FOREST CARBON PROJECT FEASIBILITY STUDY

QUANG TRI PROVINCE VIETNAM

October 2009

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Authors:

Adam Gibbon (RA), Christian Sloth (RA) and Sebastian Schrader (WWF)

The Rainforest Alliance (RA) works to conserve biodiversity and ensure sustainable livelihoods by transforming land-use practices, business practices and consumer behavior. Based in New York City, with offices throughout the United States and worldwide, the Rainforest Alliance works with people whose livelihoods depend on the land, helping them transform the way they grow food, harvest wood and host travelers. From large multinational corporations to small, community-based cooperatives, the organization involves businesses and consumers worldwide in its efforts to bring responsibly produced goods and services to a global marketplace where the demand for sustainability is growing steadily.

The Rainforest Alliance sets standards for sustainability that conserve wildlife and wildlands and promote the well-being of workers and their communities. Farms and forestry enterprises that meet comprehensive criteria receive the Rainforest Alliance Certified™ seal. The Rainforest Alliance also works with tourism businesses, to help them succeed while leaving a small footprint on the environment and providing a boost to local economies.

Contact for this study:

Christian Sloth,
csloth@ra.org

Jl. Ciung Wanara No.1x
Lingkungan Kerta Sari,
Kelurahan Panjer,
Denpasar Selatan, 80225
Bali
Indonesia

Tel: +62 361 224 356
Fax: +62 361 235 875

We would like to acknowledge the following organizations for their contributions to this project:

SNV Netherlands Development Organisation is an international development organisation of Dutch origin with over 40 years of experience. SNV currently works in 32 countries in Africa, Asia, Latin America and the Balkans, with an increasing presence of national advisors in-country.

SNV supports national and local actors within government, civil society and the private sector to find and implement local solutions to social and economic development challenges. The organization stimulates and sets the framework for the poor to strengthen their capacities and escape poverty. SNV does this by facilitating knowledge development, brokering, networking and advocacy at national and international level. Partnerships with other development agencies and the private sector are key to SNV's approach.

The Worldwide Fund for Nature (WWF) works to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by:

- conserving the world's biological diversity;
- ensuring that the use of renewable natural resources is sustainable; and,
- promoting the reduction of pollution and wasteful consumption.

The Research Centre for Forest Ecology and Environment (RCFEE) is a specialized independent research organization under Forest Science Institute of Vietnam (FSIV). It was established in 1990 to address the need of creating and transforming scientific research into ecologically and economically sound solutions for sustainable forest management and development.

RCFEE's mission is to address current issues in the forestry sector, predict threats in the future and develop solutions for such problems. Through targeted investment in science and prioritization in research, our aim is to ensure our scientific work delivers maximum benefit on the most important issues facing our partners in the forestry sector.

RCFEE's strategic research and development focus on three major themes: i) sustainable use of forests and forest land; ii) forest ecology and physiology; and iii) forest environment modeling, prediction and assessment. These themes reflect major trends in Vietnam's forest industry such as high demand of plantation products, increase of public interest on forest protection and conservation, and improvement of environmental issues to meet international standards.

RCFEE brings together more than 30 researchers and a complete set of facilities. It operates through specialists, and often multi-disciplinary research groups which have diverse interest, but are united by a common desire to make an optimal use of the forest resources for economic development while keeping it sustainable for our next generations.

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1. INTRODUCTION

The overall goal of the 2008-2011 IKEA-Rainforest Alliance project *Climate Change, Conservation and Carbon Offsets: A Pilot Project with an Emphasis on Vietnam and Malaysia* is to foster learning, experience and development of credible carbon forestry projects as one of the means to address climate change in three countries relevant to the business of IKEA in Southeast Asia: Vietnam, Malaysia and Indonesia. Due to the important role of forests in climate change, as a source of greenhouse gas emissions and in carbon sequestration, this project seeks to explore and support the creation of carbon forestry projects, which would be able to meet internationally accepted and credible standards.

Through this partnership, IKEA and the Rainforest Alliance (RA) will build capacity amongst actors that have potential to create carbon projects, and thus the activities are largely focused around training. Tools, methodologies, and standards will be tested and developed by RA and partners to help bring carbon forestry projects to the market. Capacity building efforts will focus on enabling contributions by small and medium sized enterprises, but also encourage larger scale managers to take advantage of forest carbon opportunities. Participants in these capacity building activities should explore collaborations with businesses and organizations that work with IKEA and also those that are external to IKEA.

This feasibility study was carried out as part of RA's efforts to accomplish Objective A of the project, denominated *Reforestation or agroforestry activities with communities and forest rehabilitation activities with sustainable forestry enterprises in Vietnam facilitated by on-the-ground organizational partners identified by IKEA and RA.*

The intent of activities under this objective is to stimulate a number of Vietnamese companies, communities, and/or government land management agencies to conduct reforestation, restoration, or agroforestry practices through tree-planting that could be eligible to earn payments for carbon credits. Such forest managers may include small forestry enterprises (SFEs), cooperatives, individual land owners, communities and large plantation companies, amongst other actors. We aim to explore ways to combine forest certification and carbon project validation and verification, which should add value through payments for environmental services for carbon and well-managed forest products.

Through consultation with representatives from SNV Netherlands Development Organisation, the Worldwide Fund for Nature (WWF), the World Bank and national and local government institutions it was agreed that a feasibility study should be focused on small holder plantation farmers in Quang Tri Province in Central Vietnam. The feasibility study was carried out in close cooperation with Sebastian Schrader (WWF), Mr. Le Khac Coi (WWF), Mr. Le Tien Duc (WWF) and Richard McNally (SNV).

The current feasibility study was carried out based on a concept note developed by WWF and SNV suggesting the project site to be Quang Tri and focusing on small-scale farmers planting acacia for pulpwood production.

1.1 Objectives

The objectives of the feasibility study were as follows:

1. To evaluate the feasibility of developing a forest carbon project in Quang Tri Province following an Improved Forest Management (IFM) project type and implemented by private smallholder farmers growing acacia plantations, which could potentially be certified to Forest Stewardship Council (FSC) standards. The evaluation will include:
    a. Determine the amount of carbon sequestered when rotation lengths for Acacia plantations are extended and FSC practices are adopted;

b. Analyze the potential of carbon credit generation from such a project with respect to the Voluntary Carbon Standard (VCS) and Climate, Community and Biodiversity (CCB) Standards; and
c. Conduct a cost/benefit analysis for the plantations earning FSC certification, and for earning FSC certification plus developing a carbon credit project.

2. To outline possible further steps toward the development of such a forest carbon IFM project in Vietnam in collaboration with selected non-governmental organizations (NGOs) operating at local level.

1.2 The Study Area

The study focuses on smallholder farmers in Quang Tri Province. Located in North Central Vietnam, Quang Tri Province is surrounded by Quang Binh Province on the north, Thua Thien-Hue Province on the south, Savannakhet Province of Laos on the west, and the East Sea on the east (with 75km of ocean border). Except for the narrow piedmont coastal plains, the terrain is dominated by hills and the Annamite Mountains. The highlands, characterized by steep slopes, sharp crests and narrow valleys, are covered mainly by a dense broadleaf evergreen forest. The province consists of about 219,000 ha forest area, thereof 84,000 ha of plantations. About 20,000 ha is managed by Forest Enterprises; another 72,000 ha is managed by peoples' committees, including 17,000 ha of smallholder plantations having the Red Book Certificate (a 50 year land-use license). It is estimated that roughly two third of the plantation area in Quang Tri is managed by smallholders.

Most of the peaks are 4,000 to 7,000 feet high, but some rise above 8,000 feet. The narrow coastal plains flanking the highlands on the east are compartmented by rocky headlands and consist of belts of sand dunes and, in areas where the soil is suitable, rice fields.

From the crests that mark the drainage divide in the highlands, streams flow either east towards the South China Sea or west into Laos or Cambodia. Those flowing eastward are swift and follow short courses through deep narrow valleys over rocky bottoms until they reach the coastal plains, where they slow down and disperse over silty and sandy bottoms. The westward flowing streams follow longer traces, sometimes through deep canyons, other times through poorly drained valleys that, like the coastal plains in the east, are subject to seasonal flooding. Its topography consists of mountains, hills, plains, sand dunes and beaches. The long coast and complex network of rivers includes the Ben Hai, Cam Lo, Quang Tri, and Thach Han rivers, offering a good potential for hydroelectricity production and aquaculture. The weather features a wide range of temperatures and rainfall, with hot and dry south-west winds during the Southwest Monsoon (May through September) and much cooler wet weather during the rainy season (November to mid-March). Annual average temperature is 24ºC, but temperatures can drop as low as 7ºC during the rainy season.

1.3 Potential Project Members

The farmers included in this study are primarily found within areas that have been covered by the German Development Bank KfW project which, since 1995, has aimed to establish plantations in the province for land use change and poverty reduction. The area in Quang Tri Province under this program covers approximately 7,500 ha plantations, and approximately 5,000 households have been given possession of Red Book Certificates (50 year land use licenses) as a result of its implementation. The area used for the cost benefit analysis conducted as part of this feasibility study covered 8,000 ha or roughly half of the smallholder forest area with secured land use rights.

1.4 FSC and Carbon Projects

During the FSC General Assembly 2008, the FSC community formally recognized that forests can have an important role to play in addressing climate change and as a result the General Assembly passed motion 43, which states that that FSC shall explore the role that the Principles & Criteria, governance, accreditation, policy development and forest certification can play in frameworks to mitigate climate change by maintaining and/or increasing carbon stocks.

The FSC motion specifically mentions efforts focused on establishing real and verifiable emission reductions from forest protection and improved forest management projects, and research into how FSC-certified management practices could maintain and/or increase forest carbon sequestration. FSC will also explore alignment or partnership with voluntary carbon standards or program design protocols as well as engaging voluntary and regulatory carbon finance mechanisms to recognize FSC certification as an effective tool to ensure environmental and social co-benefits. Lastly, and equally of relevance, the FSC should explore the development of guidelines and cost models to help FSC certificate holders, including small holders, indigenous peoples, and communities, access revenue sources for maintaining or enhancing carbon stocks.

The FSC standards have great potential to benefit carbon projects where they are implemented, as FSC-certified forests are already delivering social and environmental performance at implementation level that corresponds to some of the requirements of voluntary standards such as the Climate, Community and Biodiversity Standard (CCBS).

In this feasibility study we took care to examine the connection between FSC certification and voluntary carbon standard requirements for reforestation projects as well as the socio-economic costs and benefits of developing carbon projects in Quang Tri Province.

2. CARBON STANDARD RELATED ISSUES

Because the study focused on the feasibility of developing a project that could successfully be validated and verified to the Voluntary Carbon Standard (VCS) and the Climate, Community and Biodiversity Standard (CCBS), we have reviewed some of the key issues related to both VCS and CCBS validation and verification that would be relevant for a project to address.

2.1 Voluntary Carbon Standard

2.1.1 Methodology

As of finalization of this study (October, 2009) there is no methodology approved by the VCS Association for use with the VCS for improved forest management (IFM) by rotation length extension. However, a number of methodologies are currently under development and one *may* be developed for extending rotation lengths, although the existence of such an effort is currently unknown.[1] If a methodology does not emerge before such a project was ready to enter the development phase, a new methodology would have to be developed and approved by the VCS Association. This could pose a significant cost for a small project. It is suggested that if WWF and SNV, in collaboration with the Rainforest Alliance, decide to proceed with the development of a project concept and possibly a project proposal, that close attention is given to when and if a methodology developed by third parties may become available for use so that, if at all possible, the project can avoid having to develop their own. *The calculations presented here assume that it is necessary to develop a new methodology for this project and budget 100,000 USD for this purpose.*

2.1.2 Additionality

The concept of additionality means that credit can only be claimed for carbon dioxide sequestration (or emissions reduction) if the actions taken that led to the sequestration/emissions reduction are beyond what would have happened had the carbon project not existed. The additionality of the project is of crucial importance to the eligibility for validation and verification to the VCS. Additionality should be thoroughly documented in a potential concept/project paper, using the specific tools that have been developed for carbon projects to demonstrate additionality. This study contains a preliminary evaluation of additionality using the VCS project test[2]. *Based on this test, we find that the proposed activities are additional and would be eligible for VCS crediting.*

2.1.3 Monitoring

Monitoring with respect to conformance to the VCS standard is an important project activity that should receive attention from the onset of a potential project development. Monitoring is a way of gathering data to demonstrate that the project design has been successfully executed. In the case of the VCS, monitoring demonstrates that a verifiable number of carbon credits have been generated, by measuring sequestration and emissions reduction.

[1] Methodology elements posted for public comment are available on the VCS Web site at http://v-c-s.org/public_comment.html, so this is a place to watch for potential new methodologies. Approved methodologies are listed at http://v-c-s.org/methodologies.html.

[2] See section 5.8 of the VCS 2007.1 standards for an example of an additionality test: http://www.v-c-s.org/docs/Voluntary%20Carbon%20Standard%202007_1.pdf

2.1.4 Non-Permanence buffer determination

This feasibility study includes a tentative evaluation of risks to permanence of the described project scenario. This is conducted using the VCS's risk analysis tool. *It is found that the main challenge to the proposed project is the ability and willingness of farmers to sign up to the project for the period required under the standard (at least 20 years, but often between 30-60 years), the resulting risk being that the economic constraints of project participants, who mostly come from poor rural households, could lead to the participants' non-ability to remain in the project in times of unforeseen crisis and sudden need for cash income (when they would need to harvest their plantations prior to the date committed to for the project). A project would need to consider these issues carefully and subsequently make appropriate assumptions in the buffer withholding percentages.*

2.2 Climate, Community and Biodiversity Standard

The standard of the Climate, Community and Biodiversity Alliance is considered to have two main roles in the development and execution of carbon projects: i) to provide rules and guidance to encourage effective and integrated project design, and ii) to be applied throughout a project's life to evaluate the social and environmental impacts of a land-based carbon project.

It is important to note that the CCBA does not issue quantified emissions reductions certificates and therefore encourages the use of a carbon accounting standard (such as that of the Clean Development Mechanism or the VCS) in combination with the CCB Standard. Therefore, for the purpose of this study we have considered issues related to carbon sequestration only under the VCS analysis above. With respect to the CCBS, we focused particularly on the following issues.

2.2.1 With- and without-project scenarios

Comparing the expected "without-project" scenario with the expected "with-project" scenario as accurately as possible is an important component of the project design document required for evaluation to the CCBS. This comparison does not only relate to the carbon stock but also to community and biodiversity values. Completing the with- and without-project scenarios requires thorough analysis of the current and possible future development of the project areas and surroundings as well as identification and estimation of the expected impacts of the project on communities involved.

2.2.2 Net positive project impact

For the project to be deemed in conformance with the standard, the net impact of the project (both on- and offsite) must be positive in each of the three areas (climate, community and biodiversity). The CCBS refers to identification and conservation of high conservation value forest (HCVF)[3], and so forests of this type must be addressed in the project area. To conform to the CCBS, the project proponent must use "appropriate methodologies" to estimate any possible changes to community and biodiversity values and take action to ensure that such values are maintained or enhanced.

2.2.3 Monitoring

Similarly to the VCS, the CCBS requires the establishment and implementation of thorough monitoring systems. However, the CCBS specifically requires that these systems are designed to allow evaluation of the impact of the project on both community and biodiversity values.

[3] All natural habitats possess some inherent conservation values. These could include the presence of rare or endemic species, sacred sites, or resources harvested by local residents. High Conservation Value (HCV) areas are defined as natural habitats where these values are considered to be of **outstanding significance** or **critical importance**.

2.2.4 Group development and management

As the subject of this study is a community project involving a large number of small-scale rural farmers it is considered of critical importance to the success of the carbon project – and to the achievement of net positive climate, community and biodiversity impacts – that project management is carefully designed. In this case a good management model would likely mean the development of a well defined group formation and management structure that could work within the existing levels of administration at village, commune, district and province levels to allow adaptation to the current administrative structure. Local authorities, such as the Provincial and District branches of the Department of Forestry (DOF), should also be closely involved with the project management unit.

3. BASELINE ASSUMPTIONS AND SCENARIOS

For the purpose of this feasibility study it was useful to build two new, tailored models to enable an assessment of the baseline and project scenarios. The first model calculates the average biomass sequestered on the land for each of the two scenarios by modeling tree growth under the different management regimes. The second model uses inputs from the first model and cost/revenue assumptions to calculate the cash flow, net present value and internal rate of return for a number of scenarios.

These models were simplifications of the system they were trying to emulate. Both use a system whereby assumptions are transparent and can be easily changed in order to assess the effect on the result.

3.1 The Carbon Model

The carbon model emulates tree growth and removal at harvest using a number of simplifications and assumptions. Two scenarios were developed based on consultation with the Quang Tri Department of Forestry, literature references and previous studies carried out in the area. In order to conduct the analysis, the baseline and project scenarios were defined using assumptions listed in Table 1. Further details regarding the model are explained the file Ikea Viet Nam Feasibility Carbon Model V1.xls, Appendix 2 to this report.

Table 1: Summary of baseline and project scenarios

Criteria	Baseline	Project Scenario
Species	Acacia Hybrid (100%)	Acacia Hybrid (80%) Cassia or other native (20%)
Seedlings	Cuttings	Improved seedlings
Soil Preparation	Plowing, high disturbance	Hole planting, low disturbance
Planting Density	1600 trees ha^{-1}	1600 trees ha^{-1} (80% Acacia, 20% Native Species)
Buffer Zones	None	Yes, 5% average assumed
Management	Weeding	Weeding
Thinning	None	Year 5 (remove 20% volume) Year 9 (remove 20% volume)
Rotation Length	Year 6 (100%)	Year 12 for Acacia only Selective logging of natives*
Growth rates	Acacia = 10 $m^3\ ha^{-1}\ y^{-1}$	Acacia = 15 $m^3\ ha^{-1}\ y^{-1}$ Native Species = 6 $m^3\ ha^{-1}\ y^{-1}$

Harvest Years	6, 12, 18, 24, 30, 36	12, 24, 36
Products	Acacia 95 Pulp 5% Saw Timber	Acacia 60% pulp 40% saw wood (>18cm dbh): for high quality furniture, local house building Native Species Indoor furniture
Acacia volume at harvest	50 m^3 ha^{-1} (after 6 years)	132 m^3 ha^{-1} (after 12 years)
After Harvest	Burning Stems less than 5 cm left on the ground and burnt	No Burning

* For the purposes of model simplification and conservativeness in the financial analysis, no harvesting of native species was considered. A lower growth rate than expected for native species was used to compensate for reduced biomass storage due to harvesting.

3.1.1 Assumptions and Possibility of Variance:

Species - Acacia Hybrid is one of three species of Acacia currently grown in the province. It is the best performing of the three and it is expected in both scenarios that farmers would select this species.

Seedlings - In the project scenario it is assumed that to avoid stem rot and reduce the risk of wind throw, better quality seedlings compared to the baseline would need to be sought (at additional cost).

Soil Preparation - Plowing is common practice in the project area, yet forest technicians do not approve of its use as it can lead I the long term to soil erosion and reduced soil fertility. This practice is expected to continue in the absence of the project. To meet FSC standards, hole planting would be used in the project scenario.

Planting Density - The planting density is a based on data from within the project area. It is assumed that the same density could be planted in the project scenario (although this will involve a mixture of Acacia and native species).

Buffer Zones - To meet FSC standards, buffer zones will be required, and this is not a practice that occurs at present.

Management/Thinning – Current technical knowledge amongst small holders is not high and therefore little thinning is conducted. It is anticipated that with silviculture training (combined with improved seedlings), growth rates could be improved, i.e., through such interventions as thinning.

Rotation Length – There is currently urgency amongst small holders to harvest as soon as possible to generate regular revenues. The plantations that were established under the KfW program during the late 1990's and early 2000's are expected to be harvested as soon as payments from KfW end, which would lead to a rotation length of 6-7 years. In order to extend rotation lengths, better management would be required, species of hybrid Acacia would need to be selected that do not suffer from stem rot after 10 years, and payments would be required to bridge the delayed revenue stream. It is expected that a 12 year rotation length could be achieved under the project scenario. That said, the forest department did comment that 10 years may be a more suitable target to avoid the issue of stem rot. If all other elements are kept the same, reducing the rotation length reduces the carbon credits that would be available from 88 t CO_2 ha^{-1} to 68 t CO_2 ha^{-1}.

Growth Rates – The current growth rate for Acacia Hybrid (10 m^3 ha^{-1} y^{-1}) was based on data gathered by WWF in their plantation report. The '*Acacia. Hybrid Data*' and '*Hybrid Vol by Year*' tabs in the model spread sheet, show that an average growth rate of 10 m^3 ha^{-1} y^{-1} was achieved in the plantations measured by WWF. It was assumed that under good management, and with good seedlings, this rate could be increased to 15 m^3 ha^{-1} y^{-1}; the analysis tabs referenced demonstrate that this rate has been achieved in Quang Tri, albeit on a study farm (labeled '*Yield Table 1*'). This was considered reasonable by the Department of Forestry. Figure 1 below shows that higher growth rates have been achieved in Quang Tri with better management. The linear lines presented are a simplification, but help to put the observed growth rates in perspective.

Products – The assumptions around products have come from the SNV study into Value Chains in Quang Tri as well as from the Department of Forestry.

Figure 1: Growth rates gathered from data within Quang Tri Province. Yield table = data from forestry school test plots. All report data collected by WWF.

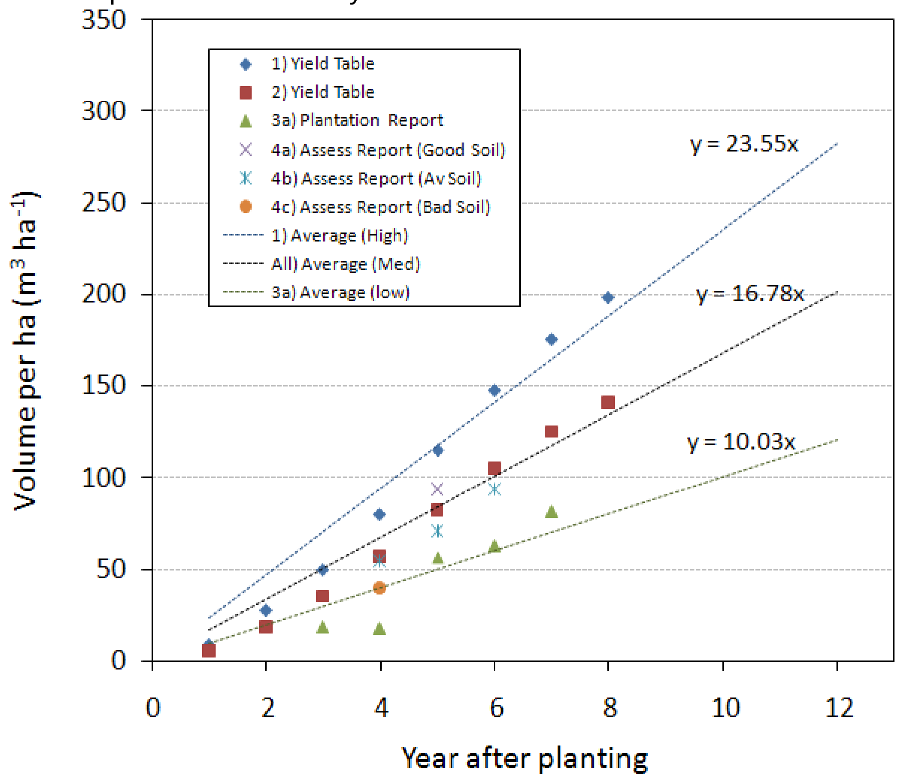


Table 2: Explanation of data sources for Figure 1.

Data	**Source**
1) Yield Table	Data from forestry school test plots.
2) Yield Table	Data from forestry school test plots.
3a) Plantation Report	Report on Plantation Survey Results (in Vinh Linh and Gio Linh districts, Quang Tri Province) (1st Draft) (assessed in 2009).
4a) Assessment report (Good Soil)	Report on Field Survey Result Made By WWF Advisory Team.
4b) Assessment report (Average Soil)	Report on Field Survey Result Made By WWF Advisory Team.
4c) Assessment report (Poor soil)	Report on Field Survey Result Made By WWF Advisory Team.

3.2 The Cost Benefit Analysis (CBA)

A cost benefit model was developed to model the two scenarios. The assumptions made are all transparent and can be changed with ease. Full details of these assumptions can be found in the CBA itself, IKEA Viet Nam Feasibility CBA V1.xls, appendix 3 to this report. The model calculates a cash flow as well as net present values (NPV) and internal rates of return for the baseline scenario as well as three project scenarios. The three project scenarios are as follows:

1) The project to lengthen rotation length, introduce buffers and native species is carried out, but no FSC certification is sought and no carbon project is developed.
2) The project to lengthen rotation length, introduce buffers and native species is carried out, FSC certification is sought but no carbon project is developed.
3) The project to lengthen rotation length, introduce buffers and native species is carried out, FSC certification is sought and a carbon project is developed.

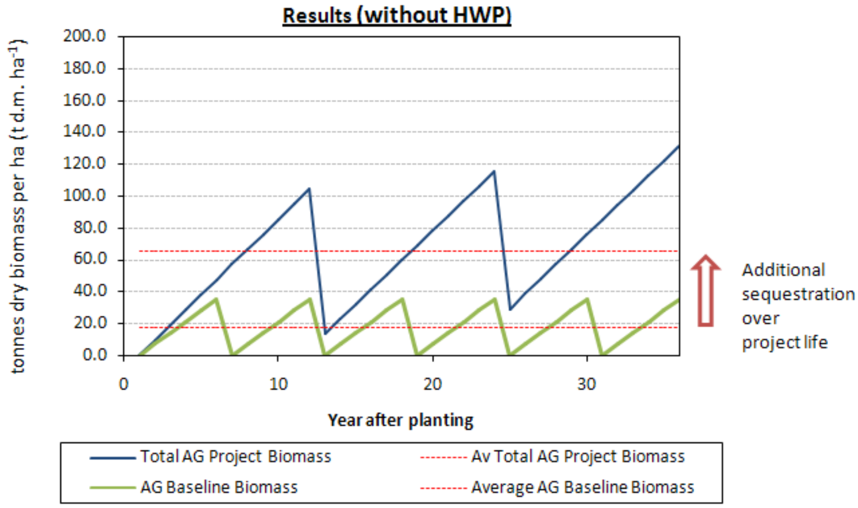
Results are presented in terms of NPV which utilizes a discount rate of 9%.

4. RESULTS OF THE MODELING

4.1 Carbon Modeling

Increasing the rotation length, incorporating native species and having a buffer was found to increase the average amount of biomass on the land from 17.5 tonnes of dry matter per hectare (d. m. ha^{-1}) to 65.6 t d. m. ha^{-1} over the length of the project (See Figure 2). This translates to 88 t CO_2 ha^{-1} over the project life, which would be the amount of credits that could be claimed. If, in the project scenario, extended rotation lengths of 10 years can be achieved, then the carbon credits that could be claimed would be reduced to 68 t CO_2 ha^{-1}. If growth rates were only increased to an average of 12 m^3 ha^{-1} y^{-1} in the project scenario, then the credits would fall to 72 t CO_2 ha^{-1}. The results were found to be relatively insensitive to changes in the area of the buffer zone.

Figure 2: A comparison of the biomass on the land in the baseline and project scenario.



HWP: harvested wood products; AW: above ground

4.1.1 Discussion of Carbon Modeling Results

If the assumptions of the model are realistic and conservative, the carbon credit values calculated are most likely to be an underestimate. A more sophisticated model could take into account accumulations in root carbon (minus decay after death) and harvested wood products, and likely increase the sequestration potential. Including root carbon may increase carbon sequestration by 10-20%. A simple model, based on the Climate Action Reserve's protocol[4] and comparing the carbon stored in harvested wood products in two 6 year rotations to one 12 year rotation shows that an additional 8 t CO_2 ha^{-1} is sequestered for each 12 year rotation of acacia. Thus, with a project length of 36 years, an additional 24 t CO_2 ha^{-1} could be sequestered through the accounting of carbon stored in wood products. Full details can be found in appendix 2.

Future carbon modeling would also need to consider thinning harvests and harvest of native species. In this model, growth rates were set at a level that was intended to account for losses due to thinning and selective logging of native species. However, this approximation should be improved in future.

4.2 Cost Benefit Analysis (CBA)

The cost benefit analysis here is presented based on a number of estimates and assumptions. In reality, costs and benefits may differ and unanticipated costs could occur. Whilst the results presented here can be used as a guide, further, more detailed analysis should be conducted prior to any investment decision being made.

The results from the costs benefit analysis are broken down into a per hectare value. This means that the size of the project has an effect on the results. Fixed costs such as project design document development, which are independent of project size, are cheaper per hectare as the project gets bigger. The Quang Tri area considered currently has 17,000 ha of acacia grown by smallholders on land with Red Book Certificates (clear land tenure). For the purpose of the cost benefit analysis it was assumed that a reasonable project size was 8,000 ha.

[4] http://www.climateactionreserve.org/how-it-works/protocols/adopted-protocols/forest/current-forest-project-protocol/

4.2.1 Estimated Project Development Costs

The following table outlines the potential costs associated with the project development costs of the rotation extension only, carbon and FSC projects. In order to conduct and FSC and/or carbon project it is necessary to also invest in the extension of rotation length project. These are estimated costs and reflect an approximate amount for each item, but the true costs incurred by a project may be lower or higher. These costs are considered to be of particular importance to the possibility of the project implementation, since they are up-front and relatively large sums.

Table 3: Potential costs associated with project development scenarios.

Extending rotation length only	USD
Project Development	30,000
Annual Implementation Costs (over first 6 years)	200,000

Carbon project costs	USD
Disbursement Scheme Development & Preparation	30,000
Project Validation	30,000
Project Design Document Development	100,000
Methodology Development	100,000

FSC related costs	USD
FSC Certification Audit (every five years)	25,000
FSC Annual Audits	6,000

4.2.2. Real time and NPV costs and additional revenues from projects

Figure 3 shows the real time (undiscounted) project development costs and upfront investments of the project alongside the price premiums that FSC certification brings and the revenues from carbon credits.

In the baseline scenario, costs were restricted to site preparation, planting, weeding and harvesting. In the first five years the total costs (not discounted) were USD 502 per ha. In the extended rotation scenario, the costs were over double that, at USD 1,082. The additional costs (relative to only extending the rotation length) related to the carbon and FSC components are relatively small. To obtain FSC certification would cost only an additional USD 7 per ha in project development costs and USD 39 per ha in upfront investment. To add a project component which realizes carbon credit benefits would approximately double the upfront investment costs to USD 61 per ha.

In the baseline scenario the total revenues (undiscounted) are USD 9,099 over the 36 year project life. By comparison, in the extended rotation only scenario the revenues double to USD 18,218. With FSC certification, the premium received for timber sales is an additional USD 2,453, as shown in Figure 3. Carbon credit sales total USD 455, based on a conservative carbon price of 5 USD per t CO_{2e}.

Figure 3: Real time (undiscounted) project development costs, upfront investment costs, and additional revenues raised by FSC and carbon revenues over the full 36 years of the project. Note that the revenues from the extended rotation are not shown (only the price premium from FSC).

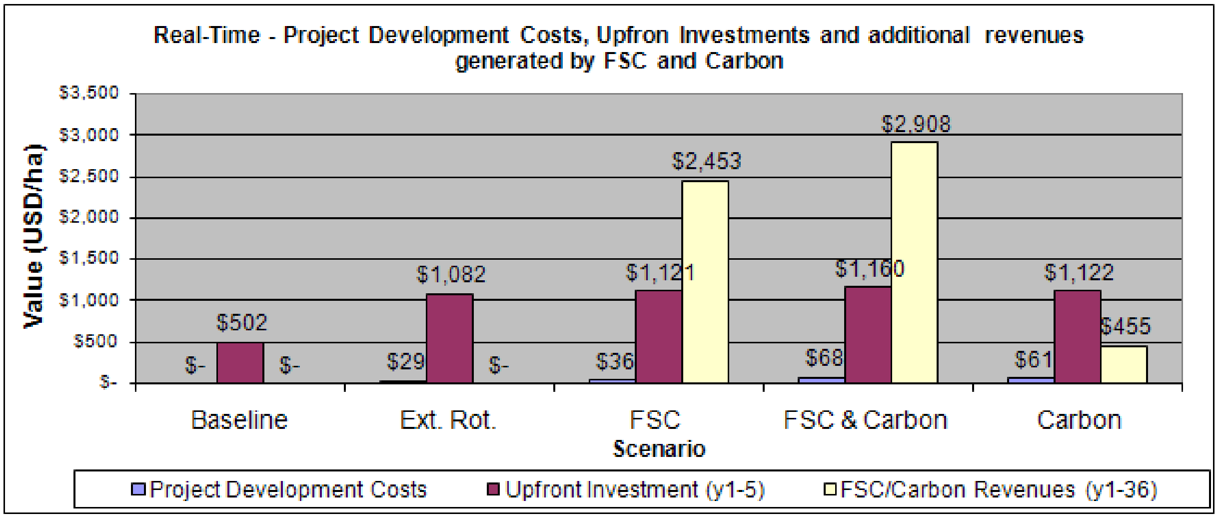
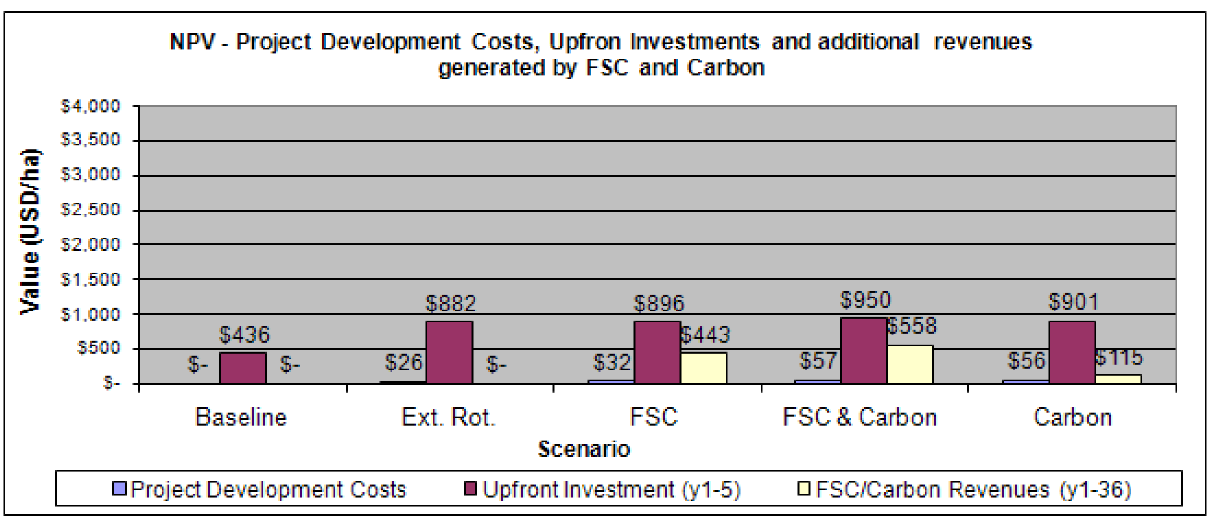


Figure shows the same project development, upfront investment and revenues as Figure 3, however applying the discount rate of 9%, to generate the net present value. When the discount rate is considered the revenues raised by selling FSC-certified products (USD 443) are still significantly more than the additional costs of earning and maintaining FSC certification (USD 20). The net present value of carbon sale revenues is still greater than the net present value of the cost of doing the project. The assumption in the CBA was that the carbon credits earned per hectare (88 voluntary carbon units, or VCUs) are received spread equally at each of the seven monitoring events, which occur at 5 year intervals. However, if it were possible to secure upfront payment for carbon credits, then the money (or some portion of it) may be able to be received much earlier in the project, significantly increasing the net present value of the payment.

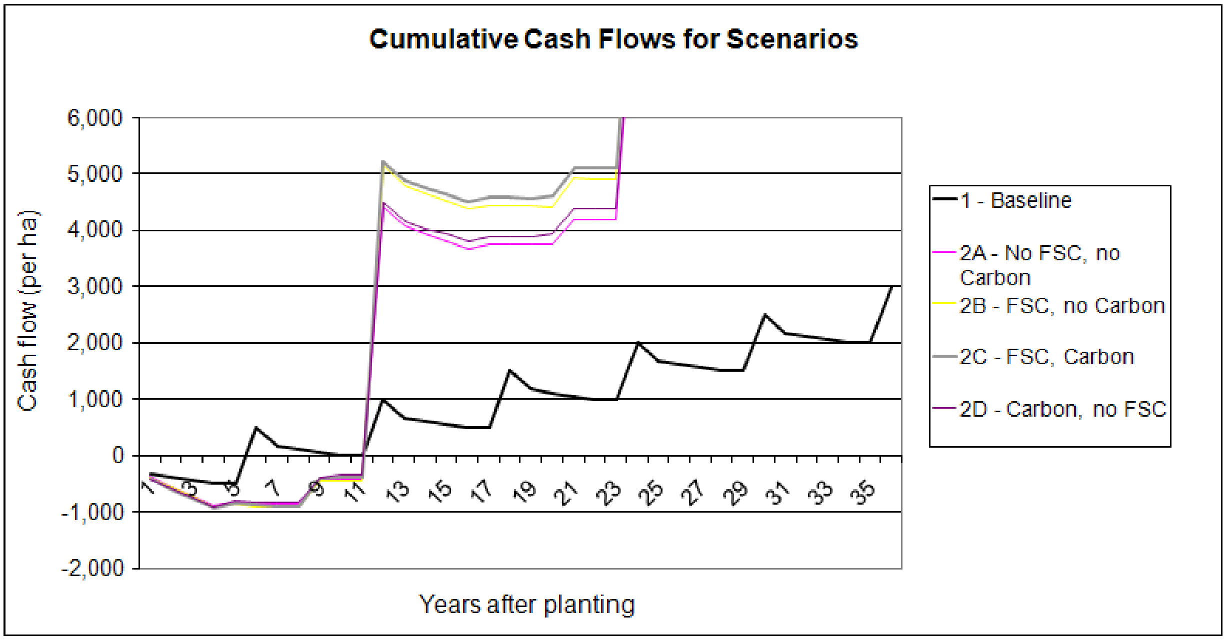
Figure 4: Discounted (rate of 9%) project development costs, upfront investment costs, and additional revenues accrued from FSC-certified timber and carbon credit revenues over the full 36 years of the project. Note that the revenues from the extended rotation are not show (only the price premium from FSC).



4.2.3 Cumulative cash flows

Figure shows the cumulative cash flow per ha for the baseline and project scenarios. The baseline scenario requires less initial investment and the early harvest in year 6 moves the cumulative cash flow into positive figures from year 6 onwards. The project scenarios however, require more upfront investment, although the FSC and carbon components require only marginally more. Some money is earned prior to the year 12 harvest through selling the trees harvested for thinning. However, it is not until year 12 in the project scenarios that the project has a positive cumulative cash flow. Although not shown on the graph the final cash flow position for the carbon and FSC component is USD 15,814, whilst for the project in the absence of carbon or FSC the position is USD 13,297.

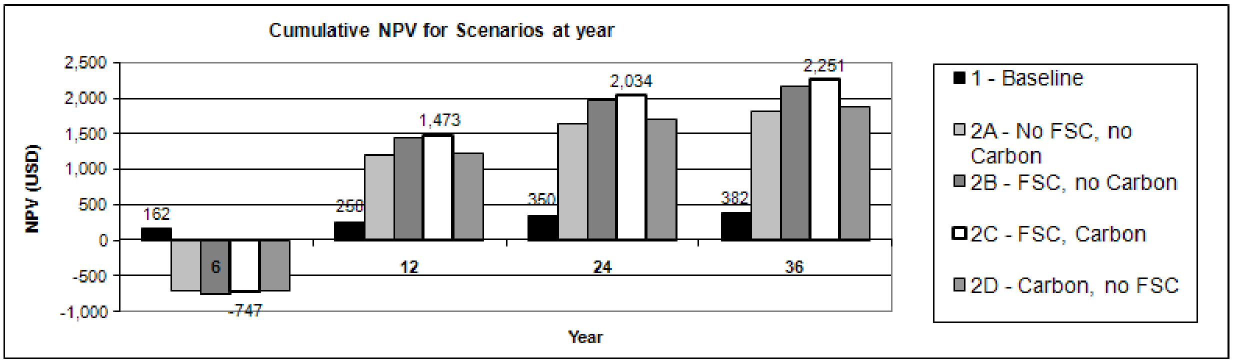
Figure 5: Cumulative cash flows per ha for the baseline and potential project scenarios.



4.2.4 Complete baseline and projects net present value

Figure 6 shows the cumulative net present value (NPV) for the baseline and potential project scenarios. Of most interest are the 36 year values, as at this point the whole project is included. The four project scenarios are shown to have a significantly greater NPV than the baseline scenario. However, the effect of adding a carbon component is almost negligible at 71 USD per ha. The net present value of the additional FSC component is 359 USD per ha.

Figure 6: Cumulative net present value for the baseline and potential project scenarios shown for years, 6, 12, 24 and 36.



4.2.5. The importance of getting carbon credits early

The assumptions used in the CBA presented above, whereby the flow of carbon credits is steady through the project, means that the benefit of those received later is minimal due to the high discount rate. However, it is possible (if a buyer can be found), to sell carbon credits before they are created. This is achieved by selling the promise of deliverance of credits at a future date at a price set today. With carbon prices likely to rise, this could be a viable investment for an investor, although they would likely request a low selling price (such as USD 5 per VCU) due to the risk involved in investing in credits that have not yet accrued. This risk would need to be managed in the contract and is not discussed in detail here. However, were this early sale achieved, the addition of the carbon component is made more attractive. If 50% of the credits were sold in year one, and the remainder spread between the seven verification events, then the NPV of the carbon component rises from 71 USD per ha to 216 USD per ha. Were they all received in year one this would rise to USD 358 per ha (equal in NPV to the FSC component). Selling 88 VCUs from 8,000 ha at USD 5 per ha would generate approximately USD 3.5 million.

5. RISK ASSESSMENT

The following risk assessment has followed the VCS guidelines for risk assessment of IFM projects as a preliminary assessment of risks found to exist in the study area.
This preliminary risk assessment follows the VCS "*Tool for Non-Permanence Risk Analysis and Buffer Determination 2008*".

Step 1: Risk assessment

- **Sub-step 1a:** Evaluate the project against the risk factors applicable to all AFOLU project types.
- **Sub-step 1b:** Evaluate the project against the risk factors associated with the specific project type.
- **Sub-step 1c:** Based on the above assessments, the overall risk classification for the project is determined.

Sub-step 1a: Determination of the risk factors applicable to all project types

Table 4: Risk factors applicable to all project types

Project risk
Risk of unclear land tenure and potential for disputes The project aims at only accepting farmers who hold a valid Red Book Certificate (RBC) into the

project. The RBC grants the holder 50 year rights for forestry use and allows for exchange, transfer, and lease, giving as inheritance and mortgage of the land. Since this system is well established and recognized the tenure is considered secure under the RBC. Land managers without the RBC will be included in the project only under the condition that they obtain RBC. There is a risk of timber theft within the region and this issue affects the small holders' decision on whether or not to harvest. Timber theft was explicitly stated by farmers as a reason to want to harvest. In the first 6 months of 2009, 372 instances of theft were recorded with a total volume stolen of 795 m^3. In 2008, 382 cases were recorded with a total volume of 750 m^3. **Risk rating: medium**
Risk of financial failure The CBA calculations are based on the assumption that the project would be implemented without external donor funding and thus that the project activities will be profitable enough to pay for validation and verification costs. As mentioned above, the decisions of farmers about their land management is, to a very high degree, determined by the financial constraints they face on a daily basis. The farmers are poor and cash income is very limited. Plantation forestry, even at 6-7 years rotation, is considered a long term investment. Expanding that rotation length will most likely be perceived as additional risk to the farmers. Even though the CBA analysis results supports the adoption of longer rotation lengths and FSC certification, the risk of farmers not wanting to get involved in such a project due to the extended investment horizon is a real one. The risk can most likely be mitigated by supporting the process with donor funds and technical support for training, capacity and awareness building as well as project development. However, it is perceived that the risk of financial failure to farmers is high. Seen form the viewpoint of a potential project the current IFM scenario looks sound, and should be a viable model, if farmers are able and willing to invest. **Risk rating: high**
Risk of technical failure The proposed project builds on simple silvicultural techniques that will be implementable by small holder farmers and there is no technical risk involved with these. **Risk rating: low**
Risk of management failure The project is proposed to be managed through existing provincial structures of the Department of Forestry in Dong Ha, Quang Tri with technical support from SNV, WWF and Rainforest Alliance. **Risk rating: medium**
Economic risk
Risk of rising land opportunity costs that cause reversal of sequestration and/or protection Project activities will focus on land areas allocated as forest land and will build on cost-benefit analyses to ensure that the activities will be viable and attractive to farmers for long term economic gains. Large parts of the land on which plantations are established are heavily degraded areas that were exposed to defoliant application during the American/Vietnam war as well as heavy bombing. The plantations areas have all been established on land formerly occupied by degraded shrub lands. The plantations that are proposed to be included in the scope of the carbon project were all established mainly through external donor funding. The fact that the land is marginal and not suitable for agriculture makes it unlikely that alternative land uses would be able to compete with plantations.

Risk rating: low
Regulatory and social risk
Risk of political instability The political system in Vietnam is considered to be very stable, at least in the short- and medium-term. The government maintains tight control on policymaking and there is negligible risk of succession. **Risk rating: low**
Risk of social instability Social instability is considered to be a low risk in Vietnam. However unexpected changes in economic growth could cause increases in unemployment that could lead to social unrest and migrations. On the other hand, it is considered that the areas in which the project proposes to work demonstrate relatively secure household-based farming systems and community social structures. **Risk rating: low**
Natural disturbance risk
Risk of devastating fire During the first half of 2008, 134.8 ha were destroyed by 10 fires in the project area. In 2009, 9 fires covering 37 ha have been reported to date. **Risk rating: medium**
Risk of pest and disease attacks The only recorded incidence of serious pest outbreak occurred in 2007, when 415.6 ha of acacia plantations in the project area were affected by wood borer (*Phalera sp*.). **Risk rating: medium**
Risk of extreme weather events (e.g. floods, drought, winds) In 2006 the area was hit by a serious typhoon which destroyed 445 ha. The timber was harvested yielding 15,000 m2. **Risk rating: medium**
Geological risk (e.g. volcanoes, earthquakes, landslides) The project location is not prone to geological calamities. **Risk rating: low**

Sub-step 1b: Determination of the risk factors associated with the specific project types

The project activities that are proposed can be categorized as extended rotation age (ERA) and conversion of low-productive forests to high-productive forests (LtHP).

Risk Factors	**Extend rotation age (ERA)**	**Conversion of low-productive forests to high-productive forests (LtHP)**
Devastating fire potential	Low to medium	Low to medium
High timber value	Very low	Low

Illegal logging potential	Low	Medium
Unemployment potential	Low	Very low

Sub-step 1c: Determination of overall risk classification for project

Overall the risks associated with the proposed project are estimated to be medium. One of the main concerns related to carbon is that the revenue that could be expected from implementing the carbon project is relatively low compared to the added value originating from switching from chip wood to saw log production. Involvement in carbon activities may not be seen as a desirable activity. This risk may be overcome if external support could be secured to support some of the initial costs of development of the project design document and project verification and validation.

Based on above risk assessment, the buffer withholding percentage for the project has been set to 15-20% (though accounting for the buffer was not included in the model).

6. ADDITIONALITY

Additionality of the proposed activities was reviewed to ensure that a possible project would be additional and thus eligible for selling VCUs.

The additionality of any project that wishes to be evaluated to the VCS must be tested using the Project Test defined for this purpose by the VCS Association. The Project Test is replicated here and responses given for the Quang Tri project.

6.1 The Project Test

Project Test Step 1: Identification of Regulatory Surplus

There is currently no regulatory framework that mandates the proposed project activities to take place.

Project Test Step 2: Implementation Barriers
The project shall face one (or more) distinct barrier(s) compared with barriers faced by alternative projects.

a. Investment Barrier – Project faces capital or investment return constraints that can be overcome by the additional revenues associated with the generation of VCUs.

   The proposed project activities (increased rotation length, increased buffer area maintenance and diversification using long rotation native species for high value timber production) are all activities that are not within the economic reach of small scale farmers that are the focus of the proposal. These farmers own and manage marginal land and are primarily subsistence farmers with very limited cash income available. The average household income in Quang Tri province for farmers is app. 450 USD per year, assuming a 5 person household size.

   The current practice of plantation management by smallholders is a rotation length of no more than 6 years. This short cycle management is driven, partly, by the fact that farmers face high discount rates and are only able and willing to invest for the immediate returns. Short rotations are preferred because those biomass-oriented systems allow flexible harvesting whenever money is required for their day to day needs. This socio-economic environment does not allow farmers to invest in longer rotations, high quality seedlings, increased buffers or long rotation native timber species, since this would prolong their investment horizon.

b. Technological Barriers – Project faces technology-related barriers to its implementation.

   Farmers do not generally have access to the technology that would allow them to increase the productivity of their plantations. Their financial situation does not allow them to invest in high quality seedlings and they are similarly limited in the amount of effort they can invest in production enhancing silvicultural techniques. Without additional financing these barriers would not likely be overcome and farmer would maintain practices as usual.

c. Institutional barriers – Project faces financial, organizational, cultural or social barriers that the VCU revenue stream can help overcome.

   Plantation and farming practices in the region are, as mentioned, based on very short term objectives and has traditionally been guided by short and immediate need for cash. Such practices will not likely change unless farmers are provided with additional income that can assist to meet emergency and short term needs. The project proposal also contains activities that relates to management of funds by individual farmers.

Project Test Step 3: Common Practice

a. Project type shall not be common practice in sector/region, compared with projects that have received no carbon finance.
b. If it is common practice, the project proponents shall identify barriers faced compared with existing projects.
c. Demonstration that the project is not common practice is based on guidance in the GHG Protocol for Project Accounting, Chapter 7.

The proposed project activities to increase the biomass of standing forest by introducing extended rotation lengths, increased buffer areas and introduction of long rotation native timber species is not common practice in the region. As mentioned above common practice consists predominantly of very short rotation single species stands followed by clear cut and burning at the end of the rotation. There is no evidence that common practice is changing except for in few areas that have received substantial amounts of direct payments via donor-funded projects in the past.

7. REGULATORY FEASIBILITY, UNCERTAINTIES AND CONCERNS

7.1 Regulatory Feasibility

There were no regulatory issues identified during the feasibility study that were found to possibly hinder the implementation of the proposed project.

7.2 Uncertainties

There are a number of uncertainties that should be highlighted in assessing the feasibility of this project.

Firstly, the prices obtained for wood chips and saw logs (with and without FSC certification) cannot be accurately estimated. Prices were assumed in the model to stay constant, which is considered conservative, as demand and prices are likely to increase for certified and non-certified wood. Price increases would be expected due to inflation, which has been dealt with in the model by assuming a discount rate, while demand is expected to increase due to the expected development and expansion of the wood processing industry in Vietnam.

The price of carbon credits in the future is also unknown. The value of 5 USD per ton CO_{2e} was assumed to remain constant going forward, which again is conservative as prices are likely to rise in the future with increased demand. The average price paid for improved forest management credits in 2007-8 was USD 7 per ton CO_{2e}.[5]

As mentioned above in the risk determination, a major uncertainty is whether or not the local farmers will perceive the possible project benefits as outweighing the perceived risks associated with extended rotation lengths. This issue is something that should be included in a project design as a strategy to ensure adequate stakeholder consultation and awareness-raising to ensure that farmers understand the risks and opportunities of the project. The uncertainty here is the ability of the project to get enough farmers to sign up to the project and stay committed. A study team that analyzed the KfW project found that this is a risk, but also that through proper planning and implementation the project should most likely be able to overcome these risks. The fact that the KfW project found that signing farmers up to their project would be a challenge would be expected to be reflected in similar challenges in a possible carbon project.

[5] State of the Voluntary Carbon Market 2009 - http://64.27.23.230/documents/cms_documents/StateOfTheVoluntaryCarbonMarkets_2009.pdf

The model does not account for the fact that some credits would be held in a risk-based buffer account by the VCS, although contract negotiations with the buyer could help minimize the effect of this may have on the cash flow. For example, if all credits were sold up front, the delay in receipt of credits due to the buffer account would not affect the project cash flow directly.

7.3 Concerns

The proposed project scope includes and area of 8,000-12,000 ha. This is a considerable area that will require relatively large up-front investments, as well as considerable organization and planning. Collaboration with the Provincial Forestry Department will be essential to the project's success.

Timing of credit sales and potential buyers are both uncertain. The concept of extending rotation length to sequester carbon is not as easy for donors to visualize as avoided deforestation or tree planting. As such, the pro-poor and community elements of this project would need to be emphasized to attract donor and investor attention.

The importance of secured funding should not be underestimated. The discount rate in the model was set high, but for the project to be successful its financial structure must not put farmers in a position to take on debt or have any great incentive to leave the scheme by harvesting early.

In order to ensure eligibility for validation and verification to the VCS the project timeline is set to 30-40 years, meaning that farmers would be required to commit their land to the project for 30-40 years into the future. As they are mostly relatively poor and have traditionally oriented their livelihoods around short term decision-making, it is likely to be a serious challenge to convince farmers to sign up their land for such an extended period of time.

8. CONCLUSIONS

Based on this analysis, it seems that the project (extending rotation length with Forest Stewardship Council certification and carbon credit generation components) could provide long-term financial viability for participants and could be developed to meet the requirements of validation and verification against the VCS and CCB Standard.

As can be seen from figures 5 and 6 the main financial benefit from the project would originate from the farmers adopting longer rotation ages and thus reaping the benefits of being able to produce higher value saw logs instead of low value chip wood. The financial benefits of FSC certification and carbon credit production are small when compared to the extra money made from extending the rotation length alone. Adding an FSC certification component to the project is more financially attractive than adding a carbon project unless all carbon credits can be sold at the start of the project, and could help increase the chance of the project's success through better management practices as well as increasing the marketability of the timber. Adding the carbon component to the project will not contribute significantly to the success of the timber generating aspect of the project, but does bring extra risk. The revenue per hectare is low for carbon due to the project type, and monitoring costs are likely to be relatively high because the project has a high number of dispersed land parcels.

The biggest challenge of facilitating the carbon and FSC certification efforts is structuring finance to cover the high cost of initial investments related to these activities and to cover the delayed receipt of revenues for farmers. Due to the uncertainties listed above, a carbon project also brings risk, as the invested funds will only reap benefits if the project is executed as planned.

On balance, given the limited resources available to invest in carbon sequestration projects, this idea is not considered one that should be pursued. Many of the benefits of the carbon project can be achieved without the project if donor funding can be found.

REFERENCES

Le Truong Giang (2009) Report on Plantation Survey Results (n Vinh Linh and Gio Linh districts, Quang Tri Province (1st Draft). WWF

Wheatly, C. & Peters, D. (2008) Acacia Value Chain in the North Central Region of Vietnam. Part of a 3 value chain analysis and programme development study. SNV.

APPENDIX 1: LIST OF PEOPLE INVOLVED IN THE STUDY

Name	Contact	Type of Participation
Adam Gibbon	Rainforest Alliance	Co-Author of report. Developer of the Carbon model.
Christian Sloth	Rainforest Alliance	Co-Author of report. Standards Reseach.
Sebastian Shcrader (WWF)	WWF	Developer of the Cost Benefit Analysis Tool. Provision of background information and field knowledge.
Le Khac Coi (WWF)	WWF	Participation in field trip.
Dung Tri Ngo (SNV)	SNV	Participation in field trip.
Richard McNally (SNV)	SNV	Participation in field trip.
Rob Ukkerman (SNV)	SNV	Participation in meetings and field trip.
Thuy An (WWF)	WWF	Participation in field trip.
Vu Tan Phuong	RCFEE	Participation in meetings.
Hoang Duc Doanh	DoF Quang Tri	Meeting about the feasibility study and to seek statistics about the project area.
Doan Viet Cong	DoF Quang Tri	Meeting about the feasibility study and to seek statistics about the project area.
Ho Sy Huy	DoF Quang Tri	Meeting about the feasibility study and to seek statistics about the project area.

APPENDIX 2: CARBON MODEL

See spreadsheet titled: Ikea Viet Nam Feasibility Carbon Model V1.xls
Please contact climate@ra.org for a copy.

APPENDIX 3: COST BENEFIT ANALYSIS

See spreadsheet titled: Ikea Viet Nam Feasibility CBA V1.xls
Please contact climate@ra.org for a copy.