Voluntary Carbon Market Opportunities for Maori Owners of Indigenous Forest

Project Overview Report V1

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Te Puni Kōkiri
REALISING MĀORI POTENTIAL

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Indigenous Forest Carbon

THE RESOURCE

Forests cover approximately 29% of the New Zealand land area. Of this, 6.4 million hectares is indigenous forest, most of which is in Crown ownership and protected. The government's best estimate of the New Zealand harvestable forest estate stood at 3.6 million hectares of privately owned forest as of 2010. Of this total area, 2.4 million ha comprises of harvestable indigenous forest and 1.2 million ha of exotic plantations (MFE and Treasury 2007). More than a quarter of the harvestable indigenous forest area (614,000 hectares) is Maori owned. Of this approximately 205,000 hectares has timber production potential (MAF 2001).

The indigenous forest component of the harvestable forest estate is subject to Part 3A of the Forest Act (the 1993 amendment), which prohibits clear felling of indigenous forest on private land. Timber from indigenous forests can be harvested under a sustainable forest management regime. According to the Ministry of Agriculture and Forestry (MAF), approximately 50,000 hectares of indigenous forest (Maori and non-Maori ownership) are being managed under a sustainable management regime, involving around 400 permits, with an allowable annual harvest of 78,000 m^3 of timber (MAF 2010).

The Maori owners of non-Kyoto harvestable indigenous forests are ineligible to participate in emissions trading under the New Zealand compliance carbon market (under the Permanent Forest Sink Initiative (PFSI), or the NZ ETS). A large proportion of these forests are either sequestering carbon annually (carbon sink), or eligible for sustainable forest management timber harvesting (potential carbon source). Because of this, forest management practices can potentially enhance the carbon sink or avoid/reduce the carbon source from these forests, but how do owners of these forests make a living by helping the climate system?

One of the purposes of forest sector carbon finance is to enable forest owners to harvest carbon revenues as a means of financing forest protection and improved forest management. The ineligibility of pre-1990 indigenous forests under the NZ compliance carbon market, combined with the fact that New Zealand elected to not undertake Article 3.4 of the Kyoto Protocol is precisely the reason such forests are eligible (in principle) for generating carbon revenues in the voluntary carbon market. The next question is whether carbon trading from indigenous forests using the voluntary carbon market is a commercially viable proposition for Maori forest owners. This project set out to answer this question by means of a case study in Maori-owned indigenous forest in Western Southland.

The case study forest comprises an aggregation of 21 land blocks totalling 2,617ha. Located within this project boundary is 1,425ha of forest eligible for timber harvesting and (by definition) eligible for carbon trading.

FORESTS AND CARBON

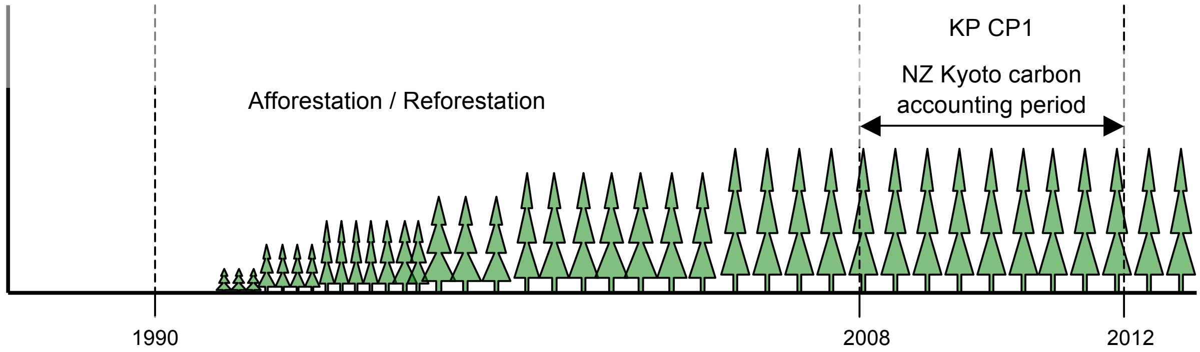
Forests play an important role in the carbon balance of a country. They pose a challenge for carbon accounting, however, because forests (unlike fossil carbon) store, gain (sequester), and lose (emit) carbon dioxide depending on a range of circumstances including the way they are managed. Carbon sequestration (carbon sink) occurs through the process of photosynthesis, which is when a plant fixes atmospheric CO_2 by combining it with water and the sun's energy to produce sugar and oxygen. This process harnesses the sun's energy by storing it as chemical energy in the form of complex sugars, some of which become incorporated into wood. Carbon dioxide is released (carbon source) from plants and animals though respiration, decomposition, and combustion, each of which releases the sun's energy previously stored in complex sugars and their metabolic derivatives. Every living ecosystem will continually give out and take in CO_2 (carbon flux).

Photosynthesis and respiration operate as a reciprocal pair and the net carbon balance of a system (tree, forest, ecosystem, biome) will result from the balance between the rate of photosynthesis and the rate of respiration in that system. When photosynthesis runs ahead of respiration in the system (e.g. a forest), the system will accumulate (sequester) solid carbon with positive net biomass accumulation (i.e. a carbon sink). When respiration runs ahead of photosynthesis the system transfers carbon to the atmosphere (i.e. becomes a carbon source).

FOREST CARBON ACCOUNTING

Forest carbon accounting is complicated by the dynamic character of forest systems, and by the architecture of the Kyoto Protocol. Firstly, the Kyoto Protocol has 1990 as the base year. Secondly, national carbon accounting rules under the Kyoto Protocol require a country to measure the change in carbon stocks (emissions minus sequestration) for the first commitment period (KPCP1 – 2008 to 2012 inclusive), but only for forests that were not forests as of 1 January 1990. This rule is specified in Article 3.3 of the Kyoto Protocol, and is a rule that was mandatory for ratifying nations (New Zealand being one of them).

Figure 1. Kyoto Forest (Post-1989)



This establishes the first order eligibility criteria for forests in the New Zealand carbon accounting system (for intergovernmental reporting under Kyoto), and subsequently the New Zealand Emissions Trading Scheme (NZ ETS). In short, if your forest was already forest on 31 December 1989, then

a. It is invisible to the Kyoto Protocol carbon accounting system
b. Has nothing to do with the national carbon balance (unless deforested), and
c. Is ineligible for incentives or penalties under both Kyoto (at the international scale) and the ETS (at the domestic scale).

This is because New Zealand elected to not undertake Article 3.4 of the Kyoto Protocol that deals with the management of carbon stocks in forests that were established prior to 1990. This is the situation for the vast majority of indigenous forests in New Zealand. Accordingly, owners of these forests are ineligible for participating in the ETS and can gain no compliance carbon units for avoiding emissions (by avoiding timber harvesting) or sequestering carbon (through growing more wood).

Figure 2. Non-Kyoto Forest (Pre-1990)a: Afforestation/Reforestation

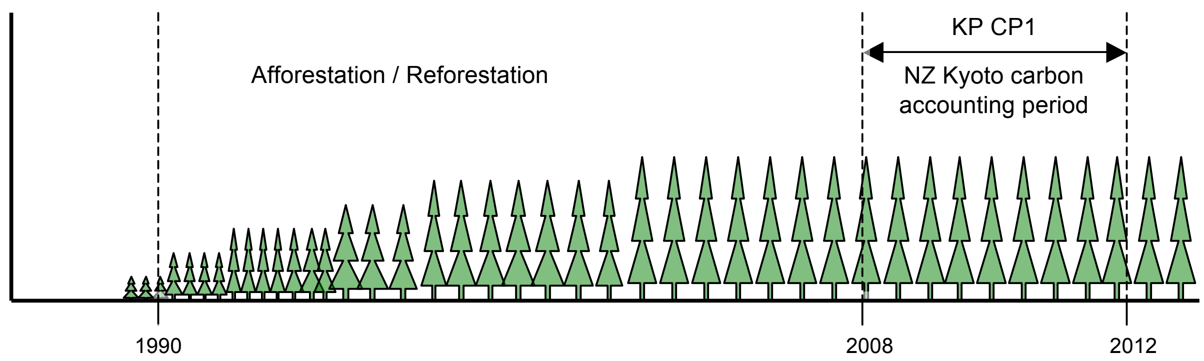
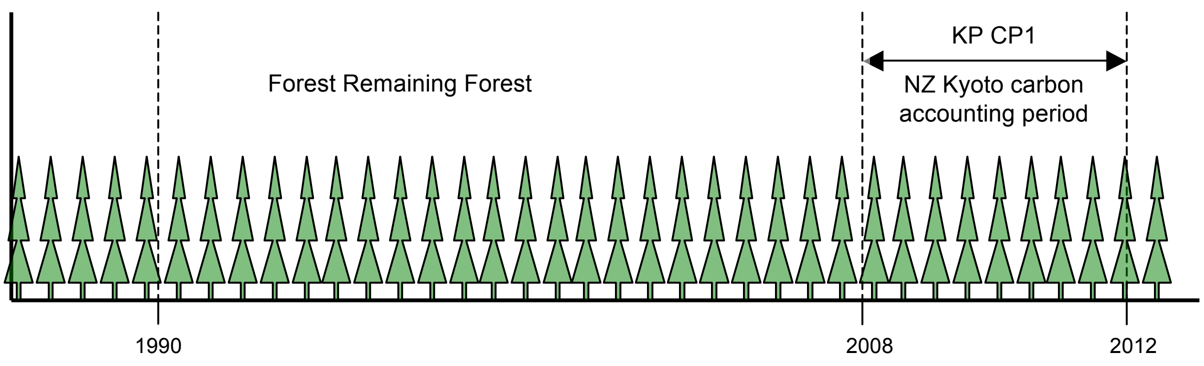


Figure 3. Non-Kyoto Forest (Pre-1990)b: Forest Remaining Forest



The only way that pre-1990 forests come into the Kyoto carbon accounting system is if they are deforested[7], in which case they become counted as a source of emissions in the national carbon accounting scheme. The New Zealand Government has, however, decided to not impose a carbon liability upon indigenous forest owners should they deforest, because the Forest Act and the Resource Management Act prevent such deforestation (apart from smaller scale forest removals in the West Coast Region – i.e. too small for the government to worry about at a national scale).

Indigenous forest that established since 1 January 1990 is eligible for incentives (and penalties) under the NZ ETS, the Permanent Forest Sinks Initiative (PFSI) and the EBEX-21 Programme. Such lands can potentially gain carbon revenues provided they meet the eligibility criteria of the chosen scheme.

The focus of this report, however, is indigenous forest that established prior to 1990. Many owners of this kind of indigenous forest asset consider themselves disenfranchised servants of the public good, particularly if they would like to earn an income selling carbon instead of timber from these forests as a way of contributing to climate change mitigation. But the ETS is not the only carbon market – there is also the voluntary carbon market.

VOLUNTARY CARBON MARKET

To describe the voluntary carbon market it is worth clarifying how it differs from the compliance carbon market. The players in the compliance carbon market are called 'Points of Obligation' (POs), and have binding obligations relating to their greenhouse gas emissions. Points of obligation include:

a. Countries that took on binding emission reduction targets in the Kyoto Protocol (New Zealand is one of the 37 Kyoto Annex B[8] countries that are international POs (United Nations 1998), and
b. Domestic entities that have been assigned PO status within a domestic emissions trading scheme.

Points of Obligation participate in emissions trading and carbon markets when they are required to meet a binding emissions reduction target and/or take responsibility for their emissions by purchasing carbon units to match their emissions. Either way the driver behind the demand for carbon units is a regulatory obligation. In contrast, the voluntary carbon market is a market instrument operating outside of any regulatory obligation to reduce

[7] The term 'deforestation' has a specific definition in carbon accounting and tends to refer to a permanent change in land use (from forest to non-forest land use such as agriculture).

[8] The Kyoto Annex B countries are: Australia, Bulgaria, Canada, Croatia, Czech Republic, Estonia, EU (15 countries), Hungary, Iceland, Japan, Latvia, Liechtenstein, Lithuania, Monaco, New Zealand, Norway, Poland, Romania, Russian Federation, Slovakia, Slovenia, Switzerland, Ukraine.

emissions. This sets up two distinct domains: the 'Compliance Space' and the 'Voluntary Space.' These domains have geographical, sectoral, temporal, chemical, and participant boundaries. An activity with only one of the attributes listed in the 'Voluntary Space' above will disqualify it from the 'Compliance Space' and in so doing qualify it for the 'Voluntary Space.' As can be seen below, pre-1990 forests sit firmly in the Voluntary Space and are eligible (in theory) for participating in the voluntary carbon market.

Table 1: Comparison of Compliance Space and Voluntary Space Attributes

Compliance Space	
Boundary	**Attributes**
Geographical:	Countries that ratified the Kyoto Protocol and took on binding emission reduction targets (listed in Annex B of the Kyoto Protocol).
Sectoral:	Sectors covered by the Kyoto Protocol carbon accounting regime: stationary energy, transport, waste, agriculture, domestic aviation, domestic shipping, and **post 1989 forests**.
Temporal:	1 January 2008 to 31 December 2012.
Chemical:	The 6 Kyoto gases – carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbons, perfluorocarbons.
Participant:	Points of Obligation.

Voluntary Space	
Boundary	**Attributes**
Geographical:	Countries not listed in Annex B of the Kyoto Protocol (i.e. counties that did not ratify the Kyoto Protocol (e.g. the USA), and developing countries that did ratify but did not take on binding emission reduction targets.
Sectoral (NZ):	Sectors not covered by the Kyoto Protocol carbon accounting regime: soil carbon, international aviation, international shipping, and **pre 1990 forests**.[9,10]
Temporal:	Prior to 1 January 2008.
Chemical:	Greenhouse gases other than the 6 Kyoto gases.
Participant:	Non-Points of Obligation.

[9] Article 3.3 and 3.4 of the Kyoto Protocol cover the forest sector. Article 3.3 was compulsory for ratifying nations in the Kyoto Protocol and covers post-1989 forests. Article 3.4 relating to pre-1990 forests was optional for ratifying nations and New Zealand elected to opt out of this part of the Protocol.

[10] While Article 3.3 of the Kyoto Protocol deals with post-1989 forests, any pre-1990 forests that are deforested during the Kyoto First Commitment Period (2008-2012) come into Article 3.3 as a carbon liability. This is why forest owners in the central North Island worked very rapidly to clear forests to convert land to dairying up until 31 December 2007 and then abruptly stopped.

Non-Points of Obligation

The vast majority of individuals and organisations in the global economy and Kyoto countries (including New Zealand) are not Points of Obligation in either intergovernmental emissions trading (only countries are POs) or a domestic Emissions Trading Scheme. For example, the New Zealand ETS has only about 200 companies that are POs (not counting forest owners to opt into the scheme). This relatively small number of POs relates to the design of domestic emissions trading schemes normally following an 'upstream' model that captures entities at the top of the energy supply chain (which is administratively simpler and less costly).

Any non-PO can make a voluntary contribution to reducing greenhouse gas emissions. These voluntary efforts are visible in, for example, corporate social responsibility (CSR) activities. One such activity is 'carbon neutrality' and involves reducing to zero the net emissions inside one's project boundary (e.g. a business or household). Getting to zero requires three basic steps (e.g. see Commerce Commission 2009):

1. Measure: Establish a project boundary and measure the annual carbon emissions footprint within the project boundary.

2. Reduce: Reduce emissions as much as possible within the project boundary (e.g. through behaviour change, installing clean technologies). Even with a lot of effort and expense it is common that some emissions are high on the cost curve and very difficult and/or prohibitively expensive to eliminate from within the project boundary (residual emissions). These residual emissions are measured and form the target for carbon offset purchases.

3. Offset: Purchase carbon offsets (carbon units), which involve causing emission reductions outside the project boundary. These offsets are now routinely required to meet independent quality assurance standards (voluntary carbon standards) (similar to organic foods). A key element in voluntary carbon standards is a requirement to demonstrate that the carbon emission reductions (or sink removals) would not have happened without the carbon finance associated with the sale of the carbon units. This is called 'additionality.'

Step 3 is what generates demand (among non-POs) for voluntary carbon units. Another source of demand for voluntary carbon units is corporate social responsibility (CSR) aspirations without any carbon neutrality aspiration (e.g. voluntarily choosing to take responsibility for certain unavoidable emissions).

The motivation for CSR buyers includes maintaining or increasing market share in a customer environment where there is increasing demand for goods and services that are beneficial to society and the environment (e.g. see California Environmental Associates 2007). Another motivation is simply a desire to do the right thing. The location of buyers of voluntary carbon units need not be restricted to the country where the units are supplied. Indeed the voluntary carbon market is an international market.

Maori owners of pre-1990 indigenous forests are potential suppliers/sellers of voluntary carbon units in this market. The incentive to being a supplier of voluntary carbon units is the carbon revenues that can be gained from the sale of these units. This carbon finance is designed to enable a more sustainable development option to compete with the less sustainable business-as-usual scenario. In the case of indigenous forests, the more sustainable option (from a climate point of view) might be to not harvest timber from these forests (timber harvesting generates carbon dioxide emissions) but instead, protecting them (which avoids these emissions).

Quality Assurance

The next question then relates to how one becomes a supplier of voluntary carbon units (carbon credits). Just because owners of pre-1990 forests are eligible in principle to participate in voluntary carbon market emissions trading, it does not necessarily mean that this can happen in practice. Like any business proposition the core issue is whether the product is of sufficient quality to be acceptable to the buyer, and whether the value obtained from selling the product is greater than the cost of generating it. Both of these issues have a close connection with quality assurance processes in the voluntary carbon market.

Buyers in the voluntary carbon market are increasingly demanding that the units they purchase are subjected to a third party quality assurance process. This has arisen partly from the bad press that the voluntary carbon market generated around 2005 and 2006 when it was revealed that several projects were not delivering the promises they claimed to their customers. As a consequence, 2007 saw a rapid increase in use of voluntary carbon market standards (Hamilton et al 2008). These standards operate much like any other voluntary performance standard such as the Forest Stewardship Council, and the standards used in industrial standards (e.g. ISO standards), and for organic agricultural products. In the case of the voluntary carbon market, the standards are often modelled on the project-based emissions trading mechanisms in the Kyoto Protocol – Joint Implementation (JI) and the Clean Development Mechanism (CDM). Many of these standards have also tended to follow the methodological developments in the CDM and the Intergovernmental Panel on Climate Change (IPCC), particularly for the Agriculture, Forestry and Other Land Uses (AFOLU) sector (IPCC 2003, IPCC 2006).

The key quality assurance and eligibility criteria for voluntary carbon market projects require that:

a. Project type falls within an eligible category of project types supported by the standard in question,
b. The project follows the project cycle for that standard, and
c. The emission reductions (reducing source) or removals (enhancing sinks) must be measurable, verifiable, and additional.

Matching Project Type And Standard

When undertaking a voluntary carbon project it is important to decide on an appropriate carbon market standard. Some project proponents elect to bring a project to market without a standard (self-certified) but such projects commonly find difficulty selling carbon units, getting low prices per tonne of CO_2, and buyers of such units are exposed to criticism by watchdogs and competitors given that such carbon has not been third party quality assured.

Voluntary carbon market standards provide three key project development components:

1. Methodological guidelines for the project
2. A basis for an independent third party audit of the project
3. Some standards issue carbon units to the project (i.e. carbon credits are awarded that can then be sold. These may be Verified Emission Reductions (VERs) or other more specific units aligned with a particular standard (e.g. VCUs form the Voluntary Carbon Standard).

There are currently several different voluntary carbon market standards available (Hamilton et al 2009) including[11]:

- American Carbon Registry Standard
- Climate Action Reserve Protocols
- The CarbonFix Standard
- Clean Development Mechanism
- Chicago Climate Exchange Offsets Program
- Climate, Community, and Biodiversity Standard
- EPA Climate Leaders Offset Guidance
- Greenhouse Gas Services Standard
- Gold Standard
- Australian National Carbon Offset Standard
- ISO 14064-2 Standard
- Plan Vivo
- Social Carbon
- TUV NORD Climate Change Standard
- VER+ Standard
- Voluntary Carbon Standard
- Supplier specific standards

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[11] Not all of these voluntary carbon market standards support forest projects (e.g. the Gold Standard will only certify energy projects). Of those for which forest projects are an eligible activity, some will only certify afforestation/reforestation project types (e.g. The Carbonfix).

Most voluntary carbon standards focus on the carbon aspects of a carbon project, whereas some standards specialise in certain co-benefits associated with a carbon project. For example, the Climate Community and Biodiversity Standard (CCB) specialises in providing quality assurance for biodiversity and social co-benefits of carbon projects involving natural forest (CCBA 2008). Here the carbon component of the project will normally be certified under a carbon standard (e.g. the Voluntary Carbon Standard or ISO 14064-2), and the co-benefits certified under the CCB.

Of the standards available in the above list, only a few are suitable for the protection of indigenous forest in New Zealand, because only a few support this project type, and the geographical location. Those that are potentially suitable for this project include the Climate Community and Biodiversity Standard, ISO 14064-2 Standard, and the Voluntary Carbon Standard.

Project Cycle

Each standard will come with project eligibility criteria and detailed methodological guidance. The role of the project proponent is to develop the Project Description Documentation (PDD) using the guidance criteria provided by that particular standard. The process commonly follows a sequence similar to that required by the Voluntary Carbon Standard (see VCS 2008a,b):

Table 2: Typical Carbon Project Cycle

Typical Carbon Project Cycle	
Task	**Description**
1. Project Idea Note (PIN):	Brief scoping document that identifies the project boundary, the project type, the standard that will be used (including eligibility statement), and an estimate of potential carbon units to be generated by the project should it be certified.
2. Project Description Documentation (PDD):	Project proponent prepares PDD using relevant methodological guidance provided by the relevant standard. The cost of this exercise is dependent on strategic decisions of the project proponent together with the quality assurance requirements.
3. Validation:	PDD audited and validated by verifier who is accredited by the relevant standard (verifier appointed by project proponent). The verifier assesses claim against the standard and produces a validation report.
4. Registration:	Project proponent submits documentation to the Registry operator of the given standard.
5. Certification:	Registry operator checks documentation and submits it to the Project Database of the standard.
6. Registry Check:	Project Database checks that the project has not been previously registered and issues Carbon Credit serial numbers. Registry

	operator for particular standard requests and receives a Registration Levy from the project proponent.
7. Issuance:	Registry operator places documents into custodial service and issues carbon credits into the account of the project proponent.
8. Monitoring:	Project monitoring and associated verification according to an approved monitoring plan. Some standards will only issue carbon credits ex post (i.e. after the emission reductions or sequestration has occurred). The issuance of ex post credits usually occurs following the verification of a monitoring report.

Measurable And Verifiable

In order to measure the climate benefits of a forest carbon project it is necessary to establish a carbon measurement, reporting and verification (MRV) system for the project. The project MRV system is an integral component of the Project Description Documentation (PDD). This will require the establishment of a carbon inventory for the forest in question, with the measurement of forest carbon stocks and carbon stock change through time within the project boundary. This measurement requirement falls into two main categories: the Baseline Scenario and the Project Scenario. The Baseline Scenario is the "business-as-usual" scenario where timber harvesting would occur in the forest in question. The Project Scenario is the situation should the forest protection project go ahead.

The carbon accounting dimensions of carbon projects can be undertaken at various levels of measurement resolution and accuracy. These levels of measurement resolution are commonly aligned with the Intergovernmental Panel on Climate Change (IPCC) 2003 and 2006 guidelines for forest carbon accounting according to three tiers of measurement – Tier 1 (low resolution), Tier 2, and Tier 3 (high resolution). As a rule of thumb: the higher the resolution, the higher the accuracy and the higher the cost. Deciding on the Tier for project MRV will best begin with a project data assessment to determine the MRV Tier possible using existing data sets. Then it will be necessary to determine the requirements to fill the data gaps for the chosen Tier, which will need to be accompanied by an evaluation of costs associated with attaining the data needed to deliver the desired MRV Tier.

The voluntary carbon market tends to operate under the principle of conservativeness whereby the number of carbon units issued to a project will match the lower end of the error margin arising from the carbon stock and stock change calculation.

Additionality

The purpose of carbon credits is to enable a carbon buyer to cause new emission reductions / removals by purchasing carbon credits. This means that the emission reductions or sink removals in the carbon project would not have happened anyway (i.e. are additional).

There are two broad types of carbon project additionality:

1. Project additionality (the carbon benefits would not have occurred without the project)
2. Financial additionality (the project would not have occurred without the sale of carbon credits as necessary co-financing)

For a forest protection project to be additional it must be displacing an activity that is legally sanctioned and is likely to go ahead if the project (e.g. forest protection) did not occur. Additionality also requires that it is human management intervention that caused measurable carbon benefits to occur.

Natural forest that is already regenerating is sequestering carbon dioxide every year and will do so until it reaches maturity. This normally takes about 200 years. This sequestration is being caused by nature and so is not additional, and will not normally be eligible for carbon financing. If however, some form of management intervention were to enhance the rate of sequestration then such activity could potentially qualify as additional. For example, if a regenerating forest contained commercially viable timber species and volumes, and there was a robust business case that this timber would be extracted if the carbon project did not go ahead (e.g. because the forest owners want to use the forest as a source of revenue), then protecting the forest from any timber harvesting would potentially be considered additional by a carbon market standard.

Exploring Eligible Project Types

There are a number of different potential forest sector project types available for carbon project development in the voluntary carbon market. Worth considering briefly are pest and weed control, carbon farming (enhanced regeneration), and reduced or avoided timber harvesting.

Pest Control

A common feature of indigenous forest management is the control of pest browsers such as possums. For possum control to be eligible for carbon financing (the generation and sale of carbon credits) the control of possum populations would have to demonstrably cause an increase in the rate of carbon sequestration in that forest. Research that has been conducted on the vegetation biomass (carbon) response to possum control has shown no significant difference in the rate of carbon sequestration compared with forests with no possum control. This research shows that possum browsing causes changes the species mix, but does not demonstrably change the rate of forest growth[12].

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[12] Ian Payton, Fiona Carswell, Larry Burrows Landcare Research Ltd pers. com.

It is therefore, unlikely that possum control alone will be a sufficient activity type to satisfy the additionality requirements of a carbon project in indigenous forests in New Zealand. Pest management of this form would however, add value to a carbon project and could potentially gain certification under a non-carbon component of the quality assurance associated with a project (e.g. biodiversity co-benefits). Even without certification of the biodiversity co-benefits, adequate documentation of these co-benefits in the project documentation may be sufficient to enable the project to command a higher price per carbon unit in comparison with a project that did not generate these co-benefits.

Weed control will face similar challenges to pest browser control where the likely project outcome is not an increase in the rate of carbon sequestration but a change in the species composition of the managed forest. If, however, a non-woody weed species was particularly aggressive and inhibited the natural process of forest regeneration, then it may be possible to demonstrate additionality should that weed be subjected to intensive control in a carbon project and where the weed control was not possible without carbon financing (financial additionality).

Carbon Farming

Carbon farming involves assisting the growth of forests. In the New Zealand compliance carbon market (e.g. the Permanent Forest Sinks Initiative – PFSI (MAF 2008), and its predecessor the EBEX-21 Programme (Richardson et al 2004)) carbon farming arises from demonstrating a change in land use from non-forest to forest. This is relatively easy to do if you can demonstrate that your forest was grassland on 1 January 1990 (e.g. through remote sensing or aerial photography), and that you have changed the form of land use from agriculture to forestry. Most pre-1990 indigenous forests do not constitute 'new forest' and commonly involve a 'forest remaining forest activity' (FF) according to the IPCC 2006 typology for Agriculture, Forestry and Other Land Uses (AFLOU). It is therefore somewhat more difficult to demonstrate a change in management sufficient to satisfy a voluntary carbon market standard for FF projects. This is particularly true for projects seeking to demonstrate enhanced rates of sequestration arising out of a change in management practices.

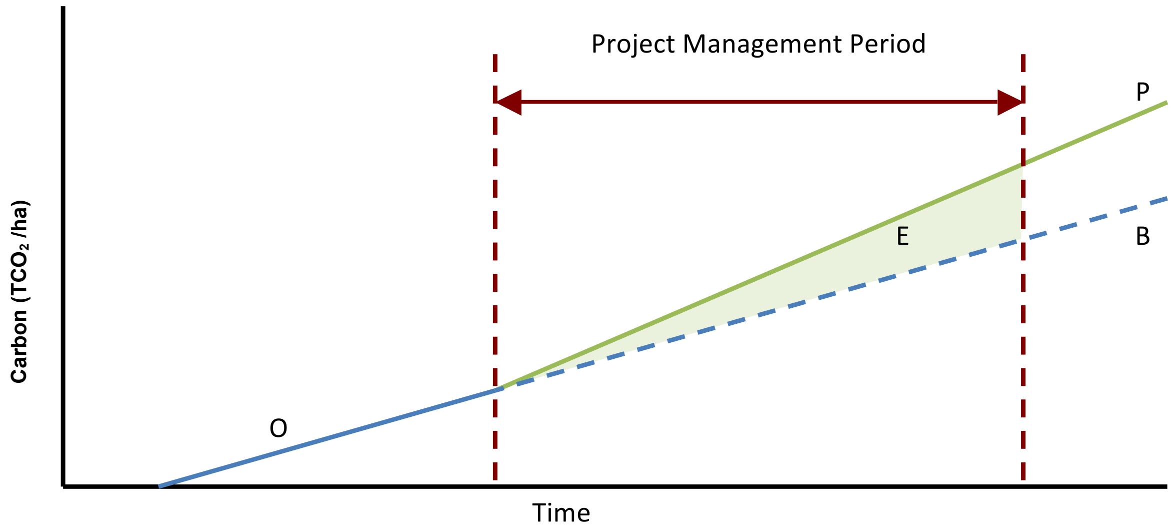
One way to proceed is to identify forest areas that are ineligible for participation in the ETS or PFSI (because they were forests on 31 December 1989) but where such lands are subject to a baseline (business-a-usual) activity that a carbon project could change for the better. Examples of potentially eligible baseline activities for carbon farming could include

- Recurrent timber and/or fuelwood harvesting.
- Recurrent burning and clearing for grazing (where the cycle of burning and clearing meant that on 31 December 1989 the "farmland" was covered in regenerating scrub sufficient to qualify as forest.
- Recurrent livestock grazing.
- Combination of the above.

A potentially eligible project activity therefore, would involve changing management practices to remove the activities that would prevent the on-going regrowth of such forests and enable it to progress to an eventual old-growth condition (see Figures 4 and 5). Examples might include:

- Stopping wood harvesting.
- Stopping periodic burning and grazing.
- Establishing a permanently protected forest through a land covenant or binding management agreement.

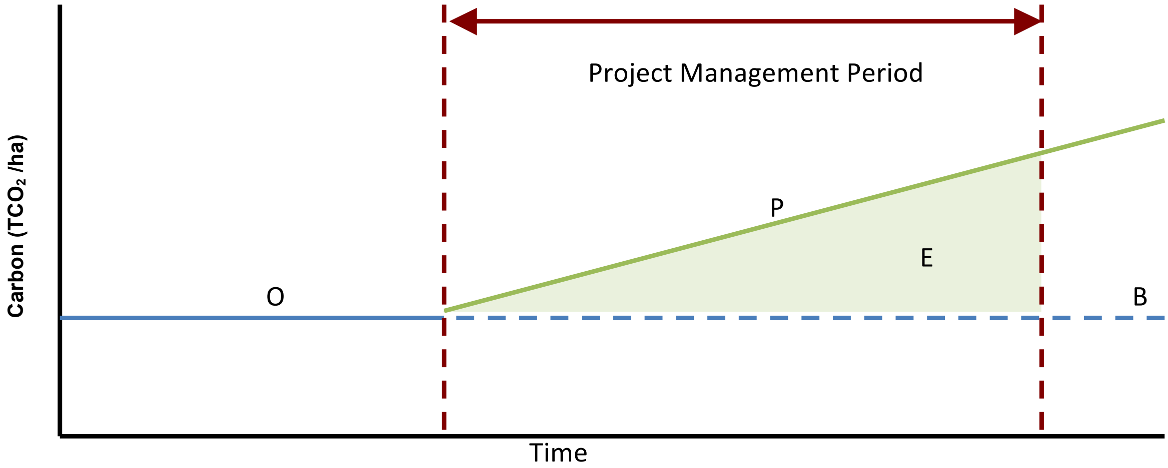
Figure 4: Concept diagramme for carbon farming project scenario where the native vegetation would be regenerating anyway.



Key: O = Original vegetation showing mean rate of change in carbon stocks (biomass).
B = Baseline Scenario mean carbon stocks.
P = Project scenario mean carbon stocks caused by carbon project and carbon finance.
E = (Shaded area) - Difference between Baseline and Project carbon stocks and carbon volume eligible for crediting.

NB: In practice the mean rate of sequestration follows a curve rather than a straight line.

Figure 5: Concept diagramme for carbon farming project scenario where the baseline native vegetation is degraded and subject to periodic human induced disturbance (e.g. burning, grazing, and regrowth).



Key: O = Original mean carbon stocks in degraded native scrub.
B = Baseline Scenario carbon stocks under continuing cycle of degradation/recovery.
P = Project Scenario carbon stocks under carbon farming management.
E = (Shading) Carbon stock increase under the Project Scenario within the project management period (shading).

NB: The mean carbon stocks in a degradation/recovery forest system would be an undulating curve.

Avoided Timber Harvesting

A baseline activity that does tend to reduce carbon stocks is timber harvesting and its associated activities (e.g. roading, logging, log hauling). A carbon project could potentially stop existing or avoid future timber harvesting by establishing a management regime that protected the forest. Here the project proponent will need to demonstrate that either:

1. Timber harvesting that is/has been occurring would continue if the carbon project did not go ahead, or

2. Timber harvesting (that has not yet started) would go ahead in the future if the carbon project did not go ahead.

The carbon project baseline scenario will need to demonstrate that timber harvesting is of a scale that is legally sanctioned, and is commercially viable for the project area. Under New Zealand forestry law, timber can only be harvested from indigenous forests by means of a sustainable management plan or permit. The Forests Act defines sustainable forest management as "management of an area of indigenous forest land in a way that maintains the ability of the forest growing on that land to continue to provide a full range of products and amenities in perpetuity while retaining the forest's natural values."

Indigenous timber harvesting under a sustainable management plan, therefore, reduces the carbon stocks of the standing indigenous forest in comparison with a non-harvest (e.g. old growth and/or regenerating) project scenario. In other words, the baseline carbon stocks are lower than the project carbon stocks, and conversely, the baseline GHG emissions are higher than the project GHG emissions.

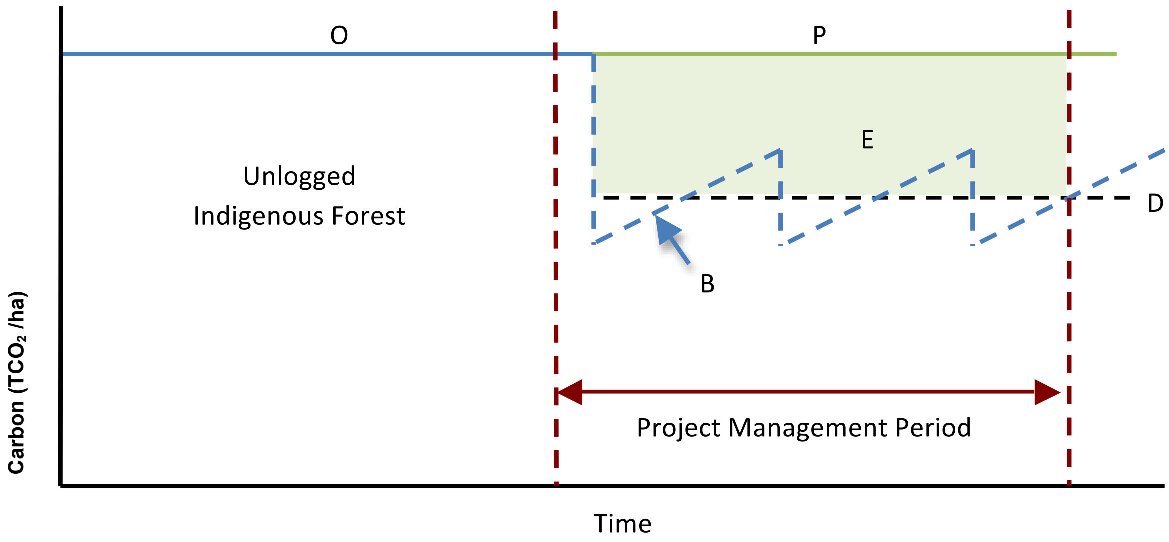
Because timber harvesting from indigenous forests is permitted only as part of a sustainable forest management regime (MAF 2009), the Baseline Scenario will not involve the gradual degradation of the forest carbon stocks. Because a forest degradation scenario has been outlawed for tall forest in New Zealand the potential Baseline Scenario will involve an on-going mean carbon stock that is lower than the project carbon stocks (where this can be demonstrated).

There are two main variants to this project type depending on the condition of the forest in question:

Variant 1: Avoided timber harvesting in an old growth ("climax") forest (Fig 6).
Variant 2: Avoided timber harvesting in a regenerating forest (Fig 7).

Under Variant 1 (Figure 6) the carbon project involves avoiding emissions arising from a carbon reservoir. The emissions would occur as a result of timber harvesting and associated activities.

Figure 6. Concept diagramme of avoided timber harvesting project type starting with an old growth ("climax") forest.



Key: O = Original mean carbon stocks in old growth undisturbed forest
B = Baseline Scenario carbon stocks under sustainable forest management regime
P = Project Scenario carbon stocks under forest protection regime
D = Projected mean baseline carbon stocks
E = Avoided emissions under the Project Scenario within the project management period (shading).

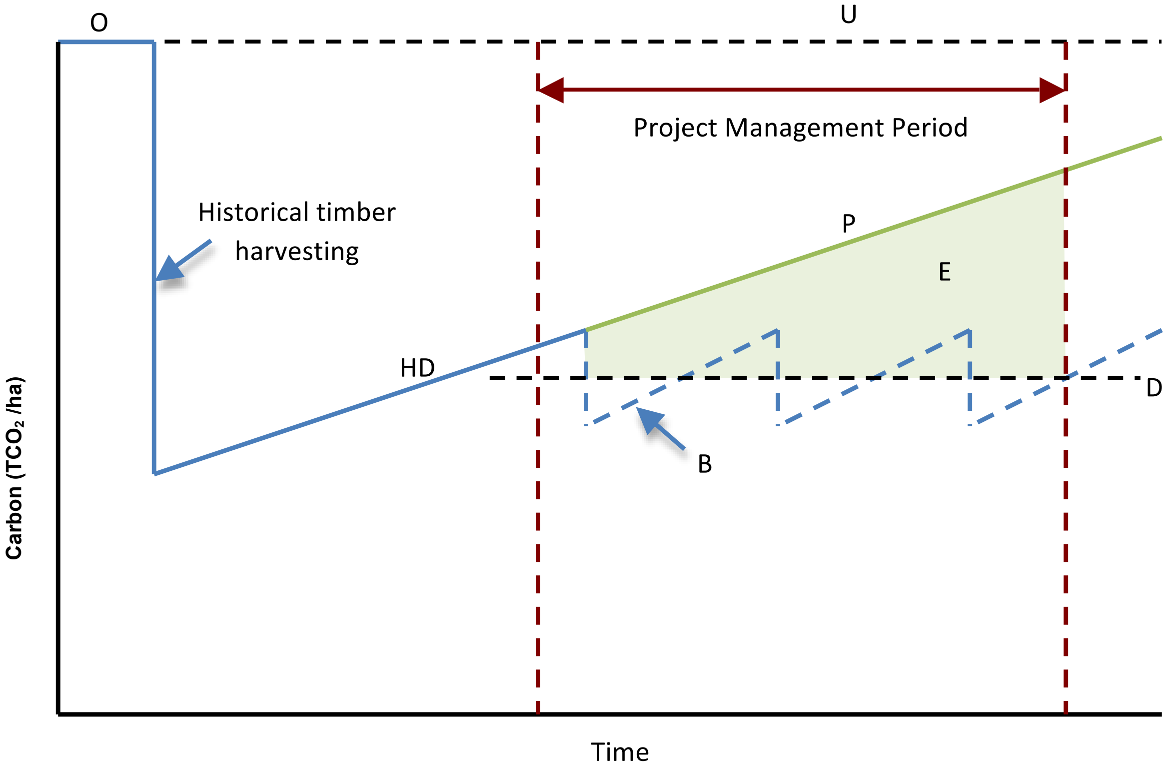
Variant 2 (Figure 7) is slightly more complicated by the fact that the forest in question is accumulating carbon biomass annually because it is a regenerating forest system. If such a forest were subject to timber harvesting, the timber harvesting activity would

a. Generate emissions, and
b. Interrupt the process of regeneration by preventing the annual accumulation of carbon stocks expected if the forest were left to regenerate undisturbed.

For this reason a carbon project that protected the forest and prevented timber harvesting would avoid emissions, and enhance sequestration.

In each case, the eligible crediting volume of CO_2 is restricted to the difference between the net mean projected baseline carbon stocks and the net mean project carbon stocks, where the baseline activity maintains a relatively constant (sustainable) mean carbon stock (and emissions) through time.

Figure 7. Concept diagramme of avoided timber harvesting project type starting with a regenerating forest.



Key: O = Original mean carbon stocks in old growth undisturbed forest
HD = Historical Data
B = Baseline Scenario carbon stocks under timber harvesting regime
P = Project Scenario carbon stocks under forest protection regime
D = Projected mean baseline carbon stocks
E = Carbon stock change under Project Scenario within the project management period (shading).
U = Upper limit of future mean carbon stocks

NB: In practice the mean rate of sequestration follows a curve rather than a straight line.

From Theory To Commercial Reality

In all project types described above, eligibility (in principle) for undertaking a carbon project in the voluntary carbon market is by no means equivalent with commercial viability in practice. The commercial viability of any carbon project is very much a measure of benefits versus costs. There is little merit in spending $100,000 to generate $80,000 worth of carbon revenues.

The commercial realities of carbon projects are the fine print of this set of potential opportunities. Due diligence in estimating project development and transaction costs is a fundamental component of any prospective carbon project venture. The project development costs include (but are not necessarily restricted to):

- Coordination of the Project Description Documentation (PDD)
- Project governance and social dimensions of project development
- Carbon accounting components of the Baseline and Project Scenarios (including forest inventory where necessary)
- Economic components of the Baseline Scenario
- Economic analysis required for the additionality test and leakage assessment
- Remote sensing and GIS elements of the mapping requirements
- Analysis associated with addressing non-permanence risk
- Preparation of a monitoring strategy
- PDD validation by accredited verifier
- Monitoring and verification
- Registration levy
- Project overheads

These costs need to be recovered through generating sufficient carbon revenues to warrant this investment, and then generate sufficient surplus to cover the full net opportunity costs associated with foregoing the business-as-usual development option (e.g. timber harvesting). In practice, crediting requires that the project passes all of the quality assurance milestones in the project cycle, and then follows a monitoring cycle to demonstrate the carbon gains *ex post* (e.g. VCS 2008a). This may mean a 5 yearly monitoring and verification cycle (e.g. set within a 50 year crediting period), and issuance of the number of credits verified by an accredited verifier for that 5-year period.

When considering a comparison between timber harvesting and carbon credits, it is important to note that carbon can often be forward sold, whereas this is rarely possible for timber. So even if net carbon revenues on a per hectare per year basis are lower than financial returns from timber harvesting, carbon can sometimes present an attractive prospect because forward selling carbon units (or carbon rights) can remove considerable financial risk to the forest owner.

Carbon prices for forest projects vary considerably (e.g. ranging from US$2 to US$30 per tonne CO_2) depending on a range of factors including vintage, project type, location, standard used, and co-benefits (Hamilton et al 2009). Moreover, interest rates rise and fall during the life of a project, and together these financial issues contribute to a level of financial risk worth considering in full detail prior to committing to a carbon project option.

References

Burrows, L.E., Evans, G.R., Pruden, C.C., Kuru, G.A., and Janett, D., 1992. The standing wood volumes of the Landless Natives grant lands of Southland and Stewart Island. Forest Research Institute Contract Report FWE 92/19.

California Environmental Associates 2007. Design To Win. Philanthropy's Role in the Fight Against Global Warming. California Environmental Associates, August 2007. Available at: http://www.ceaconsulting.com/work/case_studies.aspx?v=1&c=1&cs=29

CCBA. 2008. Climate, Community & Biodiversity Project Design Standards Second Edition. CCBA, Arlington, VA. December, 2008. Available at: www.climate-standards.org

CDM Tool for Demonstration and Assessment of Additionality. Available at: http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf

CDM Tool for testing significance of GHG emissions in A/R CDM project activities. Available At: http://cdm.unfccc.int/methodologies/ARmethodologies/approved_ar.html

Commerce Commission 2009. Guidelines for Carbon Claims. Fair Trading Act 1986.

Forme Consulting Group 2007. Evaluation of Sustainable Management Prospects. West Rowallan Blocks November 2007 for the Office of the Maori Trustee. Forme Consulting Group Ltd. Wellington.

Forme Consulting Group 2007. Evaluation of Sustainable Management Prospects. Rowallan Alton Blocks November 2007 for the Office of the Maori Trustee. Forme Consulting Group Ltd. Wellington.

Green Collar 2010. VCS Proposed Methodology for Improved Forest Management, Conversion of Logged to Protected Forest V3-0, July 2010.

Hall, G.M.J. 2001. Mitigating and organisation's future net carbon emissions by native forest restoration. Ecological Applications 11: 1622-1623

Hall, G.M.J., and Hollinger, D.Y. 2000. Simulating New Zealand forest dynamics with a generalised temperature forest gap model. Ecological Applications 10: 115-130.

Hall, G.M.J., and McGlone, M.S. 2001. Forest reconstruction and past climatic estimates for a deforested region of south-eastern New Zealand. Landscape Ecology 16:501-521.

Hamilton, K., Sjardin, M., Marcello, T., and Xu G. 2008. Forging a Frontier. State of the voluntary carbon markets 2008. Ecosystems Marketplace and New Carbon Finance.

Available at: http://www.carboncatalog.org/blog/2008/05/13/state-of-voluntary-carbon-markets-2008/

Hamilton, K., Sjardin, M., Shapiro, A., and Marcello, T. 2009. Fortifying the Foundation. State of the voluntary carbon markets 2008. Ecosystems Marketplace and New Carbon Finance. Available at: http://www.ecosystemmarketplace.com/

IPCC 2003. Good Practice Guidance For Land Use, Land Use Change And Forestry. Intergovernmental Panel on Climate Change. Published: IGES, Japan.

IPCC 2006. 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan.

ISO 14064-2:2006. Greenhouse Gases - Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements. First Edition 2006-03-01.

MAF 2000. Assessment of SILNA Timber Resources, 1999. Land designated under the South Island Landless Natives Act of 1906. Ministry of Agriculture and Forestry.

MAF 2001. Development of Maori Owned Indigenous Forest. MAF Technical Paper No: 2003/4. Prepared for MAF Policy by Don Hammond Ministry of Agriculture & Forestry Contract E01-09. Available at www.maf.govt.nz/publications

MAF 2008. Permanent Forest Sink Initiative Guidelines, July 2008, Ministry of Agriculture and Forestry. Available at: http://www.maf.govt.nz/forestry/pfsi/pfsi-guidelines/PFSI-guidelines.pdf

MAF 2009. Standards and Guidelines for the Sustainable Management of Indigenous Forests. Fourth Edition, September 2009.

MAF 2010. Sustainable Management of Private Indigenous Forests. Available at: http://www.maf.govt.nz/forestry/indigenous-forestry/

MAF 2010. A Guide to Preparing Draft Sustainable Forest Management Plans, Sustainable Forest Management Permit Applications and Annual Logging Plans. Ministry of Agriculture and Forestry Available at: http://www.maf.govt.nz/forestry/indigenous-forestry/guide/page.htm

Meurk, C.D., and Hall, G.M.J. 2006. Options for enhancing forest biodiversity across New Zealand's managed landscales based on ecosystem modelling and spatial design. New Zealand Journal of Ecology 30: 131-146.

MFE and Treasury 2007. The Framework for a New Zealand Emissions Trading Scheme. Publication number: ME 810.

Payton, I. J. 2007. Forest Carbon Tables To Determine Carbon Dioxide (CO_2) Emissions Resulting From The Deforestation of Pre-1990 Indigenous Forest Land. Landcare Research Contract Report: LC0708/052.

Richardson, S.J., Burrows, L.E., and Carswell, F.E. 2004. A Plot Based Method For Measuring C Accumulation in EBEX21® Vegetation. Landcare Research Contract Report LC0304/143.

United Nations 1998. Kyoto Protocol. Available at: http://unfccc.int/kyoto_protocol/items/2830.php

Voluntary Carbon Standard 2007.1. Available at: http://www.v-c-s.org/docs/Voluntary%20Carbon%20Standard%202007_1.pdf

Voluntary Carbon Standard 2008. Guidance for Agriculture, Forestry and Other Land Use Projects. Available at: http://www.v-c-s.org/docs/Guidance%20for%20AFOLU%20Projects.pdf

Voluntary Carbon Standard Program Guidelines 2007.1. Available at: http://www.v-c-s.org/docs/Voluntary%20Carbon%20Standard%20Program%20Guidelines%202007_1.pdf

Voluntary Carbon Standard Tool for AFOLU Methodological Issues. Available at: http://www.v-c-s.org/docs/Tool%20for%20AFOLU%20Methodological%20Issues.pdf

Voluntary Carbon Standard Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination. Available at: http://www.v-c-s.org/docs/Tool%20for%20AFOLU%20Non-permanence%20Risk%20Analysis%20and%20Buffer%20Determination.pdf

Wallwork Forest Management 2006a. Draft Sustainable Forest Management Plan for the Land: Section 1 Block III Rowallan Survey District. Wallwork Forest Management Ltd, Christchurch.

Wallwork Forest Management 2006b. Draft Sustainable Forest Management Plan for the Land: Section 1 Block IV Rowallan Survey District. Wallwork Forest Management Ltd, Christchurch.

Wallwork Forest Management 2006c. Draft Sustainable Forest Management Plan for the Land: Section 2 Block IV Rowallan Survey District. Wallwork Forest Management Ltd, Christchurch.

Wallwork Forest Management 2006d. Draft Sustainable Forest Management Plan for the Land: Section 3 Block IV Rowallan Survey District. Wallwork Forest Management Ltd, Christchurch.

Wallwork Forest Management 2006e. Draft Sustainable Forest Management Plan for the Land: Section 4 Block IV Rowallan Survey District. Wallwork Forest Management Ltd, Christchurch.

Wallwork Forest Management 2006f. Draft Sustainable Forest Management Plan for the Land: Section 9 Block IV Rowallan Survey District. Wallwork Forest Management Ltd, Christchurch.

Wallwork Forest Management 2006g. Draft Sustainable Forest Management Plan for the Land: Section 12 Block IV Rowallan Survey District. Wallwork Forest Management Ltd, Christchurch.

Wallwork Forest Management 2006h. Draft Sustainable Forest Management Plan for the Land: Section 15 Block IV Rowallan Survey District. Wallwork Forest Management Ltd, Christchurch.

Wallwork Forest Management 2007. Draft Sustainable Forest Management Plan for the Land: Section 9 Block III Rowallan Survey District. Wallwork Forest Management Ltd, Christchurch.

Weaver, S.A., Ward, M. Payton, I.J., deRoiste, M., and Hewitt, T. 2008. Carbon market opportunities for SILNA forest owners. Phase 1 Report: Scoping and policy analysis. Te Puni Kokiri & Victoria University.

Weaver, S.A. Hewitt, T., and Payton, I.J. 2010. Methodology for Improved Forest Management, Conversion of Logged to Protected Forest, In New Zealand Non-Kyoto Indigenous Forest. NZ IFM-LtPF Methodology V1. Carbon Partnership Ltd.

Weaver, S.A., Hewitt, T., Payton, I.J., and Barringer, J. 2010. Rowallan-Alton Forest Carbon Project. Project Description Documentation for Improved Forest Management, Conversion of Logged to Protected Forest in Southland, New Zealand. Carbon Partnership Ltd.