils” (Petermann, 2004). Additionally, monocultures are more susceptible to disease and infestations by insects, increasing the risk of project failure (Good et. al, 1993). Non-native species also have the potential to become invasive species, outcompeting the native vegetation for resources and seed establishment (Petermann, 2004). Such plantations do not supply the biomass needed for varied uses of poor locals (such as fodder, manure, small timber and fuel) (Shailaja, 1994). Monocultures do not provide the same habitat diversity and food resources for animals as natural, or mixed-woods forests. Monoculture plantations have the risk of being less sustainable than mixed-wood plantations because the litter production is poorer, decreasing nutrient recycling (Shailaja, 1994). Planting with a single species of tree also increases economic risk. As experienced with the pine plantations, decreased value in the international market is more adverse if only one type of timber is planted. A multi-species tree plantation acts like a diversified investment portfolio with decreased risk against market fluctuations and natural disasters. Finally, monoculture plantations are often argued to not be forests. Thus the incentive towards planting a single, fast-growing species may further impede the possible benefits of CDM reforestation.

WOULD THE PROJECT FULFILL THE GOALS OF SUSTAINABLE DEVELOPMENT?

CDM projects theoretically create synergies between all three realms of sustainable development: social, economic and environmental. Olhoff et al. asserts that “CDM is the first type of climate change mechanism to take into account the challenges [of incorporating sustainable development], and explore the potential for integrating climate change and

sustainable development considerations in specific projects” (Olhoff et al., 10). Thus CDM reforestation projects should address the problem of global warming, provide local environmental benefits, and contribute to local and national development goals. If designed so that the project can uphold predetermined goals of sustainable development (whether determined nationally or locally), CDM can therefore be of great benefit to the region.

The value of a CDM reforestation project for the region include the project’s ability to generate sustainable development benefits.

CDM AND SUSTAINABLE DEVELOPMENT

Currently in CDM, the selection of Sustainable Development criteria is not regulated by the legislation of the Kyoto Protocol. As the Designated National Authority on the Kyoto Protocol, ANAM plays a central role in ensuring that the CDM project is in harmony with national goals of sustainable development discussed below (Olhoff et al., 13). A central feature and goal of CDM is to work with local and/or national government development goals with the “aim of selecting and designing CDM projects so that they create and maximize synergies with local development goals” (Olhoff et al., 7). Therefore it is important when evaluating a CDM project to determine whether its impacts will be in accordance with the development goals of Panama. Once Panamanian development goals are outlined, the extent that a CDM project in Santa Fe can address these goals will be examined.

PANAMA’S NATIONAL DEVELOPMENT GOALS (Steps 1 and 2 of sustainability assessment (Olhoff et al))

Panama has adopted the UNDP Millenium Development Goals of which the first goal is to reduce extreme poverty and hunger, and the seventh goal is to guarantee the sustainability of the environment (Gabinete Social de la Republica de Panama, 2003).

In the proposed programme of Panama’s Cooperation framework with the UNDP and UNPF it is stated that:

The general objective of the 2002-2006 programme is to promote and support national action designed to advance sustainable human development and eradicate poverty and inequality” (Executive Board of UNDP and UNPF, 3).

Panama’s National Development Plan is presented in “Plan Puebla Panama” in which the first two goals are concerned with sustainable development, and human development. In the explanation of human development it is stated that: “**Several projects will focus on traditionally disadvantaged groups such as low income farmers**, indigenous peoples and Afro-Caribbean communities. The plan will encourage their participation in programs for environmental management and the sustainable uses of natural resources...” (Gonzalez, 2001).

It is clear that sustainable development is a strong element in Panama’s development goals, which are characterized by poverty and inequality reduction while harmonizing economic development with environmental protection.

THE REALITY OF CDM: FAVOURING LARGE LANDHOLDERS

The initial costs of the implementation of CDM, in addition to the need to create carbon credits that are competitive on the international market, combine to favour a focus on large plots of land. Bundling and bubble projects are options that permit smaller tracts of land to be combined and considered as one large project. Thus a project of 800 hectares can, in reality, be an aggregation of any given number of plots throughout Santa Fe, or even throughout the Republic of Panama; theoretically providing the opportunity for involvement of small landholders. It must be underscored however, that the certification and insurance process is such that it is necessarily more expensive the more individual plots are aggregated into one project, and the more distance that exists between plots (due to costs associated with increased travel and legal work, for example). Higher costs result in less profit, which is unattractive to investors. Thus in order to incur the greatest return on investment, there is much incentive to create bundling projects with land that remains relatively large in comparison to the majority of small-scale landholders. As Olhoff et. al. note: “there is a sound economic argument for achieving [emissions reductions] where they are least costly” (9).

As reported, the general situation in the Santa Fe region is such that the majority of campesinos are small-scale farmers with less than 2 hectares of land, and in only a few cases ownership of 2 hectares up to 10 hectares was reported. Even fewer farmers owning more than 100 hectares were interviewed; however are in the clear minority based on census data, interviews and general impressions. The large-scale farmers are cattle-ranchers and have the most capital, the most land, the most chemical inputs in production, and the most land in pasture as opposed to agro-forestry production such as orange, mandarin and coffee trees (present in all small-landholder plots). In other words, the wealthiest citizens are responsible for much of the deforestation, and most of the erosion and water contamination with agro-chemicals and animal excrement, on a per-capita basis. There is no doubt that by focusing on the cattle-ranching population, reforestation can be incredibly effective, economically-efficient, and targeted toward the individuals with the most resources available to invest in reforestation. Additionally cattle-ranchers are likely to hold official property titles for relatively enormous plots of land, or are the individuals who are most capable to acquire titling given their access to credit and capital (generally unavailable to small-scale farmers). Therefore it seems that it is only logical to focus CDM on cattle-ranchers. Undoubtedly the highest return on investment will be achieved through this focus. In purely economic terms, it is the only practical focus.

However, the deforestation in the region cannot be attributed solely to cattle-ranching, as the current conditions are due to a combination of few large-scale *ganaderias*, many small-scale plots, and previously abandoned lands in fallow. As such, focusing solely on large-scale cattle ranches ignores the serious environmental impact of the conglomeration of small-scale landholders who are the greater majority of the Veraguense population. They too contribute significantly to the vulnerability in the region.

In light of the above discussion it seems apparent that an economically efficient CDM in the Santa Fe region may benefit only the large-landholders, in other words the rural elite. Philosophically, it is also important to examine the consequence of focusing solely on large landholdings. Earlier it was mentioned that cattle-ranchers are traditionally the most responsible for extensive environmental destruction on a per-capita basis. The question must be asked: is it fair, is it morally right, to reward those who have caused the most damage, only because it is most efficient and expedient? At the same time, it is of outmost importance to note that the

environment of Santa Fe region is severely degraded, that ANAM has identified the region as vulnerable to the potential effects of global warming, and that the Rio Santa Maria is a resource of incredible value to communities throughout Veraguas. As such, the most efficient and expedient manner of improving environmental health may be the highest priority. Therefore, the sustainability of a CDM reforestation project in Santa Fe is complex and an important factor to consider when designing the implementation the project.

F. CONCLUSION

It appears that a CDM reforestation project would be feasible in the upper region of the Santa Maria watershed. There is enough suitable land, with official land title that has been deforested since 1989, to cover transaction costs and there is abundant interest from landholders in reforestation. There are a variety of organizations within the region and many landholders seem to have had experience with community projects. Given all these factors, a bundling project in the area would therefore be feasible. However, some limitations to such a project remain. For example, the protection of trees included in reforestation initiatives may be costly due to poverty pressures in the region and dispersed land. Other limitations include lack of resources such as time and money to dedicate to such a project. A major impediment is the lack of infrastructure for such a project. Without the strong and constant presence of local and/or national organizations, one can only hope private investors could provide the resources necessary for such a costly, time-intensive project. Additionally, implementation schemes that balance the cost-effectiveness and sustainability of the project should be considered.

G. OVERALL SUGGESTIONS

1. The development of a CDM reforestation project requires year-round presence. The involvement of local organizations would be beneficial. A McGill 4 month internship may be useful to help with the process however it might be more useful to have internships for Panamanian students that are present for longer periods of time. Given the length of procedure for CDM a four month presence is unlikely adequate to address all the needs of such a project.
2. A bundling project including large-scale landowners *and* smaller-scale landholders would address the need for economic efficiency without solely targeting the large landholders. **Involving cooperatives** may be beneficial for social reasons (because many people can be targeted at once), and for efficiency (because of the concentration of communal labor).
3. The importance of landholder participation to empower local landholders has already been emphasized. Plan Vivo comes in as an important option through which local participants can be adequately involved in the process. Plan Vivo is a method through which CDM forest projects can be managed and evidence of carbon sequestration and livelihood effects can be documented. Its success is exemplified in Scolel Te, Mexico. It abides by principles of **participation, transparency, simplicity, and flexibility**.
4. The inequalities of CDM may be inherent to the process in a region such as Santa Fe, and therefore putting environmental and economic efficiency and development ahead of sustainable development may be the best solution. There are always trade-offs in a program such as this.

However UNEP recommends creating a priori rules for dealing with such tradeoffs (See: Olhoff et. al.: CDM and Sustainable Development Impacts, Chapter 7).

5. The development of a local nursery run to reduce transportation costs of seeds and trees may be beneficial to the area, especially if it is run by locals. It has the potential to create local employment, can be a source of environmental education for children, and can allow local, community participation in the choice of trees to be grown and planted.

6. Recognition that reforestation is only a band-aid solution to the pressures of deforestation is of utmost importance. Poverty eradication, education and alternative technologies in agriculture must be examined to tackle environmentally-damaging land use. Additionally, governmental policies which support large-scale land degradation and destruction should be addressed. For example, last year's report stated that El Banco de Desarrollo supports cattle-ranching and non-traditional crops (Rivet and Roy-Bouliane, 2004). Laws which favor large-scale farmers must be addressed so that they must act more sustainably and smaller landholders can gain support. It was also often mentioned by interviewees that the rich cattle ranchers pay off governmental officials to gain access to land in order to deforest, the truth of such statements is unknown.

7. Reforestation initiatives would be welcome in the region. Therefore initiatives outside the clean development mechanism frame of reference may be desired in the area and may be accomplished with fewer obstacles and within a shorter time period.

8. Suggested sources of funding are located in appendix 1.

Limitations to our study:

There were limitations to our study. One was that due to time constraints interviews were conducted only in 5 towns, and other areas of the district may be better suited for the project. Additionally, due to limited time, the sample size of interviews is limited. Additionally, because we were not presenting interviewees with a concrete project, interest in the face of something more concrete may vary.

Recommendations for next year's PFSS Students

Directions for next year's PFSS project may include holding a workshop on CDM in the area to inform local organizations and leaders of this possibility. Additionally, we strongly recommend holding a meeting with, in addition to the supervisors at ANAM, the mayor or representative of the area at the beginning of the internship to establish a product that can most benefit the area. There seems to be much interest in the area stifled in part by a lack of resources such as time and money. The creation of the nursery in the area may be beneficial to this issue. Because there was a strong interest among the resident landholders of the area in the type of tree used for reforestation, it may be useful to do a study on which trees are able to grow in the region, what interest people the most, how profitable the trees are in terms of selling wood. If the CDM project has progressed, drafting the first part of the project, the PIN, may also be useful. It may also be beneficial to address the possibility of reforestation without the clean development mechanism, a long, drawn-out, administratively heavy process that may not be perfect at this time for the region.

Appendix 1 Amount of reforested hectares to overcome transaction costs

Source: Senor Celentino Herrera, Prime Forestry.

Conditions:

- Initial reforestation of 1111 trees per hectare (after thinning about 200 trees will be left)
- Reforesting with Teca: Incremento Medio Annual (IMA) = 10 m³/hectare
Density of the wood (D) = 0.63 gr/cm³
Relation of the wood and carbon (RC) = 0.45
- Sale of 1 t CO₂ = 3 – 6\$ (calculation done conservatively with estimation of 3\$)
- Transaction Costs range: \$200,000-500,000 (calculation done conservatively with use of 500,000 as transaction costs) (Note: transaction costs are based on large-scale project)

Carbon Sequestration Calculation:

$$\begin{aligned}\text{Carbon sequestration} &= \text{IMA} \times \text{D} \times \text{RC} \\ &= 10 \times 0.63 \times 0.45 \\ &= 2.84 \text{ tC/ha/year} \\ &= 2.84 \text{ tC/ha/year} \times 3.66 \text{ (why this 3.66????)} \\ &= 10.65 \text{ tCO}_2\text{/ha/year}\end{aligned}$$

$$\text{\$3 per CER} \times 10.65 \text{ CERs/ha/year} = \text{\$31.95/ha/year}$$

$$\text{\$63.9/ha/year} \times 20 \text{ years} = \text{\$639/hectare}$$

$\text{\$500,000 in transaction costs} / \text{\$639/hectare} = \mathbf{782 \text{ hectares of reforestation to cover transaction costs}}$

Appendix 2 Funding for CDM reforestation initiatives

Given the large production and transaction costs of a CDM reforestation project, it is evident that landholders in the region are unable to provide the resources themselves for such an undertaking. Unfortunately, investors usually prefer making payments after credits are validated, certified, registered, and transferred. This means that upfront payment from investors for carbon credits is unlikely, and that alternate funding options must be explored to cover initial costs of the project (Energy & Environment Group, 2003).

Traditionally, CDM projects are funded through private investors in developed countries. As such, projects are subject to the realities of an international market, such as maximizing profit. Should a CDM reforestation project take place in the region of Santa Fe, it will unlikely take the form of a large-scale mono-culture but of a combination of small landholdings possibly involving agroforestry. Fortunately, alternative funding strategies which support more community-based small-scale projects exist. We have investigated these types of funding in light of its necessity for the economic feasibility of a CDM initiative in the region of the Santa Fe district.

A. The World Bank Carbon Funds:

The World Bank states and recognizes that: “the poorer rural communities in developing countries where small-scale projects tend to be located are at a disadvantage when competing for carbon finance and they are likely to be bypassed by carbon investors.” It is in this context that the World Bank has developed several funds to benefit small-scale CDM initiatives. Although these funds also prefer to pay once emission reductions are certified, some upfront payment is usually available; hence through these funds some funding may be available to initiate projects. World Bank Funds include the Prototype Carbon Fund, The Netherlands Clean Development Mechanism Facility, The Community Development Carbon Fund and The BioCarbon Fund, all of which are examined briefly in Table 5. It appears that the Community Development Carbon Fund would be best suited for a small-scale reforestation project in the Santa Fe region.

Table 5. **International sources of funding for CDM reforestation projects only.**

Fund	Description	Suitability for the Santa Fe region
THE PROTOTYPE CARBON FUND (PCF)	To steer the production of Emission Reductions under both Joint Implementation and the Clean Development Mechanism, by investing the contributions of companies and government into these types of projects.	This fund may be fund a CDM initiative in the Santa Fe region, however, later funds specifically target small-scale initiatives and reforestation projects. Therefore those funds may be more appropriate for the region.
THE NETHERLANDS CLEAN DEVELOPMENT MECHANISM FACILITY (NCDMF)	This fund is intended for projects that generate emission reductions for the Netherlands. Cost-effectiveness and sustainability play a major role in selection and approval of projects. The fund favors renewable energy technology, clean, sustainably grown biomass, energy efficiency improvement, and fossil fuel switch and methane recovery over sequestration projects.	This fund would be useful should the project generate emission reductions for the Netherlands. However, carbon sequestration is the lowest on the list of projects it wishes to fund. The NCDMF also favors cost-effectiveness, which may not be characteristic of the Santa Fe region.
THE COMMUNITY DEVELOPMENT CARBON FUND (CDCF)	Strives to provide carbon finance to small-scale CDM projects in poorer rural areas of the developing world. The fund therefore targets CDM small-scale projects that seek to improve the livelihoods of local communities.	CDCF appears well suited for an area such as the region of Santa Fe
THE BIOCARBON FUND	To help generate emission reductions from land use activities such as agriculture and forestry that sequester greenhouse gases in developing countries. The BioCarbon Fund will provide for CDM projects that are only in the sector of reforestation and afforestation.	The BioCarbon Fund has already received 130 applicants and is not longer reviewing new applicants. Should this change in the future the fund would be quite suitable for an agroforestry initiative in the Santa Fe region.

B. International Brokers:

There are a few international brokers that may fund CDM initiatives to buy carbon credits and sell them to companies at higher prices. These include **NatSource, Future Forests, and Chusquines**. These could be investigated as potential investors for such a project.

C. National and Local Funds:

National and Local funds become important to complement other funds that may not cover the costs of the process completely. Some of these funds are listed in Table 6:

Organization	Description	Contact Information
Global Environmental Fund (GEF)	GEF is an independent financial organization that provides grants to developing countries for projects that benefit the global environment and promote sustainable livelihoods in local communities.	Castro De Doens of ANAM TEL: (507) 315 0217 and Eduardo Reyes of ANAM TEL: (507) 315 0527.
Fundación Natura	Goal is protection of the environment. It has small potential funds from donations ranging from \$15,000 to \$70,000. They presently have a new fund dedicated the Cuenca Santa Maria.	Zuleika Pinzón, Directora Ejecutiva TEL: (507) 232-8773
ANARAP	La Asociación Nacional de Reforestadores de Panamá	Presidente Beatriz Harrick TEL: (507) 214-3700
CARITAS	May have funds for community projects as support alternative, grassroots, community initiatives	TEL: (507) 262-3777
APRODEC	Asociación pro desarrollo de la comunidad rural	Esilda H. De Escala TEL: (507) 262-9198 o 262-6642
ODECA	Organización para el desarrollo sostenible de la comunidad y conservación de ambiente	Gerarda da Silva de Rodriguez TEL: (507) 996-6212
CEDESO	Centro para el Desarrollo Sostenible An organism managed by ANAM that provides a nursery. As long as project are sustainable, it will sell seeds cheaply or free for large quantities.	TEL: (507) 993-3585
Funde Prove	Fundación para el Desarrollo de la provincia de Veraguas	Roberto Bermudez TEL: (507) 998-4060 o 998-4000
Desarrollo y Administración Forestal de ANAM		Ricardo Brown Salazar TEL: (507) 315-0902

Table 6.

Appendix 3 Information of landholders with interest

Table 7 Land use tendencies, hectares, official title holding, 1989 deforestation and comments of interested landholders.

Town	Name	Type of farming			Crops		
		Sub/Market	Large-scale	Unspecified	Treed	Vegetable	Cattle Ranching
El Pantano	Eduardo Gonzalez	√			√	√	
	Elvis B.			√			
	Helio y Claudia	√			√	√	
Santa Fe	Fidel Tejada		√				√
	Luis Castellon Zebablos 954-0930; 627-4435		√				√
	Sevil Castellano		√				√
	Leopoldo Zalpalta	√			√		
	Anonymous	√			√		
Bajo San Juan	Thomas			√	√		
	Anonymous	√					
	Anonymous	√			√	√	
	Anonymous	√			√		
Las Quebradas	Magdalena y Mariano Rodriguez	√			√	√	
	Asoc. de pequeno y mediano productores	√				√	
Vueltas Largas	Anonymous	√				√	
	Francisco Gonzalez			√			
	Asociación San Isidro Labrador	√				√	√

Table 7. continued

Town	Name	Land in fallow	Reforested	Unspecified	Size (ha)	Unspecified	Amt avail for ref	Title	Unspecified
El Pantano	Eduardo Gonzalez				15		Unspec.	√	
	Elvis B.				7		Unspec.	No	
	Helio y Claudia					√	Unspec.	No	
Santa Fe	Fidel Tejada		√		265		15		√
	Luis Castellon Zebablos 954-0930; 627-4435				525		525	√	
	Sevil Castellano		√		220		Unspec.	√	
	Leopoldo Zalpalta				30		15	√	
Santa Fe	Anonymous					√	Unspec.		√
Bajo San Juan	Thomas					√	1	√	
	Anonymous			√		√	1		√
	Anonymous	√				√	1	No	
	Anonymous					√	Unspec.		√
Las Quebradas	Magdalena y Mariano Rodriguez					√	5	No	
Vueltas Largas	Asoc. De pequeno y mediano productores				9		1.5		√
	Anonymous					√	Unspec.	No	
	Francisco Gonzalez	√			150		150	No	
	San Isidro Labrador Assoc				9		Unspec.	√	

Table 7. Continued

Town	Name	1989	No 1989	Pine Bad	Pine Good	Type of tree is important	Comments
El Pantano	Eduardo Gonzalez	√					
	Elvis B.	√		√		√	Community project=bad
	Helio y Claudia	√					No title because too expensive
Santa Fe	Fidel Tejada			√	√		Falling pine prices
	Luis Castellon Zebablos 954-0930; 627-4435	√					Shade for cows=interest
	Sevil Castellano?	√				√	Likes espave
	Leopoldo Zalpalta	√					No title but can get one
Santa Fe	Anonymous						Sounded like lots of land, husband not there
Bajo San Juan	Thomas		√				
	Anonymous	√					Providing incentive is key, burns land, wants to stop but does not have tech
	Anonymous	√					Probs with time and protection of reforested land
	Anonymous						No time
Las Quebradas	Magdalena y Mariano Rodriguez	√		√		√	Asociacion de Productores Dos de Junio, organic farm with interest in ref., ganaderos have biggest impact, need for education and new technology
Vueltas Largas	Asoc. De pequeño y mediano productores	√					communal land owned by church.
	Anonymous	√					Corruption: rich paying off officials to clear land
	Francisco Gonzalez	√		√		√	Family lands that are completely bare
	San Isidro Labrador Assoc						Title to church

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