



Te Puni Kōkiri
REALISING MĀORI POTENTIAL



Carbon Market Opportunities for SILNA Forest Owners

PHASE 1 REPORT: SCOPING AND POLICY ANALYSIS

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DEDICATION

By Ken McAnergney

E oku rangitira, karangatanga maha o te tai Ao,
Anei ra te mokopuna e tuku ana kia koutou,
Te aroha o te Atua a Io Matua kia koutou Tenei au e mihi ana.
Ki nga mate, e takoto ana I o ratou waka mate,
Haere koutou, haere kourou, haere koutou.
Apiti hono tatai hono koutou te hunga mate kia koutou,
Apiti hono tatai hono tatou ra te hunga ora kia tatou.
No reira, tena koutou, tena koutou, tena tatou katoa.

To my seniors, to my many families of the universe,
Here is your grandchild reciting this blessing
Of love of Io Matua to you all, I greet you.
To the dead who lie in state in their canoes of death,
Farewell, farewell, farewell,
Let the dead unite in death.
Let the living continue,
Therefore, greetings, greetings, greetings to us all.

* * *

Descendants of 99 named members of the following families; BAIRD, FLUERTY, MANIHERE, PAHAU, PERE, ROPATA, SAUNDERS, TIKOU, and WELLS, who were granted land under “The South Island Landless Natives Act 1906” (SILNA) comprise the shareholders of the “Rowallan Alton Incorporation” established in accordance with the Maori Affairs Act with a total land resource of 1,212 hectares. The full list of the original grantees is included in Appendix 5.

“The Land” as we descendants call it, is situated in Te Waewae Bay on the coast between the Wairarakau (Rowallan Burn) and the Waikouau Rivers. It is accessed by road from Tuatapere, it is the only SILNA estate actively occupied and managed by its owners.

E te Ao,	to the world,
E te maramatanga,	to the light,
Me te aroha,	and to love
Mo enei taonga,	for the blessings,
E mihi nei.	I thank you all

These simple words of greeting and of Karakia were one of the word forms that my ancestors used to greet the day, the life forms, and the various resources that they went to harvest each day for their survival. To understand the forest and its resources and the sustainable management of that resource our ancestors first developed and then recorded orally and taught an understanding of;

The land, (clay, humus, rock, gravel, etc.,

The watershed, (mountains, hills, valleys, ridges, slopes, etc.,

The waterways, (springs, streams, swamps, rivers, lakes, etc.,

The flora,

The fauna,

And importantly, the controlled impact of people on all of the above.

This was the old way. This was before “First Contact.” This was before the arrival of the Sealers, the Whalers, the Missionaries, and the European settlers who brought with them their new ways of “dealing” with the land, the water, the forest, and its inhabitants who needed these resources for their survival. Our ancestors in the South, in Murihiku, adopted very quickly to the new ways. They actively sought by trade and exchange the clothes, the blankets, the metal tools, and the ways of the newcomers.

The old ways were discarded, disrespected, and even legislated against as the new people sought to clear the land of its forest or unsuitable vegetation and its inhabitants.

My own ancestors the Baird family along with many others agreed to contracts offered by the sawmillers and “The Land” was cleared of its high value forest trees. That was the way in those days.

The millers came, they felled what they wanted and they left.

Papatuanuku the Earth Mother was unclothed, but, she demonstrated her remarkable healing powers and as time passed neglect allowed her to re-clothe herself again in what is now called regenerating bush And, lo and behold this regenerating bush, growing, increasing in volume every day is no longer a damn nuisance, it is a treasure, a taonga for us the descendants and the nation. It is now making a growing contribution to the health and wellbeing of our world.

In the words of my ancestors: “Ka mate papa uma, nga horo ai ki te whenua, ko tona taikaka, taikaha, hei oranga ano, mo tona whanau, mo tona hapu. Ka ora Papatuanuku.” And the trunk crumbles its essence to the Earth, its bark and flesh, as sustenance for its family seeds, and its kind. And our earth mother lives on.

I, with the help and commitment of Dr Sean Weaver and his team, have sought to find and wish to continue to find and assess yet more ways to fulfil in some small way the role of Kaitiakitanga (Guardianship) of “The Land.”

As this process proceeds I am again reminded of one of my daily Karakia:

Kia hiwa ra, kia hiwa ra.
He Ao rere ke tena tera tenei.

Kia hiwa ra ki tena tuku,
Kia hiwa ra ki tera tuku,
Kia hiwa ra ki tenei tuku,
Kia kiki, kia kaka,
Kia u ai, kia o ai, kia i ai, kia a ai.
Kia rongorua ai te nganga,
Kia rongorua ai te tangi,
Kia rongorua ai te koko,
Kia rongorua ai te ketekete,
Hei whakaki ai, Hei whakaka ai.
Te Wao, Te Ao, Te Atea.
E mihi ana, E tangi ana,
Tena koutou, tena koutou, tena Tatou
katoa.

Arise, rejoice.
This is a world of difference here and there.
Arise to that direction distant,
Arise to that direction closer,
Arise to that direction immediate,
To fill to overflowing,
To be secure, to be plentiful, to replenish.
So that the long sounds of life,
So that the long sounds of music,
So that the long sounds of the Tui,
So that the long sounds of the parrot,
Will fill, will consume
The bush, The World, The Universe.
I greet you, I cry with you.
Greetings, greetings, greetings to us all.

Carbon Market Opportunities for SILNA Forest Owners

PHASE 1 REPORT: SCOPING AND POLICY ANALYSIS

1. INTRODUCTION

By Sean Weaver and Murray Ward

Carbon has the potential to become the world's biggest market according to the New York Times. This is because humans generate about 50 billion metric tons¹ of carbon dioxide annually and the political and economic demand for reducing this volume of emissions is rapidly growing.

"Carbon will be the world's biggest commodity market, and it could become the world's biggest market over all."²

The political demand for a reduction in emissions is driven by international climate science and the story it tells of the current and future impacts of climate change on the economy under a business-as-usual scenario. The task of global emissions reductions is connected to a goal of avoiding dangerous anthropogenic interference in the climate system, and the role of carbon dioxide in that system. A wide variety of strategies have been developed to help stabilize atmospheric CO₂ concentrations, and among them are carbon markets.

The advent of market-based climate change policies wherein 'carbon' has a value and 'carbon credits' can be bought and sold brings new opportunities for land-based activities that in some way can reduce emissions of greenhouse gases or can protect and enhance forest reservoirs and sinks.

¹ This figure is based on the total global human induced carbon emissions for 2004 which was 49 Giga tonnes. Source: Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report 2007 (Solomon, S., et al 2007).

² New York Times July 6, 2007.

New Zealand has obligations under the Kyoto Protocol, so is directly ‘hooked into’ the Kyoto compliance market. The voluntary carbon market is a newly emerging feature of business activity in New Zealand, but is much more developed in Europe and North America. The interest in New Zealand is coming both from international interest in possible ‘carbon offsets’ here and from proactive domestic businesses exploring what it may mean in practice to seek to brand themselves as carbon neutral.

There is also a growing market domestically and internationally for the protection of climate-related ecosystem services among philanthropic organisations and the business sector seeking to demonstrate corporate social responsibility.

In theory, all of these climate change related policies and markets may lead to new business activity opportunities that SILNA landowners might benefit from. In practice, the picture is less clear. All the policies and markets have their peculiarities. Accordingly, SILNA forest owners possess forest resources that are affected by these regulatory and market developments. The purpose of this project is to assess potential opportunities for SILNA owners to undertake new forms of management activity, to take best advantage of this new regulatory and market environment.

In order to undertake such an assessment it is necessary to explore carbon and climate-related market opportunities potentially available to the kind of resource set occurring on SILNA lands. This project contributes to this assessment by means of a case study of the Rowallan-Alton Incorporation³ estate (part of the collection of SILNA lands) in Western Southland.

CASE STUDY

This case study undertakes the following:

1. Assessment of potential for carbon and climate-related finance options for climate-friendly sustainable development on RAI estate. This is undertaken by examining:
 - a. The rules under New Zealand’s Kyoto obligations and the proposed NZ ETS to determine what kind of carbon project activities might be permitted under New Zealand law.
 - b. Carbon and climate-related finance instruments potentially available within New Zealand and internationally as a source of funds for sustainable development on RAI and SILNA lands.

³ The Rowallan-Alton Incorporation is an incorporated society in terms of the Te Ture Whenua Act. It owns and manages on behalf of some 750 owners approximately 1200ha of SILNA lands in Western Southland, some 2/3 of this land is covered with indigenous forest in various stages of re-growth. The remainder has been cleared since the 1980s and is managed as a pastoral asset.

2. Assessment of carbon markets for the kind of carbon projects/products potentially produced on RAI/SILNA lands
 - a. Overview assessment of RAI resource base as a means of determining potential options for carbon projects on this land.
3. Scoping for potential forest carbon stock assessment
4. Scoping for mapping requirements for potential carbon stock assessment

This case study encompasses Phase 1 of a larger proposed undertaking that aims to facilitate the implementation of one or more carbon projects on the RAI estate to test the feasibility of new financial instruments for climate-friendly sustainable development, and explore the broader implications of the availability of such instruments for SILNA and Maori forest owners in general.

The staging of the larger project is as follows:

Phase 1: Scoping, policy analysis, carbon project options assessment (pre-feasibility study). Assessment of options *in principle*

Phase 2: Appraisal of project types identified as viable (in principle) in Phase 1 (feasibility study); Assessment of options *in practice*; General capacity building and project-based training for RAI/SILNA landowners

Phase 3: Implementation of carbon project/s

SCOPE

There are three broad categories of market-based finance and one category of non-market finance that exist as potential sources of climate-related funding for sustainable development on SILNA lands:

1. Compliance (Kyoto) carbon market
2. Voluntary carbon market
3. Payment for Ecosystem Services (PES) market
4. Non-market grant finance

Within these four broad finance options there are different activities that are potentially eligible for carbon and climate-related funding:

1. Management of existing permanent indigenous forests

2. Afforestation/reforestation (indigenous or exotic species/permanent forests and timber harvest rotations)
3. Non-forest activities (e.g. agricultural practices, energy projects)

This project pays particular attention to opportunities presented by voluntary carbon markets, principally because the key resource of interest are the indigenous forests that were in existence prior to 1990 (i.e. non-Kyoto forests). These forests may be intact or may be regenerating from past harvesting regimes. Either way such forests act as

- a. Carbon reservoirs (storing carbon - much like fossil carbon in the ground⁴) and in the case of regenerating forests
- b. Carbon reservoirs and sinks (storing and sequestering carbon)

The original intention of this contract was to assess only the voluntary carbon market opportunities for the RAI estate with implications for other SILNA forest owners. However, it became apparent that to undertake an assessment of voluntary carbon market opportunities it was necessary to situate this in the broader context of carbon markets in general (including the compliance market), and options for non-market financial instruments. The goal here is to explore options to finance forest-based sustainable development using these new instruments and taking advantage of the new emphasis on the role of forests in climate change protection.

For example, under New Zealand's commitment to the Kyoto Protocol there may be potential to undertake projects on SILNA lands that involve establishing new "permanent forest" (afforestation/reforestation) under Article 3.3 of the Kyoto Protocol. This fits with the government's Permanent Forest Sinks Initiative (PFSI) programme as well as the Kyoto-based forestry rules for carbon financing in plantation forestry. A non-forest example might include 'biochar'⁵ offsets in soil on lands deforested since 1990. There may also be potential opportunities to undertake projects of a kind that the government seems not yet to have thought of - which is project-based "avoided deforestation" or even "permanent forest" projects that are ineligible under the compliance framework (i.e. for non-Kyoto forests).

The voluntary market potentials include those that might have been covered under Article 3.4 of the Kyoto Protocol (e.g. forest management - which could cover activities to reduce degradation or enhance sequestration). The reason that these could be voluntary is

⁴ NB: mature natural forests are generally not carbon sinks as carbon inputs are balanced by carbon outputs from the system. There is some debate concerning the potential effects of CO₂ fertilization from an atmosphere with increased CO₂ concentrations.

⁵ 'Biochar' is a form of charcoal that can be added to soils as a kind of soil tonic which aids plant growth, and acts as a form of carbon sequestration.

that NZ has elected not to ‘do’ Article 3.4 - so all non-Kyoto forests are out of the Kyoto Protocol accounting system (in terms of NZ’s obligations), unless they are deforested (which is then picked up under Article 3.3 of the Protocol)⁶.

The key issues to be explored (in Phase 1) with respect to SILNA forests are:

- In principle, what is the applicability of the formal Kyoto carbon market? – i.e. what types of activities might generate compliance grade carbon credits, what value may these have, what government processes facilitate such activities and, given all this, are such activities likely to be financially feasible?
- In principle, what is the viability of voluntary carbon offsets activities? – i.e. who might be interested, how might this work, what values might be realised and do the economics stack up to support changes in forest and land-use practice?
- In principle, what is the viability of using the PES market and non-market grant funding sources for climate-friendly sustainable development?
- In principle, what are the legal and/or policy constraints (if any) to undertaking market forest based carbon crediting activities? – i.e. are there any policies or rules of engagement defined under NZ government reporting obligations under the Kyoto Protocol that would constrain carbon market activities in the forest sector?

⁶ This is discussed in a lot more detail in subsequent chapters.

2. CARBON AND CLIMATE-RELATED FINANCE

By Sean Weaver and Murray Ward

There is a growing range of financial instruments for mitigating climate change including carbon emissions trading and payment for climate-related ecosystem services in the form of grants and funding schemes. Some are markets for commodities which act as a proxy for climate protection (i.e. CO₂ emissions reductions or sequestered CO₂), while others exist as payment for particular management outcomes in the landscape. This chapter presents an overview of carbon and climate-related finance by first exploring carbon markets and then looking at Payment for Ecosystem Services, followed by a section on non-market instruments for forest based climate-friendly development.

CARBON MARKETS

In general, there are two types of carbon market. The first is the **Kyoto compliance market** which stems from obligations taken on by developed countries under the Kyoto Protocol. The second is the **voluntary carbon market** which mainly stems from initiatives by governments, firms and individuals to reduce their carbon footprint (sometimes with a goal of carbon neutrality) by lowering their emissions and offsetting emissions they are unable to eliminate in-house.

These markets involve the trading of carbon units either through the sale of surplus carbon unit allocations, or through the generation and sale of “carbon credits” by owners and developers of carbon projects.

Cap-and-Trade

Allocations take one of two forms. The first are national allocations provided to countries (international point of obligation) that ratified the Kyoto Protocol and were required to take on fixed, binding emission reduction targets (industrialised countries listed in Annex 1 of the Kyoto Protocol).

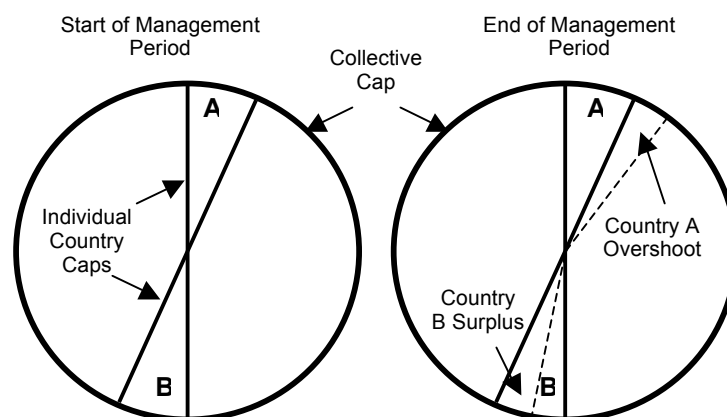
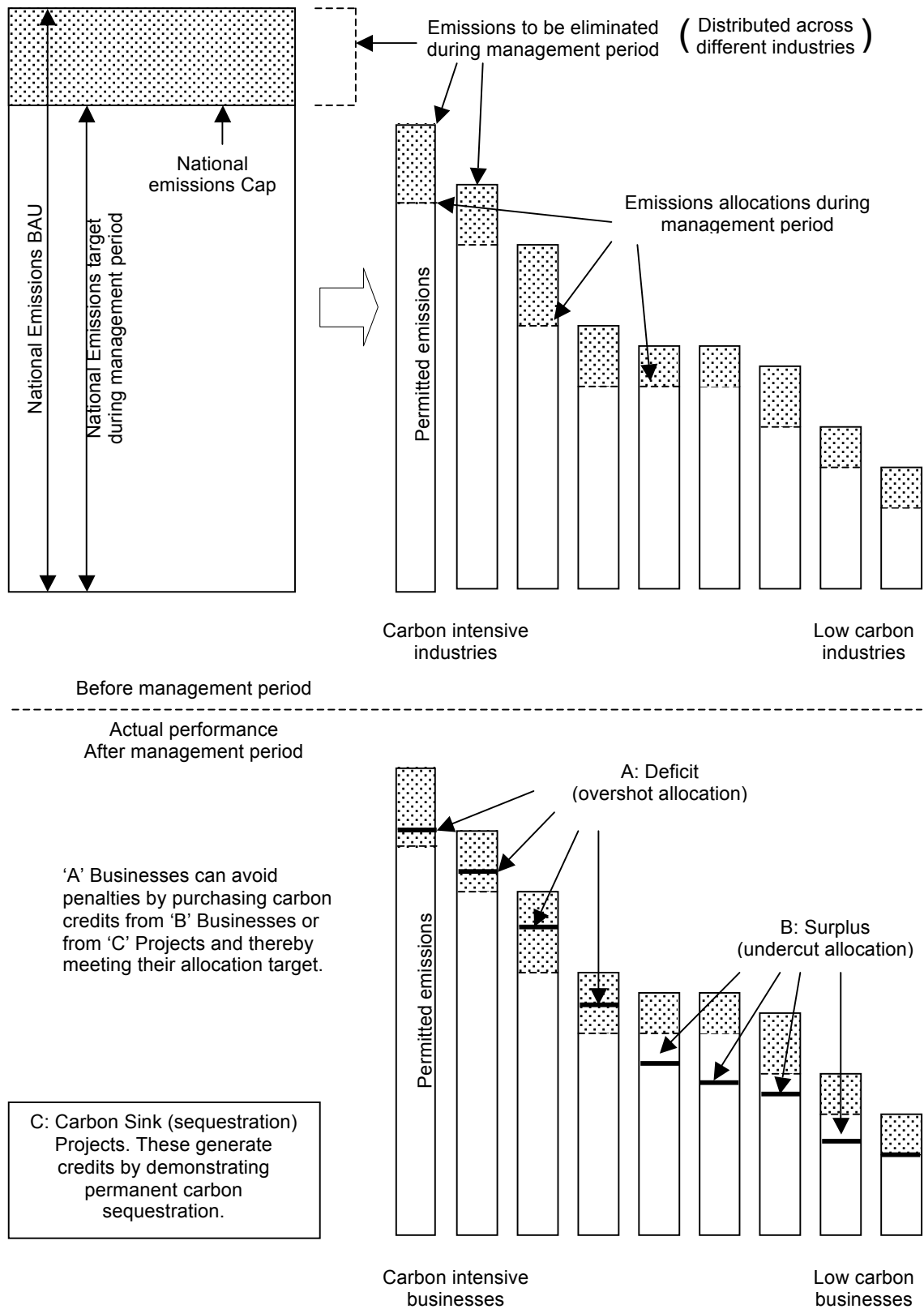


Figure 1: Carbon trading between two countries. Country A overshoots their Fixed Binding Target (FBT) but buys surplus units from Country B that undercuts their FBT through over-compliance. Both countries and the total collection of countries remain within the total cap.

The second are allocations to industries within a domestic cap and trade system (devolved points of obligation). National allocations are the number of carbon units⁷ awarded to a ratifying nation, equivalent in volume to their national Kyoto target for the first commitment period (2008-2012) of the Kyoto Protocol (KP CP1). These national allocation units are held in a national registry. If a country reduces emissions and/or sequesters carbon dioxide to a level where the national carbon balance is below its national allocation for KP CP1, then it can sell these surplus units to other nations who overshoot their target and who are seeking to buy units in the intergovernmental Kyoto cap-and-trade system (immediately following KP CP1). Domestic allocation units are a sub-national version of the same thing but instead of nations with allocations we have industries, and the exchange of carbon units takes place in a domestic (e.g. UK ETS) or regional (EU ETS) cap and trade scheme (NB: the NZ ETS does not operate under an allocation system) (see Figure 2 below).

⁷ All carbon units measured in metric tons of carbon dioxide equivalent: 1 unit = 1 MTCO₂e

Figure 2. Domestic Cap and Trade Diagram



Project-Based Activities

Carbon units can also be generated through project-based activities that reduce emissions, or those that sequester carbon dioxide from the atmosphere (sink projects). The Kyoto Protocol established two project-based flexible mechanisms to assist Annex I countries (industrialised nations) to meet their targets by the end of CP1: Joint Implementation (JI), and the Clean Development Mechanism (CDM). Voluntary carbon markets operate through project-based activities (often similar to the CDM).

Joint Implementation (JI) enables project-based emissions reduction activities to be carried across national borders from one Annex I country to another Annex I country. A business in Country A may decide that it is more cost effective to undertake an emissions reduction activity in Country B than at home (because there may be an opportunity to generate more emissions reductions per dollar invested in Country B than at home). The project undertaken in Country B is partly financed by the business in Country A, who buys carbon units generated by the project in Country B.

The Clean Development Mechanism (CDM) extends this international flexibility so that businesses in Annex I countries can undertake carbon projects in a Non-Annex I country (i.e. in a developing country). Developing countries that ratified the Kyoto Protocol are not required to meet a fixed binding emissions reduction target. They can, however, voluntarily participate in carbon trading through the CDM which is a mechanism designed to enable carbon finance from the purchase of CDM carbon units by Annex I countries to be used to fund climate-friendly (clean) development in their country.

Carbon units can be sold over the counter (OTC) or through a carbon exchange (provided they meet the rules of that exchange).

*Table 1 shows the volume (MtCO₂ e) and value (million US\$) for carbon market transactions for 2005, 2006, and 2007 depicting both compliance and voluntary carbon markets. * Voluntary market. Source: World Bank: State and Trends of the Carbon Market 2007, 2008 (Capoor and Ambrosi 2007, 2008).*

	2005		2006		2007	
	MtCO ₂ e	MUS\$	MtCO ₂ e	MUS\$	MtCO ₂ e	MUS\$
	Allowances					
EU ETS	321	7,908	1,101	24,357	2,061	50,097
NSW*	6	59	20	225	25	224
CCX*	1	3	10	38	23	72
UK ETS	0	1	na	na		
Sub total	328	7,971	1,131	24,620	2,109	50,394
	Project-Based Transactions					
Primary CDM	341	2,417	450	4,813	551	7,426
Secondary CDM	10	221	25	444	240	5,451
JI	11	68	16	141	41	499
Other Compliance	20	187	17	79	42	265
Sub total	382	2,894	508	5,477	874	13,641
Total	710	10,864	1,369	30,098	2,983	64,035

Figure 3. Annual Volumes (MtCO₂e) of Project-based Emission Reductions Transactions (Vintages up to 2012). (Source World Bank: State and Trends of the Carbon Market 2007)

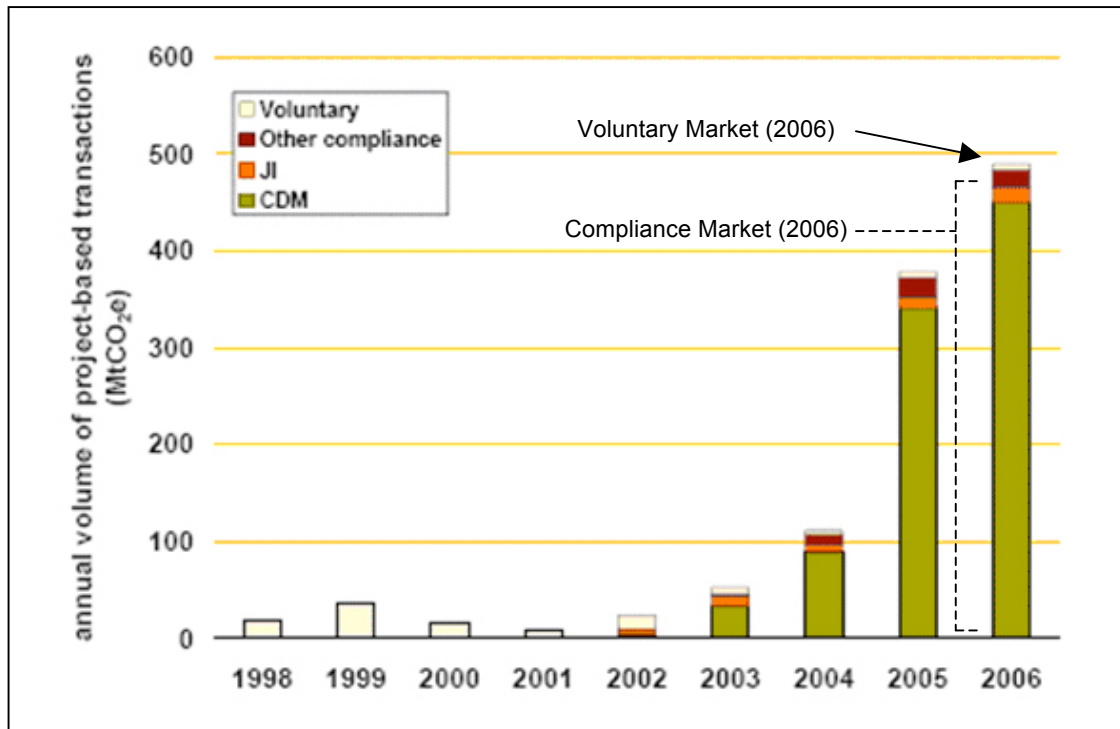


Figure 3 (above) shows the difference in scale between the compliance and the voluntary market up to 2006. The compliance market is currently a lot bigger than the voluntary market because demand for credits in the compliance market is driven by a binding emissions cap on countries that ratified the Kyoto Protocol. The voluntary carbon market is currently small but rapidly growing (to be discussed in more detail in Chapter 4 below).

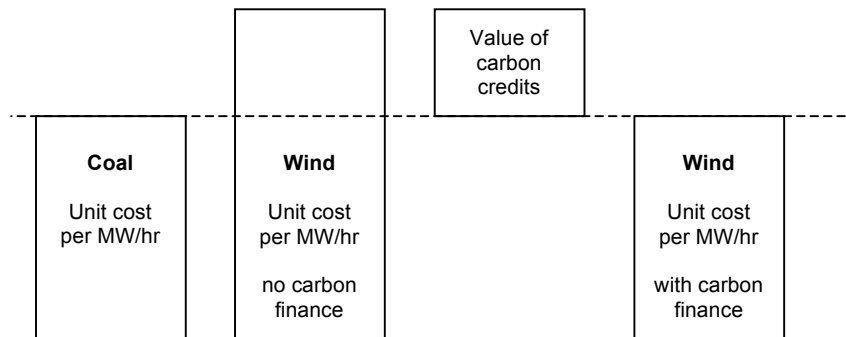
Enabling Sustainable Development

Carbon finance is designed to shift the financial balance of climate-friendly sustainable development in favour of the more sustainable option, when it would otherwise be economically rational to follow the BAU (less sustainable) path.

For example, establishing a renewable electricity generation project (e.g. wind energy) may be more climate-friendly but more costly when compared with establishing a fossil fuel based generation system (e.g. coal generation). Carbon finance in the form of carbon credits is designed to cover the additional comparative cost of the more sustainable option. This then enables an investment decision (that did not care about the climate) to

be made in favour of the more sustainable option, because of the cost-competitiveness now associated with the more sustainable option.

Figure 4. Concept diagram depicting carbon credits as a way of financing the more sustainable (more expensive) option using a comparison between coal and wind energy projects.



Real, Permanent, and Additional

It takes a certain investment to develop and generate project-based carbon credits, and for this reason carbon markets are not as simple as a free revenue stream for a land owner. A certain activity may (in principle) lower carbon emissions or sequester carbon from the atmosphere, but one needs to demonstrate this to the satisfaction of the market before any credits can be generated (issued) and sold. A “carbon project” need to demonstrate:

- A. **Real:** Measurable and verifiable emissions reduced, avoided or sequestered
- B. **Permanence:** The permanence of these carbon gains
- C. **Avoiding Leakage:** The avoidance of the project simply shifting the geographical location of the less sustainable option, and
- D. **Additionality:** That the project would not have otherwise proceeded without the carbon finance.

These requirements imposed by carbon markets and their rules of operation and certification, combine to make carbon projects complex and often associated with high transaction costs. The reason for these rigorous standards is because the carbon credits themselves, once generated by a project, can be sold to a buyer who can use these carbon units to avoid their own emissions reductions in-house by the same volume. It would defeat the purpose of carbon trading if carbon credits purchased represented higher carbon volumes than the carbon projects actually removed from the atmosphere, or if the emissions reductions would have occurred even without the carbon finance. The result

would be a flood of fake carbon on the carbon market, which would damage the environmental integrity of the mechanism, lower buyer confidence, allow too many carbon credits onto the market, and as a result, lower the market price.

Carbon Units

There are several carbon emissions trading units depending on the type of project and whether the activity falls under the compliance (Kyoto) market system or the voluntary carbon market. Carbon credit units each equal to one metric tonne of emissions (in CO₂ - equivalent terms) and include the following:

Compliance Units

- An assigned amount unit (AAU) issued by an Annex I Party on the basis of its assigned amount pursuant to Articles 3.7 and 3.8 of the Protocol.
- A removal unit (RMU) issued by an Annex I Party on the basis of land use, land-use change and forestry (LULUCF) activities under Articles 3.3 and 3.4 of the Kyoto Protocol.
- An emission reduction unit (ERU) generated by a joint implementation project under Article 6 of the Kyoto Protocol.
- A certified emission reduction (CER) generated from a clean development mechanism project activity under Article 12 of the Kyoto Protocol.
- EU Allowances (EUAs) issued by the EU ETS.
- NZU. New Zealand Units traded in the NZ ETS.

Voluntary Units

- Verified Emissions Reductions (VER). These are voluntary carbon market emissions reductions units (not compliant with the Kyoto Protocol but may adhere to equivalent standards). They are available for sale to corporations and individuals who want to offset their emissions for non-regulatory purposes. Emission offsets in this category are verified by independent agents (e.g. Gold Standard, CCB), but are not certified by a regulatory authority for use as a compliance instrument.
- Voluntary Carbon Units (VCU). These are similar to VERs but are approved by the Voluntary Carbon Standard.
- Carbon Financial Instruments (CFI) traded in the Chicago Climate Exchange.

(Sources: Eurocarbon http://www.eurocarbonltd.com/carbon_trading.htm; World Bank – State and Trends of the Carbon Market 2007).

Carbon Price

Once carbon units have been generated they can then be sold either on a trading platform, to buyers through a broker, or directly to a customer in over the counter (OTC) transactions. The price of the units will be reflected by the carbon price for the particular vintage. The vintage relates to the year that the emissions reductions occurred and the type of project (e.g. forestry, agriculture, energy). This will affect the price that the seller can command in the market. In the voluntary carbon market the certification standard (e.g. Voluntary carbon Standard, Gold Standard) will also affect both the price and sometimes the speed of sale, as some standards are more sought after than others.

Carbon credits are commonly sold on a futures market where the emissions reduction will occur at some time in the future – these kinds of credits tend to sell for a lower value. Forward selling credits will allow the carbon finance to be used earlier in the project cycle (as a form of investment finance) but there are risks to the buyer inherent in purchasing forward credits – risks of projects failing to deliver due to some form of project failure. This risk can be addressed through insurance instruments or through project design that accommodates risk by providing a buffer. For example, a forestry project may allocate a portion of the sequestering forest area as a buffer zone (an area that does not earn any credits) that can be used to replace an area within the project boundary that is damaged by fire at some stage in the project cycle.

For general reference, and for comparisons with the voluntary market, it is instructive to have a sense of the value of ‘compliance carbon’. The following graph is taken from the website of carbonpositive⁸ and reflects the recent trend up to 15 April 2008⁹. The forward price for CERs in the secondary market is suggested as being a relevant indicator for the price of carbon in New Zealand. This is because likely NZ buyers of CERs will be points of obligation in the NZ domestic system (e.g. energy companies) seeking to purchase credits at the lowest price for compliance units. If a domestic seller wants to sell to these buyers, they will need to compete with the lowest-priced international carbon available to the same buyers.

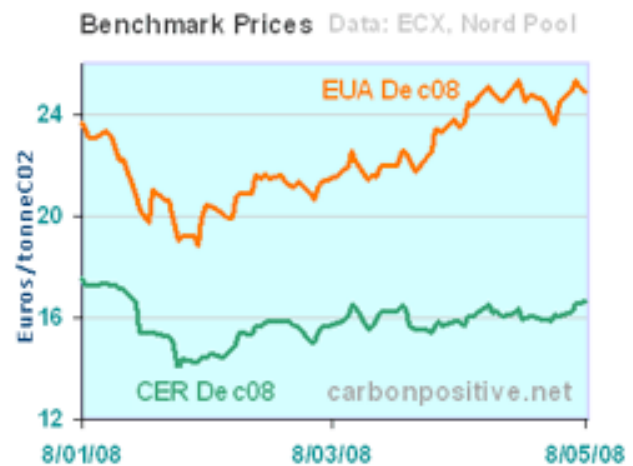


Figure 5. Prices for ‘compliance carbon’ in Europe. The top line is for allowance units, and the lower line for CDM units (CERs). Both are for December 2008 vintages. Source: Carbon Positive.

⁸ See <http://www.carbonpositive.net/>

⁹ For an explanation about this graph see <http://www.carbonpositive.net/viewarticle.aspx?articleID=90>

Transaction Costs

The generation of carbon credits involves passing several eligibility criteria, some of which are relatively expensive (e.g. project development, validation and verification). Some of these costs are specific to the carbon credit path and would not be required if the project was not seeking carbon credit finance. The value of the carbon credits generated in such projects needs to be high enough to cover these transaction costs, otherwise the value of the credits may be less than the transaction costs. For this reason project scale becomes important because small scale projects commonly will not be financially viable. This issue of scale can sometimes be overcome by aggregating several small scale projects into a single larger project, so long as the methodology is consistent across the sub-projects.

NON-MARKET GRANTS & PAYMENT FOR ECOSYSTEM SERVICES

Non-market grants here include the more traditional forms of public and private sector grant funding for environmental protection but where there is a new high priority funding target in climate protection. These may include existing grants that now include climate change protection in their funding portfolio, as well as new grants established in recent years due to the emergence of climate change protection as an important issue in need of funding support.

Non-market grants can also be important in the context of carbon markets, where grant finance may be needed for capacity building or project development during early (non-commercial) stages of carbon market programmes and projects.

The Payment for Ecosystem Services market includes finance for project outcomes that currently have no formal market (e.g. combination of climate change mitigation, biological diversity, water security) but where there is an obvious economic or social value to society (i.e. the protection of non-market ecosystem services).

Some forms of private sector finance can include the more flexible end of the voluntary carbon market spectrum where “buyers” are interested in purchasing project outcomes that include carbon emissions reduction (or sequestration) together with the generation of other co-benefits such as the protection of a range of ecosystem services (e.g. biological diversity, water systems, soil resources). Climate-related finance is perhaps best categorised as Payment for Ecosystem Services (PES) – now an internationally recognised “market.” The buyers in PES markets increasingly include elements of the private sector pursuing a profile in corporate social responsibility (CSR).

OVERVIEW OF CARBON AND CLIMATE-RELATED FINANCE

Carbon and climate-related finance can be seen as a set of financial instruments potentially available to forest owners interested in pursuing a sustainable development path. Governments impose some dimensions of sustainable development upon forest owners through legislation such as the NZ ETS (more below in Chapter 3).

The opportunities range from formal carbon markets (compliance and voluntary) as well as the less formal PES market and non-market grant finance. From a seller point of view carbon and climate-related finance presents a new set of opportunities to repackage development, business and management plans along the lines of climate-friendly development pathways. There is also a growing demand for projects that deliver climate-friendly development ranging from buyers of carbon commodities, to those seeking carbon with co-benefits, to buyers wanting to purchase the protection of a portfolio of non-market or quasi-market ecosystem services.

In this way the carbon and climate-related finance can be seen as a spectrum as depicted in Figure 6 below. The task for potential sellers is to see where their resource base fits along this spectrum and to develop projects that can deliver these outcomes.

Figure 6. The Voluntary Carbon Market Spectrum

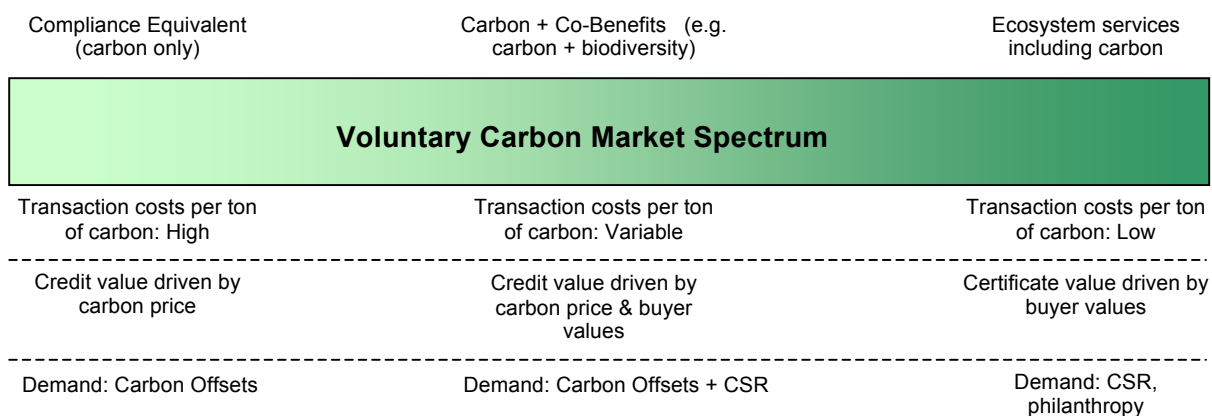


Figure 7. Overview of Carbon Markets

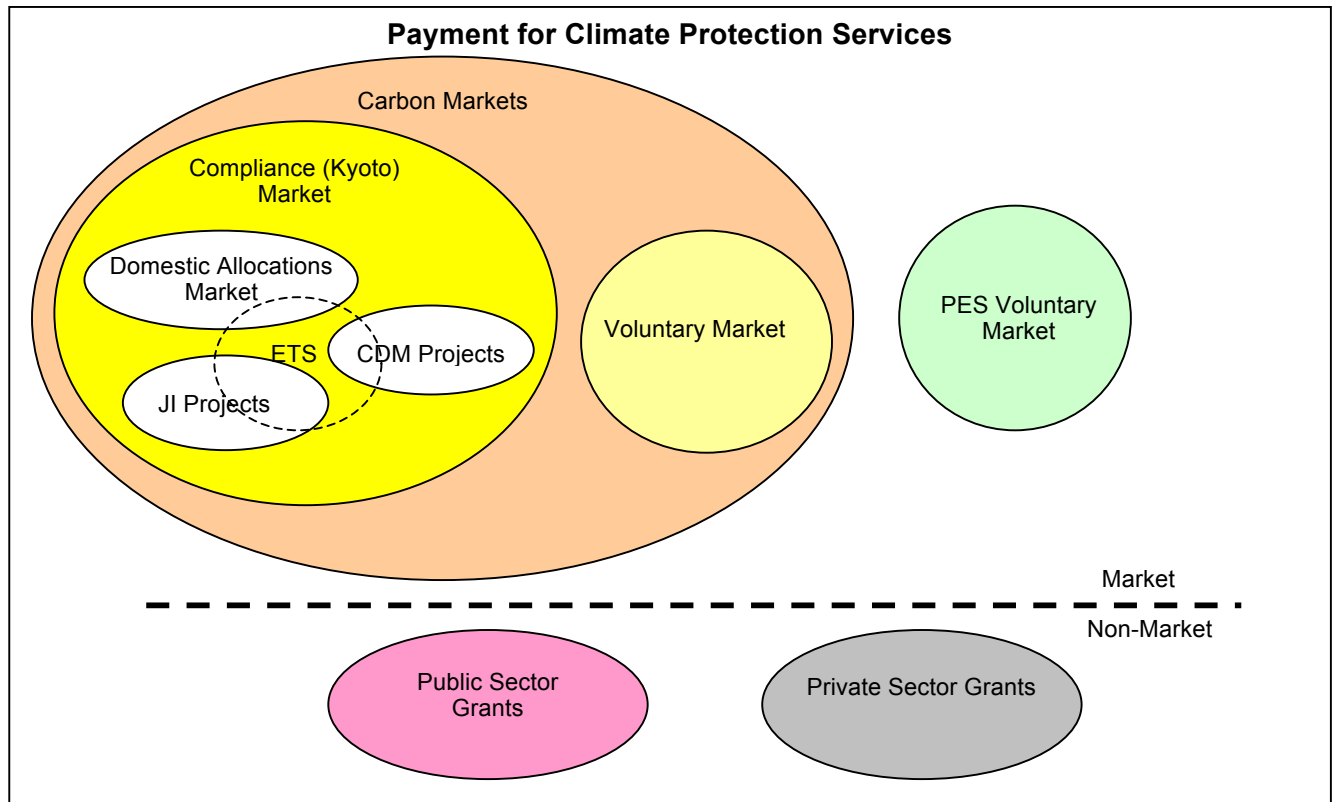


Figure 7 above shows the relationship between the different funding options for ecosystem and carbon/climate services. These are split between grants and markets, where markets are driven by demand for products and services, principally in the private sector but also where credits or certificates might be purchased by governments or government agencies. Grant finance on the other hand focuses less on the purchase of specific certified services represented by credits or certificates, and instead provides funding outside of a market context. In the broader context both grant and market based finance can be seen as a “market” given that both rely on a willingness-to-pay for products, services, and outcomes.

3. COMPLIANCE CARBON MARKET

By Sean Weaver and Murray Ward

The compliance carbon market arises from national emissions reduction obligations set under the Kyoto Protocol. The first step is for the country to negotiate¹⁰ a national cap on emissions. The next step is to assign ‘points of obligation’ for reducing emissions within that cap. ‘Points of obligation’ are domestic entities (either government or private) that are required to take responsibility for domestic emissions reduction goals in an economy that has capped emissions.

The next thing for a government to do is develop a domestic policy and strategy to put the points of obligation to work on the task of meeting the national emissions reduction target. This may take the form of a carbon tax, a domestic cap and trade scheme, policies and measures, and government supported schemes or a combination.

For the purpose of this section we are interested in the compliance market in a New Zealand context, and then the specific rules associated with forests. The New Zealand context is driven by a) the national emissions cap, and rules for how New Zealand can participate in the Kyoto mechanisms, and b) the domestic policy and legislative environment - namely the NZ Emissions Trading Scheme and associated policies and regulations.

The goal of the Kyoto Protocol is to take a first step towards reducing human induced greenhouse gas emissions as a means of stabilising atmospheric CO₂ concentrations in the 21st century. Forests present an interesting challenge for emissions management because they act as both sinks and sources of CO₂ and are vulnerable to changes in their carbon storage status (e.g. fire, timber harvesting). For this reason the Kyoto Protocol has defined a set of rules to manage the role of forests in climate change mitigation. These rules are contained in Article 3 of the Protocol. Article 3.3 (covering afforestation, reforestation, and deforestation of post-1989 forests) is mandatory for ratifying nations whereas Article 3.4 (dealing *inter alia* with forest management of pre-1990 forests) was voluntary. By ratifying the Kyoto Protocol New Zealand had to undertake Article 3.3, but it chose not to undertake the voluntary Article 3.4 (more on this in later chapters).

Because this chapter is dealing with compliance market activities for forests it will focus on KP Article 3.3. We will consider Article 3.4 when dealing with the voluntary carbon market in Chapter 4.

¹⁰ Negotiations undertaken as a lead up to ratification

AFFORESTATION/REFORESTATION/DEFORESTATION

Article 3.3 covers Afforestation/Reforestation and Deforestation and is mandatory for ratifying nations. It states:

“The net changes in greenhouse gas emissions by sources and removals by sinks resulting from direct human-induced land-use change and forestry activities, limited to afforestation, reforestation and deforestation since 1990, measured as verifiable changes in carbon stocks in each commitment period, shall be used to meet the commitments under this Article of each Party included in Annex I. The greenhouse gas emissions by sources and removals by sinks associated with those activities shall be reported in a transparent and verifiable manner and reviewed in accordance with Articles 7 and 8.”

Under the Kyoto Protocol the terms “afforestation,” “reforestation” and “deforestation” are defined in the following way:

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

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

“Deforestation” is the direct human-induced conversion of forested land to non-forested land;” (Source: Decision 11/CP.7; FCCC/CP/2001/13/Add.1, p. 54)

All these activities are based on land use changes that occur after 1 January 1990, i.e. it is this land-use change that brings such lands into the formal Kyoto accounting system. In short, afforestation/reforestation means land in some other land-use is then converted to forests. Deforestation does not mean harvesting; it means the conversion to some land use other than forests following harvesting or some other disturbance.

New Zealand and Article 3.3 of the Kyoto Protocol

For New Zealand, carbon accounting on such lands starts from 1 January 2008. From this time, changes in carbon stocks (above and below ground) on such lands are measured and accounted for. New Zealand’s Kyoto target is to reduce emissions to 1990 levels by 2012, or take responsibility for any emissions above this level. In practice, “taking responsibility” includes having sink credits from Article 3.3 or buying Kyoto carbon units from the international Kyoto carbon market. Under the Kyoto Protocol New Zealand was able to issue itself an emissions allocation in the form of Assigned Amount Units (AAUs) which it holds in its national registry. The number of AAUs is equivalent

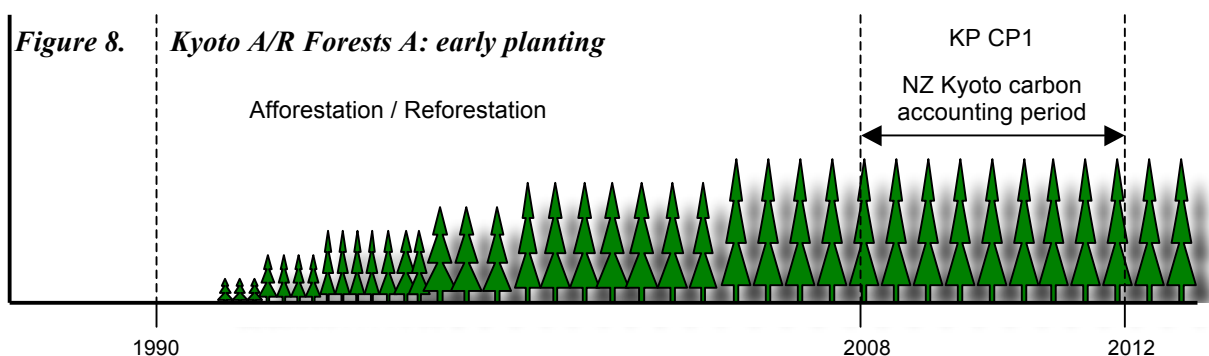
to 1990 level emissions times five (i.e. for the five year commitment period) with each unit comprising of 1 metric tonne of CO₂ equivalent. For New Zealand this initial allocation amounts to about 310 million units (MfE 2007).

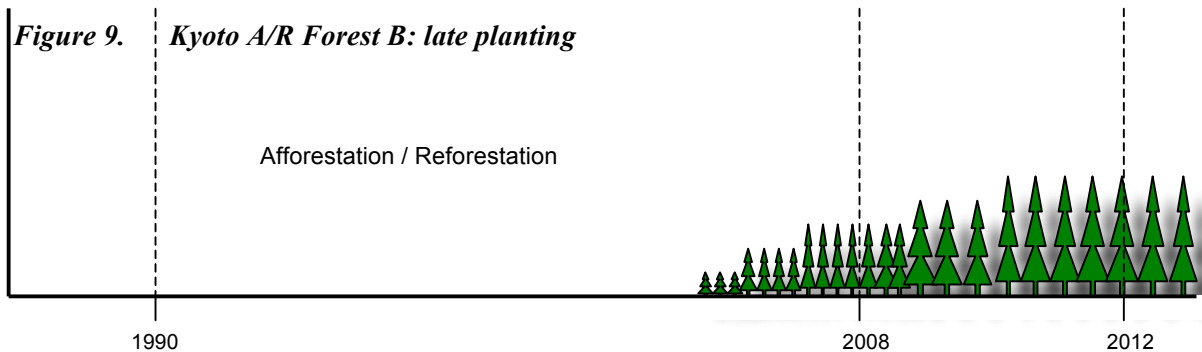
Increases in carbon stocks mean that New Zealand can issue itself Kyoto Removal Units called RMUs (often referred to as sink credits) and use these to help meet its Kyoto obligations. For reductions in stock, New Zealand must *cancel* Kyoto units from its national registry. In practice this accounting will be done at one time in a five year 'block' at the end of 2012. As such, deforestation 'debits' and afforestation/reforestation 'credits' form two sides (costs/income) of a national carbon accounting ledger for Kyoto forests. Only if the debits are greater than the credits would cancellation of units be required.

Accordingly, afforestation/reforestation (sink) activities that begin after 1990 fall within the Kyoto period for new /renewed forests, although the formal accounting for these activities takes place during the Kyoto Protocol First Commitment Period (1 January 2008 – 31 December 2012). Sequestration that started after 31 December 1989, therefore, qualifies as sequestration within the Kyoto rules and results in the accumulation (nationally) of Kyoto Removal Units (RMUs) as measured during 2008-2012. These RMUs are issued by the government as part of the international Kyoto system and are "owned" at the national level. It is then up to the government to decide whether to devolve these Rmu sink credits to forest owners or to maintain them nationally.

Under the proposed NZ ETS, where post 1989 forest owners elect to opt into the scheme and receive credits (and in turn, the harvest liabilities), the government plans to issue a separate New Zealand Unit (NZU). These NZUs can, however, be converted to Kyoto units if the owner's preference is to sell them on the international Kyoto carbon market. It can be expected that the Kyoto units to be received would be AAUs, not RMUs. This is because the government will only be able to issue RMUs at the end of the commitment period when it does its '5 year block' accounting. These RMUs would then be preferentially used by the government for its compliance as they are not able to be carried over to the next Kyoto commitment period. A key point here, then, is that NZUs can be issued on an annual basis and immediately be converted to AAUs.

Article 3.3 therefore leads to direct accounting outcomes that can involve **compliance carbon markets**. Figures 8 and 9 below schematically depict afforestation/reforestation in Kyoto forests (i.e. those established since 1990).





The key period for Kyoto carbon units is the 5 year KP CP1 (2008-2012). This is when any new carbon sinks will be measured for their Kyoto compliant unit value. If new forest is planted soon after 31 December 1989 it will be reasonably well established as of KP CP1 (Figure 8 above) and will accumulate significant volumes of carbon during the 2008-2012 period. If on the other hand new forests have been established relatively late in the period of 1990-2012 (Figure 9 above), far less carbon will be sequestered and the sink credit value of the forest will be low – perhaps too low to gain any credit value in KP CP1.

Another key issue is that any credits earned by post-1989 forests will incur an equal liability when such forests are harvested. This looming ‘debit’ is not reflected in the above diagrams, but this issue is taken up on pages 32 and 33 below.

Permanent Forests

The Kyoto Protocol aims to support and incentivize the establishment of new permanent forests and to some extent penalise the loss of existing forest.¹¹ The notion of ‘permanent forest’ is a little complex and warrants some clarification.

In general terms (i.e. not as specifically under the Protocol), the category of ‘permanent forests’ exists as a spectrum. At one end are forests that have been planted or regenerated (or both) and which are never going to be subject to harvesting. In New Zealand, if these are planted after 1989 they are eligible for inclusion in the ‘Permanent Forest Sinks Initiative’ (PFSI) and can earn carbon credits through this mechanism, or the regular afforestation provisions of the NZ ETS. At the other end of this spectrum are plantation forests that have been planted with the purpose of being clear-felled and then replanted.

¹¹ It is worth noting that avoided deforestation in the broadest sense (e.g. including deforestation in developing countries where most of the world’s deforestation is occurring) was left out of the Kyoto Protocol due to negotiating difficulties associated with the complexity of the issue. Any deforestation in Annex 1 countries is covered by the Kyoto Protocol.

In between are forests that are destined to be subjected to some form of sustainable harvesting. In these latter two cases, such post-1989 forests can earn credits through the NZ ETS, but be subject to harvesting liabilities when carbon stocks are reduced.

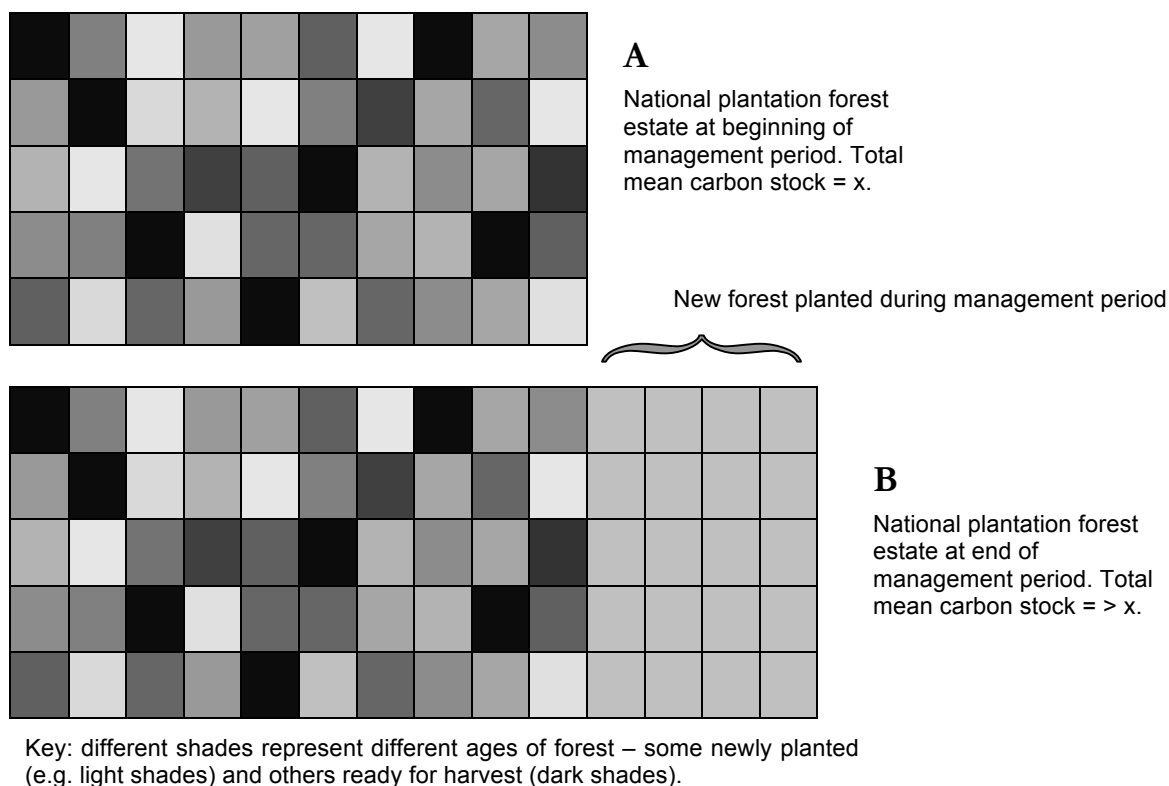
How can a clear-felled forest be a permanent forest? The key to ‘permanence’ is (in principle) the establishment of a new standing carbon stock (or carbon pool or reservoir) that is bigger than the carbon pool prior to the ‘project’ and within the project boundary. Nationally the ‘project’ is the New Zealand performance under KP CP1 and the project boundary is the national border. For a sub-national project (e.g. on private land) the ‘project’ is a carbon management effort defined in a project methodology, and the boundary is defined as the geographical area to be subject to that management. The principle of permanence applies at the national level and can be devolved to the project level also.

For New Zealand to sequester new carbon into new permanent carbon pools using a plantation resource, it needs to implement a management regime that enables the carbon volume in the project carbon pool to be larger at the end of the management period than at the beginning. Given that the project boundary for the country is the national border, the key is to make the standing forest estate bigger at the end of KP CP1 than it was at the beginning of KP CP1. Furthermore, given that there will be another Commitment Period following KP CP1 it is important to design a regime that ensures that the national forest carbon pool is permanently bigger than at the beginning of KP CP1.

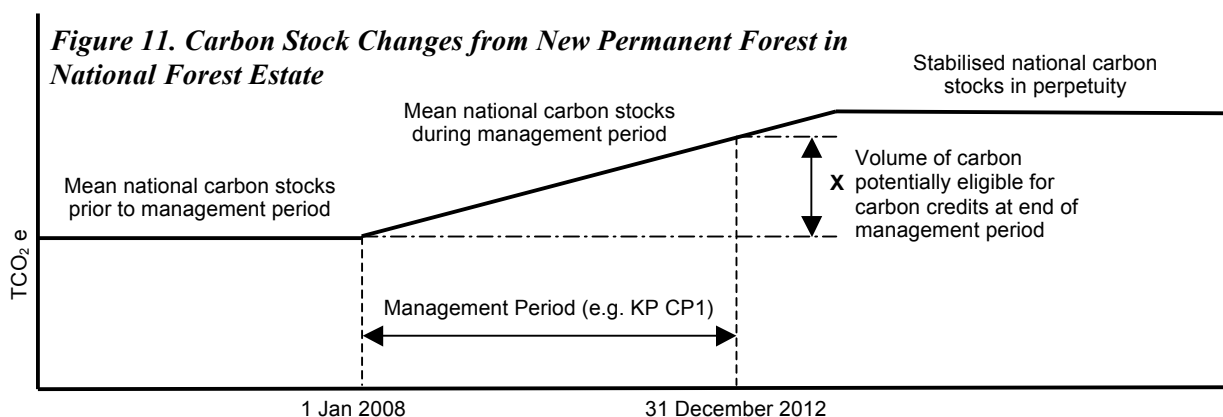
One can achieve this with a plantation resource (destined for clear-felling) by systematically planting new **additional** forest areas throughout the country (expanding the plantation forestry estate), so that at any one time in the future this carbon pool is always bigger than at the beginning of the management period. From a carbon accounting point of view, at any one time in the future, when all harvest emissions (“costs”) are measured in relation to all carbon sequestered (“income”) we have a) a net income (i.e. we still have forests), **and** b) the net income at time of measurement is larger than at the beginning of the management period (the total forest carbon volume is bigger).

The key is that not all of the plantation forests (all destined for clear-felling) in New Zealand will be clear felled at the same time. As such there will always be a standing carbon stock, and the goal from a climate change mitigation point of view is to increase this standing carbon stock because it arises from carbon taken out of the atmosphere (hence a carbon sink activity).

Figure 10. Concept Diagram of New Permanent Forest in National Forest Estate



Another way of depicting this situation (in principle) is to consider the mean national standing carbon stock for the national forest estate, first immediately prior to the start of the management period (e.g. as of 31 December 2007), and then as a result of interventions and incentive mechanisms during a management period (e.g. KP CP1); and thereafter in perpetuity as a stabilised new mean national carbon stock level. Each line depicted in Figure 11 below is the sum of sequestration minus harvests during each period.



Box 1. Permanent Plantation Carbon Credit Project

One way to design a plantation forest carbon credit project is to establish a new *Pinus radiata* plantation block of forest each year for 28 years. All 28 blocks will lie within the project boundary. Because *P. radiata* tends to have a 28 year rotation cycle, by the 28th year the 28th block will be planted at the same time that the first block is harvested. Then each subsequent block is sequentially harvested and replanted in perpetuity. This then maintains a permanent forest by year 28 so long as the management regime remains the same. The carbon credits generated are for the equivalent volume of carbon sequestered and stored permanently as living trees (i.e. the average carbon volume of all 28 blocks aggregated together as a single project).

Carbon Credit Plantation Blocks						
Block 1	Block 2	Block 3	Block 4	Block 5	Block 6	Block 7
Block 8	Block 9	Block 10	Block 11	Block 12	Block 13	Block 14
Block 15	Block 16	Block 17	Block 18	Block 19	Block 20	Block 21
Block 22	Block 23	Block 24	Block 25	Block 26	Block 27	Block 28
Buffer Blocks (insurance)						
Block 29	Block 30	Block 31	Block 32	Block 33	Block 34	Block 35

Block 1 is planted in year 1, block 2 planted in year 2 etc. Block 1 is harvested in year 28 (the same year that block 28 is planted).

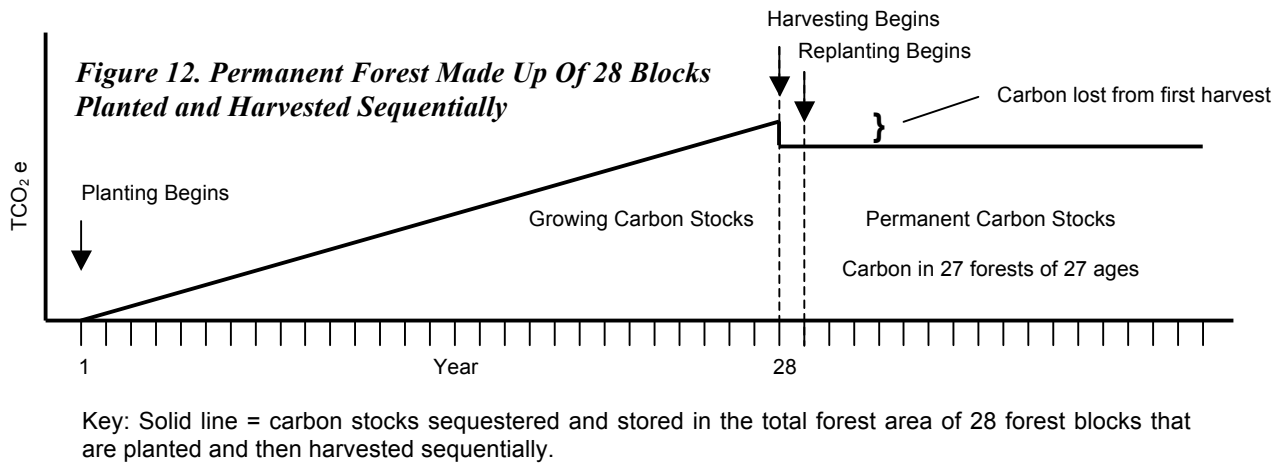
To guard against fire or other damage to the 28 blocks to be subject to carbon finance, the project may include a series of plantation blocks (e.g. blocks 29-35) that are within the project boundary but are not included in carbon finance calculations. This buffer forest can be used as a form of inbuilt insurance, whereby if the main blocks (1-28) are damaged (e.g. by fire) during the life of the project (e.g. in year 14) then the buffer forest blocks can be “recruited” into the carbon credit collection to offset any carbon lost.

Project Scale Permanent (Harvested) Forests

We can then translate this principle from the national to the project level. Here the project boundary will include all the forest areas to be subjected to the project level carbon accounting, and will include a range of forests of different ages.

One way of depicting this is to imagine a project with the same number of forests as there are years in the rotation cycle. For *Pinus radiata* the rotation is commonly 28 years and so we could have a permanent forest project involving 28 forests (see Box 1 above and Figure 12 below).

We can depict (in principle) the change in carbon stocks for this project by means of a stylised graph (Figure 12 below).

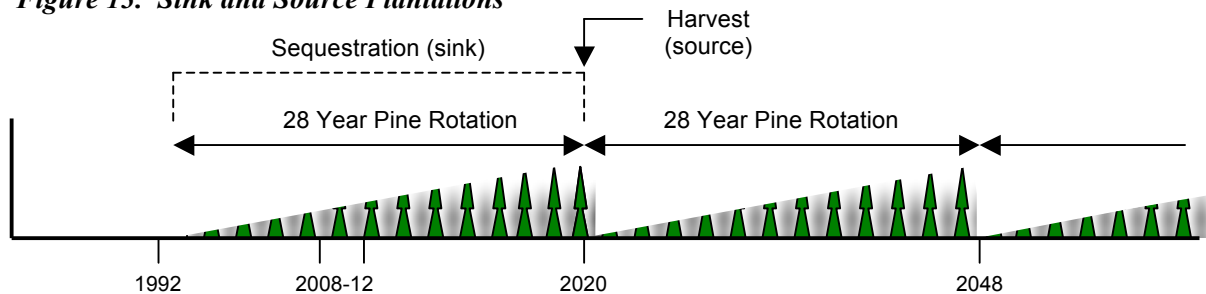


Another way of achieving this permanent forest result is to identify 28 blocks of forest that have already been planted with each forest block of a different age (28 ages corresponding to each year of the 28 year cycle). Obviously, from an economic point of view this approach would be more suitable than establishing a new forest each year for 28 years

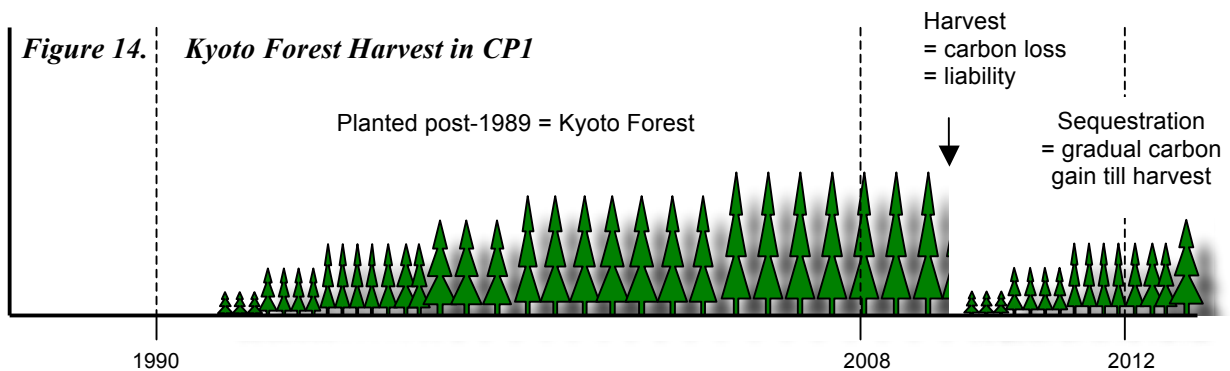
Kyoto Forest Carbon Accounting

Under the Kyoto accounting system, all carbon from a harvested forest is deemed to have entered the atmosphere at the time of harvest. This establishes a carbon sink/source cycle through the crop rotation (see Figure 13 below). Here sink credits (RMUs) can be seen in context, relative to the carbon liabilities associated with the loss of carbon at harvest time. RMUs or credits can be earned during crop growth, but the forest goes into carbon deficit at harvest time by the same volume that was accumulated during forest growth. (However, a special Kyoto accounting rule means that any harvesting debits are not greater than earned credits since 1 January 2008.) But, having harvesting liabilities at all makes economic planning for carbon credits challenging, particularly when considering potential variation in interest rates and the price of carbon through a rotation cycle (e.g. 28 years for a *Pinus radiata* forest). One way of getting around this problem is to ensure that the carbon project is adding new permanent forest within the project boundary.

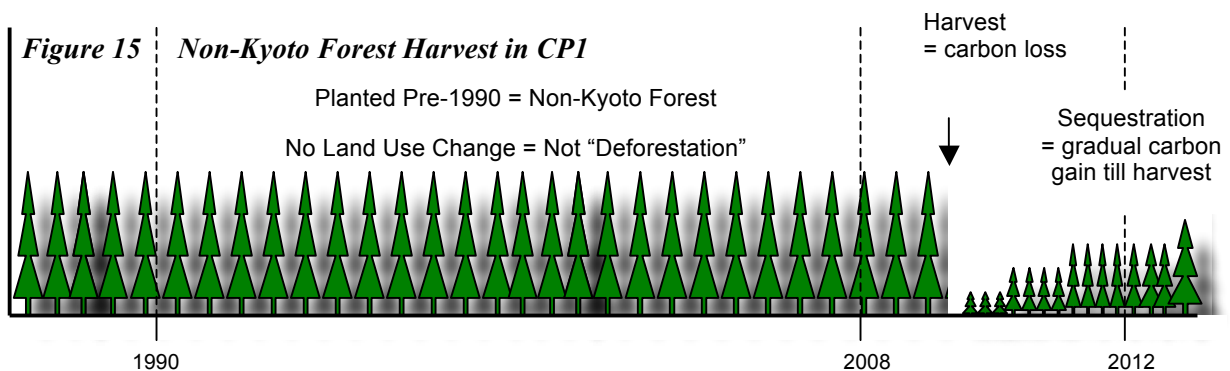
Figure 13. Sink and Source Plantations



Removal of carbon as a result of harvesting timber is subject to Kyoto penalties for the country if it takes place during KP CP1 (Figure 14 below). A government can then devolve penalties to the forest owners if they choose to implement national legislation to this effect as is the case with current government policy in New Zealand. Two issues here: Debits are not greater than previously earned credits from 1 Jan 2008 and also for the foresters to be subject to these debits they would have to have opted into the credits part of the NZ ETS and received credits.

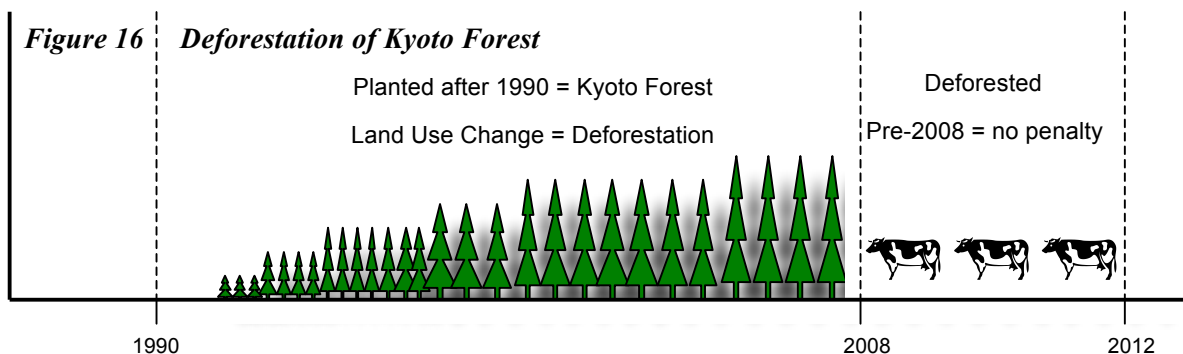


If a non-Kyoto forest (i.e. was planted prior to 1 January 1990), is harvested and then replanted during KP CP1, it remains a non-Kyoto forest, because there has been no change in land use during KP CP1 (see Figure 15 below).

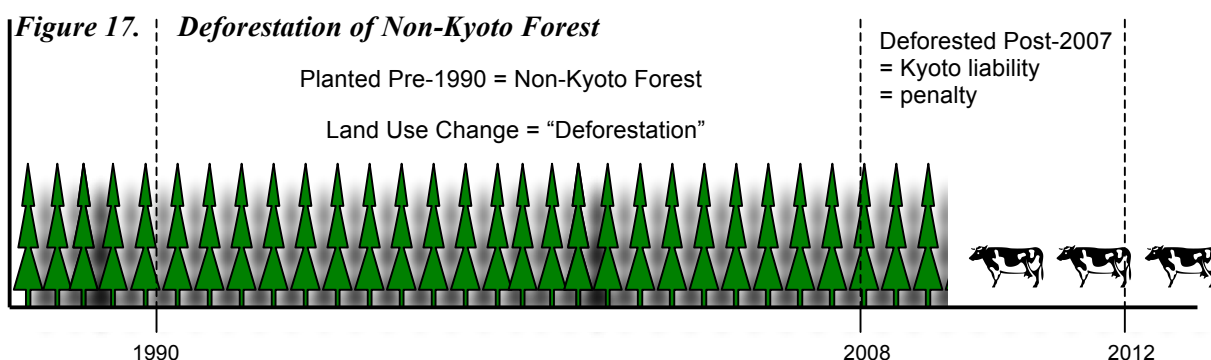


Deforestation

Deforestation is defined in the Kyoto system as the removal of the forest and permanently changing the land use to something other than forests. Because the changes in carbon stocks are measured only during KP CP1, any deforestation that occurred prior to 1 January 2008 did not count against New Zealand's Kyoto target (also measured in KP CP1), and as a result was not subject to any penalty under the government's climate change policy. This led to a surge in deforestation activity in late 2007, particularly in the central North Island.



Non-Kyoto forests (i.e. those established prior to 1990) are subject to the Kyoto accounting system if they are deforested after 1989. If they were deforested prior to 1 January 2008 and all the above ground carbon stock was removed from the site prior to 1 January 2008 the accounting does not show losses of carbon stock. This is because the key date for measurement of these stocks is 1 January 2008 to 31 December 2012. Indeed soil carbon may increase under pasture under certain forms of soil carbon management. For example, soil conditioners such as biochar can also increase soil carbon stocks. So a somewhat paradoxical situation could occur whereby land comes under the accounting system under deforestation (since 1990) and avoids penalty by deforesting before 1 January 2008, but then earns carbon credits during 2008-2012 because of increases in soil carbon stock compared with the soil carbon stock volume on 1 January 2008.



1990 is the base year for forests in the Kyoto Protocol. Any deforestation after 1 January 1990 is caught in the NZ national carbon accounting system. If this deforestation takes place after 1 January 2008 it is accounted for nationally. This amount of deforestation (counted in tonnes of CO₂ e/ha) is recorded in the national Land Use, Land Use Change and Forestry (LULUCF) sector "ledger" as a "loss." In the mean time the same "ledger"

will record “profits” from afforestation/reforestation (carbon sink) activities (also measured in tonnes of CO₂ e/ha). At the end of KP CP1 the national LULUCF sector account balance is calculated (all “losses” and all “profits”). Deforestation will only generate a penalty if the national account at the end of KP CP1 is in the red for the LULUCF sector as a whole. Either way, deforestation during KP CP1 counts against the country’s national effort, because if we had less deforestation, the national carbon balance for the LULUCF sector would be further into the positive (or less in the negative) as a result.

THE NZ EMISSIONS TRADING SCHEME

In September 2007 the New Zealand government announced the details of the NZ ETS¹² which it plans to implement as the flagship domestic climate change policy. One effect of this will be to place a ‘cost of carbon’ on greenhouse gas emissions in New Zealand, with different sectors entering the scheme at different times¹³. The forest sector came in on 1 January 2008.

Because of the ‘trading’ features of the policy and the international linkages of these trading features, this cost of carbon will be linked to the international price of carbon. It is expected that the cost of carbon in New Zealand during the First Commitment Period of the Kyoto Protocol (2008-2012) will be closely linked to the value of carbon credits (called CERs) being generated in developing countries through projects under the Clean Development Mechanism (CDM). This is because it is expected that the points of obligation in the NZ ETS such as the oil companies and upstream energy commodity companies for stationary energy will meet their obligations to the NZ government by purchasing CERs in the international carbon market.

Forest owners have the opportunity to ‘opt in’ to the NZ ETS and thereby gain carbon credits from carbon sequestration. These forest owners, however, also have to take on the liabilities that will accrue at harvesting. So this is not risk free. Indeed there are significant risks to taking and selling the credits if the rate of increase in the international

¹² For details on this scheme see <http://www.climatechange.govt.nz/nz-solutions/reducing-our-footprint.shtml>

¹³ According to government policy as at the time of writing (May 2008), stationary energy is scheduled to come in on 1 January 2010, liquid fossil fuels on 1 January 2011, and agriculture and waste sectors on 1 January 2013 (i.e. at the beginning of the next commitment period of Kyoto or whatever multilateral agreement follows it).

‘cost of carbon’ is significantly greater than the rate of interest over the period to when the forests are eventually harvested (if they are production forests).¹⁴

The primary purpose for government policy with respect to forests in the NZ ETS is to prevent deforestation liabilities falling on the government (and hence the taxpayer), which potentially could be very large. A hectare of mature *Pinus radiata* contains about 800 tonnes of CO₂ equivalent. Should this be ‘deforested’ after 1 January 2008 the liability of 800 tonnes at (the low) price of NZ\$ 15 per tonne CO₂ is \$12,000 per hectare. At NZ\$ 30 per tonne it is \$24,000 per hectare.

On deforestation (of exotic plantation forests), government policy has shifted since 2002 when the government announced a cap of 21 million tonnes (or units) associated with deforestation over 2008-2012. This was meant to be a cap on the amount of acceptable deforestation. Arguably under the NZ ETS policy announced in 2007, the amount of deforestation is expected to be negligible because of the substantial liability placed on those doing it (i.e. the \$12,000-20,000+ per hectare).

Instead the 21 million units has been recast as compensation to owners of pre-1990 plantation forests for the potential loss of land value, because the option of converting the land to a different land use has been foreclosed by the more recently imposed deforestation liability. The government proposes to spread this compensation over all such landowners by allocating units on a pro-rata per hectare basis, irrespective of whether the forest owner were likely to deforest or not. These units are to be provided as NZUs and can be a) on-sold to those in the NZ ETS with emissions obligations to the government, or b) converted to Kyoto NZ AAUs and sold offshore.

NB: Some of the 21 million units will be retained by the government to cover deforestation occurring below the ‘exemption threshold’ of 50 hectares that the policy proposes (i.e. if land is smaller than 50 ha the deforestation liability will not be imposed – instead it will be absorbed by the government).

For **indigenous forests**, the intent of policy is still not clear. The NZ ETS policy document released in September 2007 states:

The government has not yet expressed a preferred position on the inclusion or otherwise of deforestation of pre-1990 indigenous forests in the ETS. It welcomes specific feedback on this issue. If private indigenous forests were to be incorporated into the ETS, they would receive an additional allocation of units, though at a lesser

¹⁴ For example, a forest owner might forward sell their credits soon after planting a forest when the price of carbon is relatively low (Value X), then bank the value of the credits at Interest Rate Y. Then harvest time they will have to buy credits, but by then the value of carbon might be much higher (Value Z) than when the forest was planted. This will pose a significant financial problem if Value Z is greater than Value X and Interest Rate Y

rate than exotic forests. This would reflect the much lower deforestation rates of these forests in recent history.

This statement only speaks about the compensation part of the ‘deal’. But “inclusion in the ETS” would be expected to also mean the full liability for any deforestation. Mature indigenous forest is likely to contain much more than 800 tonnes CO₂ equivalent per hectare and so the scale of the liability is potentially much more than is the case for pine (\$12,000-20,000+ per hectare).

The NZ ETS and SILNA Land Owners

The enabling legislation for the NZ ETS is yet to be finalised and currently exists in the form of the Climate Change (Emissions Trading and Renewable Preference) Bill. **At the time of writing (April 2008) the Bill had no specific provision for the SILNA forests.** In addition, the Bill did not specify whether indigenous forests established before 1990 should be included in the ETS: “...Engagement is continuing on the issue of whether to include indigenous forests within the NZ ETS and if a policy change is desirable...”¹⁵

Because New Zealand did not include Article 3.4 in its Kyoto commitments, the treatment of pre-1990 forests lie outside of its national greenhouse gas accounting system. However, according to the Explanatory Note of Climate Change (Emissions Trading and Renewable Preference) Bill:

“The design of NZ ETS is compatible with the United Nations Framework Convention on Climate change... and the Kyoto Protocol..., but is designed to endure under a range of possible future scenarios for international climate change agreements.

The objective that guided the design of the NZ ETS is:

That a New Zealand emissions trading scheme support and encourage global efforts to reduce greenhouse gas emissions by:

- *Reducing New Zealand’s net emissions below business-as-usual levels; and*
- *Complying with our international obligations, including our Kyoto Protocol obligations;*

While maintaining economic flexibility, equity, and environmental integrity at least cost in the long term.

*The NZ ETS is designed to operate as an integral part of the government’s broader climate change, sustainable development, and economic transformation agendas.”*¹⁶

¹⁵ Page 50, Explanatory Note, Climate Change (Emissions Trading and Renewable Preference) Bill

¹⁶ Pages 1, 2 Explanatory Note Climate Change (Emissions Trading and Renewable Preference) Bill.

Should New Zealand elect to take on the equivalent of Article 3.4 obligations in the post-2012 global climate change agreement (or be compelled to by new rules) then forest management of what are currently non-Kyoto forests may become a compliance activity in the future.

SILNA Exemption from Forest Amendment Act (1993)

The Forest Amendment Act (1993) prohibited clear-cutting of indigenous forests by private landowners, allowing only sustainable harvesting of indigenous timbers under licence.

SILNA forest owners were given an exemption from the sustainable forest management requirements of the Forest Amendment Act (1993) (because of complex historical circumstances relating to the original SILNA settlement). A voluntary moratorium on clear-cutting of indigenous forests was established for SILNA owners from 1999 to 2005 - a period where the government provided payments in exchange for forest protection.¹⁷

Technically, therefore, **SILNA forest owners are still able to legally clear fell their forests**. If SILNA forest owners exercised this right after 1 January 2008, the key issue is: who bears the emissions liability that accrues under the Kyoto rules – the government or SILNA forest owners? **Assuming this right has not been extinguished by some new provision under the NZ ETS Bill – and preventing such an extinguishment of rights seems to be the critical issue here – then the government would have to bear such a liability.**¹⁸ It logically follows that the government may wish to compensate SILNA forest owners who may reasonably have been expected to exercise their right to convert their indigenous forested land to some other higher value land use. It is not obvious why such compensation should not apply also under the 50 hectare threshold (the government is liable in this situation as well).

In practice, it appears that a number of SILNA forests are subject to sustainable forest management as a result of government support for the development of sustainable forest management plans.¹⁹ This is particularly relevant to the fact that Section 67C of the Forest Amendment Act (2004) prohibits the export of indigenous timbers unless the “timber has been taken from an area subject to, and managed in accordance with, a registered sustainable forest management plan or registered sustainable forest management permit.” Therefore, SILNA timber harvested outside a sustainable forest management plan (as defined in the Forests Act 1993) is unable to be exported. This

¹⁷ Source: <http://www.beehive.govt.nz/release/balanced+solution+silna+forests>

¹⁸ It should be noted that Robert Kenneth McAnergney, on behalf of all SILNA owners, in 1990, filed an open ended claim (WAI 158) to the Waitangi Tribunal, as yet unheard. This claim will be reviewed with respect to any forthcoming NZ ETS legislation that might be construed to constitute a contribution to a lost opportunity to owners of land granted to their ancestors under the SILNA Act (1906).

¹⁹ <http://www.maf.govt.nz/mafnet/publications/ruralbulletin/jun-02/jun-2002-16.htm>

means that SILNA exemption from the Forest Amendment Act (1993) provisions applies predominantly to activities involving timber harvests for the domestic market, and conversion to non-forest land uses.

If Article 3.4 activities are included in the NZ ETS (in a later iteration of the Bill and post-2012 iteration of the LULUCF rules), there should be no barrier to SILNA forest owners from participating (along side any other forest owner) in forest management activities potentially capable of generating carbon credits for exchange in the compliance carbon trading system. In addition to this, because SILNA forest owners are still legally able to clear-fell indigenous forests, the carbon volumes potentially eligible for the generation of carbon credits on SILNA lands should include the total standing stock in an “avoided deforestation” activity, so long as the carbon project meets the standard additionality criteria (i.e. the avoided deforestation was only financially possible with the aid of carbon credit finance).²⁰

Recall that under the NZ ETS, carbon source liabilities will be imposed on landowners if pre-1990 forests are deforested. This has interesting potential implications for SILNA owners who seek to clear forest for agricultural production purposes, perhaps as intended as part of a business-as-usual development process. Even though SILNA owners are exempt from the Forest Amendment Act (1993), the NZ ETS, as currently described in the Climate Change (Emissions Trading and Renewable Preference) Bill, will penalise SILNA owners who deforest pre-1990 forests. SILNA owners may consider this a breach of the spirit and letter of the original SILNA legislation of 1906 and subsequent interpretations. Should this be the case, **there may be merit in SILNA owners seeking a clause in the current Bill to honour the unique SILNA context by exempting SILNA owners from penalty for deforesting under the NZ ETS.** This would:-

- a. retain the hard won status quo for SILNA lands vis-à-vis the Forest Amendment Act (1993),
- and
- b. allow SILNA owners to potentially utilise carbon finance²¹ for avoided deforestation instead of conversion to agriculture for some of their forest lands.

If the NZ ETS does not end up including Article 3.4-type activities post-2012, then such activities can continue to be undertaken in the voluntary carbon market. **There is, at present, no barrier to undertaking Article 3.4-type carbon credit activities under the**

²⁰ A high standard for certification of such projects is essential if the units traded in the NZ ETS are to be fully fungible with other emission trading systems (so long as those systems allow article 3.4 activities – the EU ETS currently does allow any forest carbon to be traded).

²¹ This kind of activity would be a compliance market activity because it is covered under Article 3.3 of the Kyoto Protocol.

voluntary carbon market. The challenge here is simply to meet the eligibility criteria of the voluntary market for a successful transaction. Furthermore, because the government opted out of Article 3.4 activities, it will not count such activities in its national GHG accounting system, and as such there is no risk of double counting the carbon from such activities. Double counting would occur if:

- a. A voluntary carbon market project counted carbon volumes from emissions reductions and gained carbon credits,

and

- b. The government counted the same carbon volumes (by including them in its national GHG balance), and then used them to meet its Kyoto target.

4. VOLUNTARY CARBON MARKET

By Murray Ward and Sean Weaver

The voluntary carbon market operates through the voluntary efforts of individuals, companies, or sectors to reduce emissions even though they are not subject to a binding emissions cap. These voluntary efforts can arise from two situations.

The first is where a country, sector, industry, or activity is not subject to binding emissions reduction obligations. Examples include the USA (which did not ratify the Kyoto Protocol), the international airline industry (which is not required to reduce emissions under the Kyoto Protocol), avoiding deforestation in developing countries (no Kyoto mechanism for this activity). Here carbon emissions are reduced and residual emissions (unable to be eliminated) are offset through the purchase of carbon credits in the voluntary carbon market. The international airline industry is an example of a sector that currently has little opportunity to reduce emissions “in-house” (unless it reduces total air miles). An option for this industry (should it wish to voluntarily take responsibility for its emissions) is to buy carbon credits equivalent to the tonnes of carbon emissions it produces (carbon offsets).

The second situation is where a sector, business, activity, or individual pursues the goal of voluntarily lowering their carbon footprint either because they anticipate future regulations requiring this or they seek to demonstrate corporate social responsibility to their market/clients/shareholders. Carbon neutrality is a goal pursued by those who seek to contribute to a low carbon economy. The goal of carbon neutrality involves an effort to bring the net carbon footprint of a business or activity to zero. This is achieved by monitoring emissions to measure the carbon footprint, then reducing emissions where possible and then purchasing carbon offset credits for any residual emissions that they are unable to eliminate (more below).

The voluntary carbon market can be broken down into two categories:

1. The Chicago Climate Exchange (CCX). This is the world’s only voluntary cap-and-trade system (mostly allowance units are traded, with some offsets). Units traded: Carbon Financial Instruments (CFI)
2. The voluntary ‘Over the Counter’ (OTC) market (sometimes called the ‘voluntary offsets market’). This involves bilateral deals operating outside an exchange (project-based offsets are traded) –Units traded: Verified Emissions Reductions (VERs).

The fundamentals of demand and supply which set the value of carbon in the voluntary carbon market are very different than in the compliance market. The voluntary market at this stage of its evolution is much less ‘commoditised’ so values can reflect the diversity of buyers’ willingness to pay. In turn this can depend on buyers’ views about the attributes of specific projects, including co-benefits (i.e. values other than carbon, such as biological diversity).

GLOBAL VOLUNTARY CARBON MARKET

The following pages provide an overview of the global voluntary carbon market provided by a survey undertaken by premier carbon market research agencies ‘New Carbon Finance’ and ‘Ecosystem Marketplace’ in 2008.

Volumes and Values

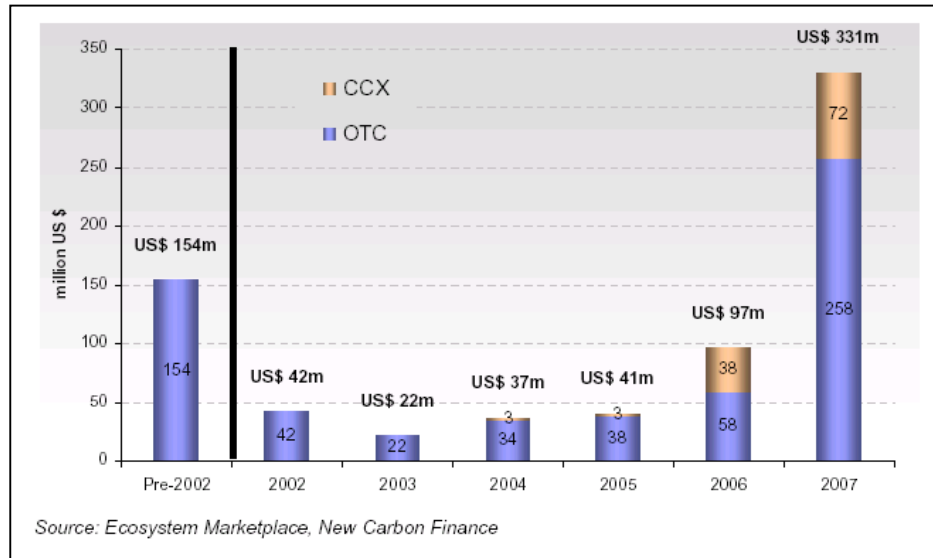
The voluntary carbon market grew from a total of US\$97 million in 2006 to US\$331 million in 2007 – a rise of approximately 240% (Table 2 and Figure 18 below). Most of the growth in the voluntary carbon market is arising from OTC transactions for project-based offset credits, which increased five-fold from US\$58 million to US\$258 million over the same period. This rapid growth is demonstrating the increasingly important role of the voluntary carbon market even though it remains much smaller in size (2.2%) compared with the compliance market where binding emissions obligations drive demand (New Carbon Finance and Ecosystem Marketplace, 2008).

Table 2. Transaction Volumes and Values 2006, 2007. (Hamilton, K. et al 2008).

Markets	Volume (MtCO ₂ e)		Value (US\$million)	
	2006	2007	2006	2007
Voluntary OTC Market	14.3	42.1	58.5	258.4
CCX	10.3	22.9	38.3	72.4
Total Voluntary Markets	24.6	65.0	96.7	330.8
EU ETS	1,1044	2,061	24,436	50,097
Primary CDM	537	551	6,887	6,887
Secondary CDM	25	240	8,384	8,384
Joint Implementation	16	41	141	495
New South Wales	20	25	225	224
Total Regulated Markets	1,702	2,918	40,072	66,087
Total Global Market	1,727	2,983	40,169	66,417

Source: Ecosystem Marketplace, New Carbon Finance, World Bank

Figure 18. Transaction Values on the Voluntary Carbon Market. (Hamilton, K. et al 2008).



Project Types and Locations

There are many different project types generating carbon offsets for the voluntary carbon market, ranging from energy efficiency programs, to livestock management, and avoided deforestation. The dominant project types shifted somewhat between 2006 and 2007. The top three project types in 2006 were forestry (37%), renewable energy (32%), and industrial gas projects (20%). In 2007 the dominant project types were renewable energy (31%), energy efficiency (18%), forestry and use (18%), and methane destruction (16%).

The primary location of projects is dominated by Asia (up from 2006), North America (level with 2006), and Europe (up from 2006), with steady numbers of projects in Latin America, an increase in those from Australia, and a decline in projects based in Africa.

Price

A huge variation in credit price was observed in 2007 depending on project type/vintage ranging from US\$1.80t/CO₂e to US\$300/CO₂e. Some of the highest prices project types for both 2006 and 2007 were forestry projects involving afforestation/reforestation activities and commanding top-end prices of US\$40-US\$50. The lowest prices were paid for industrial gas and geosequestration (US\$2-US\$4).

Figure 19. OTC Transaction Volumes by Project Type and Project Location 2007. (Hamilton, K. et al 2008).

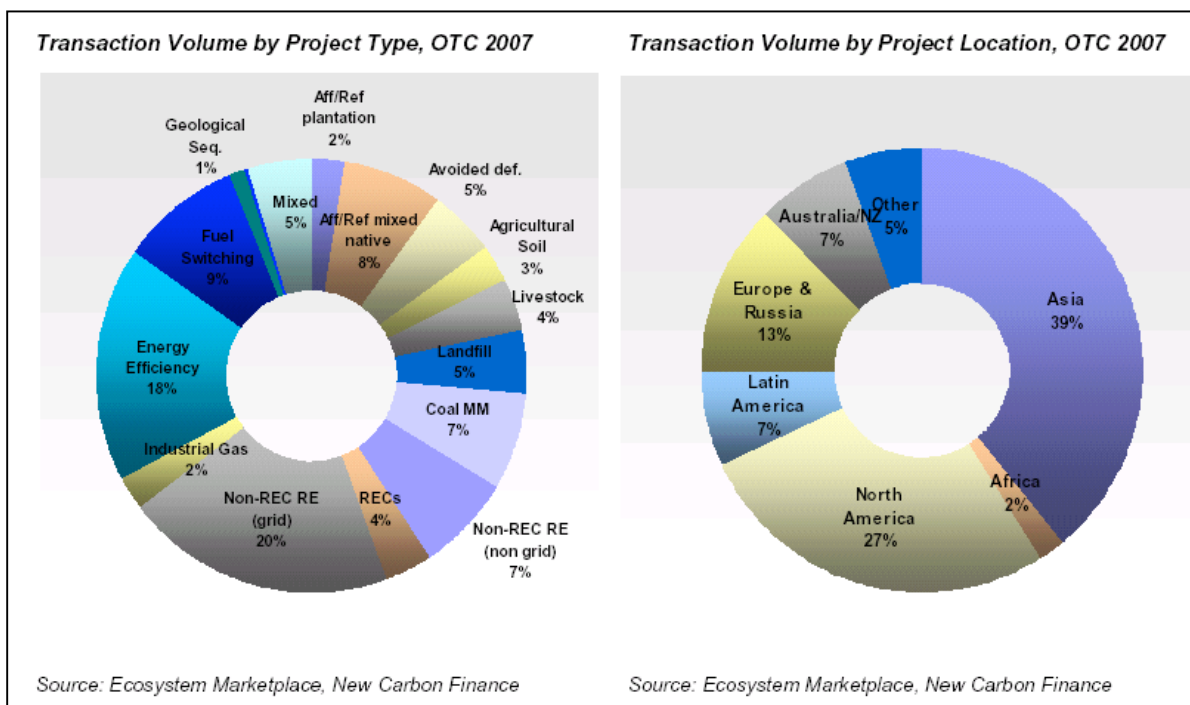
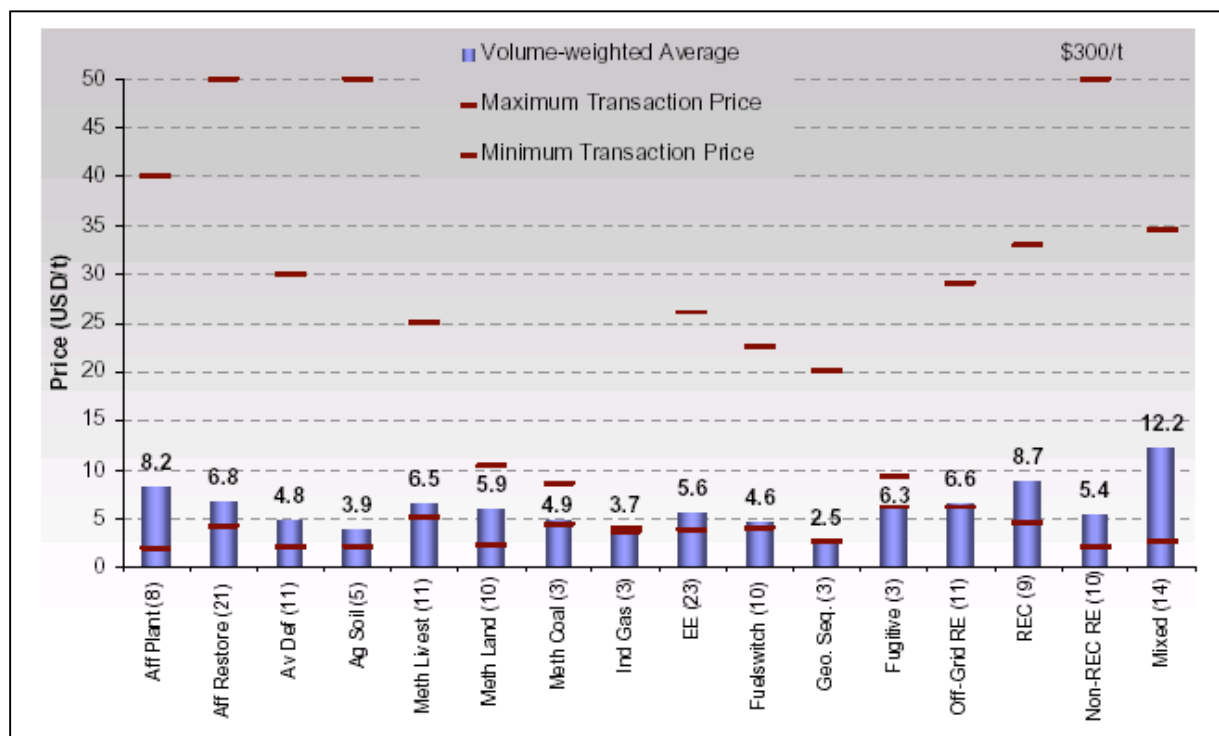


Figure 20. Credit Prices by Project Type OTC, 2007. (Hamilton, K. et al 2008).



Demand

A 2008 survey of the buyers in the voluntary carbon market found that businesses were the largest buyers by volume (80%) during 2007. The next largest buyers were NGOs (13%), followed by individuals (5%), with governments buying only 0.4% of the total.

For the business buyers, anticipation of future regulation did not appear to be the main motivation for purchases. Their main motivations for participation in the market were corporate social responsibility and to “walk the talk” in terms of environmental stewardship. For example, according to this survey 50% of credits purchased were not destined for resale (i.e. these buyers were not simply purchasing credits as a financial investment). Some notable points from the information presented in these figures are the significant portion of projects in the forests sector (the reverse of the case for the CDM) and the wide range of prices paid, especially “forests mixed”. This reflects the issue of payments for co-benefits (e.g. biodiversity values).

Standards

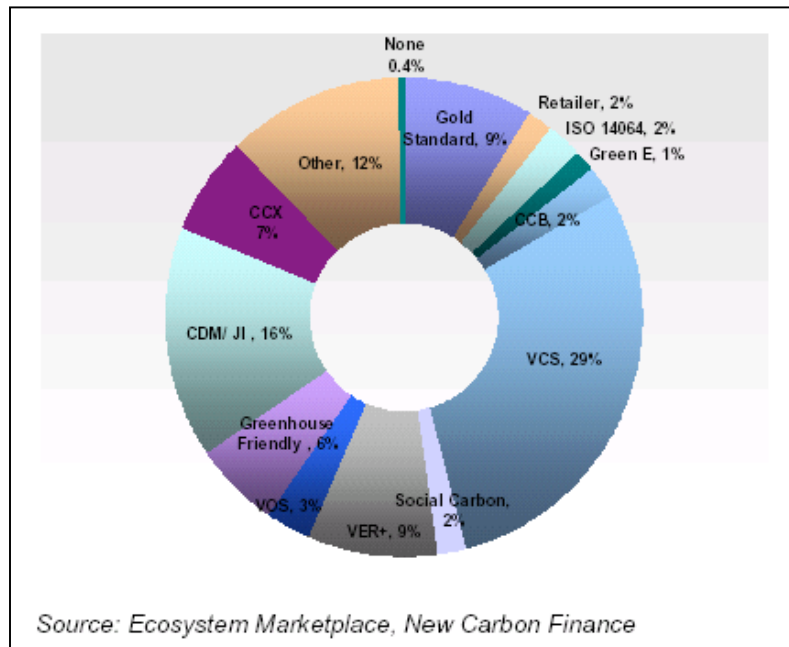
The 2007 year was characterised by a rapidly growing buyer demand for product quality, as reflected in carbon market standards. This was driven partly by bad press criticising the credibility of the voluntary carbon market, and in some cases carbon markets in general. Of particular concern to carbon market watchdogs – especially environmental groups – is the environmental integrity of this market system. This integrity is undermined if offset projects are not real (or not completely real), such as a reforestation project where the plantations are not properly managed (e.g. many trees die) but the credits are still sold. Another concern is where the project (even a well managed one) is not additional (i.e. where the project would have happened even without the carbon credit finance).

In response to this demand for quality there has been a tightening of voluntary carbon market standards and an increased demand for credits supporting the highest of these standards. The most popular standards are the Voluntary Carbon Standard (VCS), Clean Development Mechanism (CDM), Chicago Climate Exchange (CCX), VER+, and the Gold Standard (see Figure 21)

Some standards are generic (e.g. VCS, Gold Standard) while others specialise in certain project types and co-benefit portfolios such as Climate Community and Biodiversity (CCB) and Social Carbon.

Another development related to quality assurance in the voluntary carbon market is the development of voluntary carbon market registries, designed to prevent double counting and lock down transaction records in secure electronic localities.

Figure 21. Transaction Volume by Standard Used. (Hamilton, K. et al 2008).



VOLUNTARY CARBON MARKET IN NEW ZEALAND

In New Zealand the voluntary market activities so far mostly have surrounded the carboNZero programme operated by Landcare Research²². The reasons for participation by businesses and groups in carboNZero go beyond just corporate social responsibility (CSR). Here “carbon neutrality” is the goal and participants go through a ‘3 step’ programme: measure carbon footprints, reduce emissions, purchase offsets for residual emissions.

While CSR may be part of what motivates organisations to participate in carboNZero, “branding” may be a better overall term. For many participants there is also a strong international element to this. Alerted to the emergence of consumer preference campaigns and initiatives occurring in major markets in the UK and Europe, e.g. “food miles” and “food (and product) footprints” labelling, savvy New Zealand firms are seeking to get ahead of the curve and not only manage risk but gain competitive advantage.

To date, the offsets component of the carboNZero programme has mostly been met through a companion Landcare Research programme called EBEX21²³. This is a forest restoration initiative involving landowners that make an active step to stop other land use

²² For details on this programme see <http://www.CarboNZero.co.nz/index.asp>

²³ For details on this programme see <http://www.ebex21.co.nz/>

activities and allow land to revert to natural forest. All the carbon credits generated through EBEX21 are sold to carboNZero participants. In addition, some carboNZero participants have acquired voluntary carbon credits from other projects in New Zealand, e.g. Windfarms, and used these as the offsets needed to achieve carboNZero certification.

The carboNZero programme has therefore been the trailblazer in the voluntary carbon market space in New Zealand. It has developed its own strict procedures, following ISO 14064 and 14065 standards²⁴ that have been developed for the measurement/estimation of carbon emissions and emission reduction activities, for organisations that validate and verify such measurements/estimates and for bodies that audit and accredit the validators and verifiers. It has also created emission footprint calculators for use by its participants and interested general users.

In recent times, other entities in New Zealand are becoming active in the voluntary space. Trademe in collaboration with M-Co have established a combination trading platform and registry for those wanting to sell credits. The New Zealand exchange (NZX) is also establishing a fully integrated exchange-based trading platform/registry (TZ1) that will deal in both Kyoto compliance and voluntary carbon units. TZ1 will go live later in 2008 with a view to international trading activity. TZ1 stands for “Time Zone 1” recognising that the New Zealand exchange is the first international exchange to get going in any given day.

The Credibility Challenge

Internationally, the voluntary carbon market is currently responding to allegations of improper and non-credible business practices, even fraud. Articles about “carbon cowboys” and “greenwash” featured in major financial media in early 2007. The response has included a number of initiatives by groups in Europe and North America to create good practice standards, especially regarding carbon offset projects²⁵. A number of these initiatives pre-date the setting out of the concerns.

The voluntary carbon market therefore is still somewhat in a state of flux in terms of getting its house in order. This is unsurprising given it is about voluntary initiatives. However, given the potential for buyers of voluntary carbon credits to be confused or deceived, both governments and major players in the voluntary space (including key corporate buyers) are calling for more standardisation and conformity.

²⁴ See ISO in the glossary link on the CarboNZero website noted above.

²⁵ These include GS VER (Gold Standard Verified Emissions Reduction), VCS (Voluntary Carbon Standard), VOS (Voluntary Offset Standard), CFI Carbon Financial Instrument), Green-e, VER+ (Verified Emission Reduction+), CCB Standard (Climate, Community & Biodiversity Standard), CarbonFix Standard, Plan Vivo Certificate. More details on these can be found by *Googling* these terms.

Particularly noteworthy is the emerging consensus view that offset projects creating voluntary carbon units should be as “real, verifiable and additional” as projects in compliance markets. It is common for the latest standards, or newest version of older standards, to start from the basis of methodologies developed in the CDM and require the involvement of the same validators and verifiers that have been accredited under CDM procedures.

Particularly noteworthy is the strong focus on *additionality* (meaning that projects would not have just been going to happen anyway in the absence of the incentive provided by awarding of carbon credits and the ability to turn those credits into cash) and the prescribed use of methodologies developed in response to this core requirement of the CDM or methodologies equivalent to these. New Zealand thus far has limited experience with the application of such methodologies in domestic policy, including the earlier PRE²⁶ policy. Both government and corporate groups in New Zealand that are keen for the voluntary carbon market to grow here are beginning to realise that there are some significant efforts needed to put in place the proper credibility ‘building blocks’ (or *conformity infrastructure* in policy jargon). Such efforts are now ‘work in progress’ for a number of government departments and corporate players.

One question that has arisen is whether New Zealand should develop its own standards and conformity infrastructure for activities in the voluntary carbon market here, or whether it should just adopt international standards and practice. It is likely that the answer is that it should be a mixture of both. Given the international brand issue that underpins much of the current carbon neutrality activity in New Zealand (arguably including that of the government’s Carbon Neutral Public Service initiative), it will be important that what we do in New Zealand meets tests or perceptions of credibility in the UK and Europe. This suggests the use of international standards.

However, to maximise the level of activity in New Zealand it will not be practical to be constrained by having to work through project or methodology acceptance committees or bodies in the UK or Europe. These can become the same bottleneck that has constrained the development of the CDM where everything goes through the CDM Executive Board (EB). This suggests the need for the necessary elements of *conformity infrastructure* to be established in New Zealand, and the use by these of relevant and well accepted international standards – or ‘best practice’ where standards per se do not exist.

Voluntary Market Activities in Sectors Covered by Compliance Accounting

One currently active international debate, as yet unresolved, is whether it is even appropriate to have voluntary carbon market activities occurring in sectors covered by ‘cap and trade’ compliance regimes (such as the Kyoto Protocol or the upcoming RGGI scheme in the USA NE states). The viewpoint of the recently released international

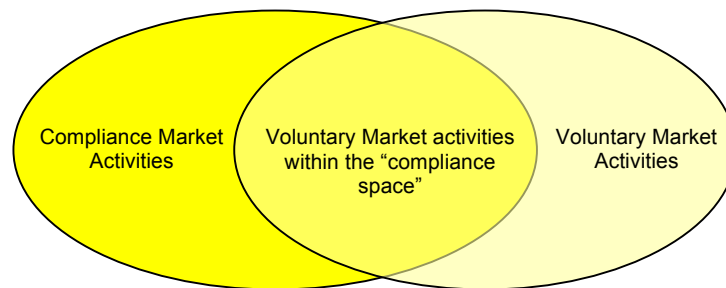
²⁶ Projects to Reduce Emissions (PRE).

Voluntary Carbon Standard (VCS)²⁷ is that this would somehow constitute “double counting”. To address this concern the VCS requires that an equivalent number of compliance units be cancelled in the compliance scheme for any voluntary units issued in the voluntary scheme. In practice this will kill the economics of voluntary projects. It is tantamount to precluding the use of the voluntary carbon market in most developed countries, as most are covered by accounting regimes of compliance cap and trade schemes. Note that this is not just about activities in sectors covered by domestic cap and trade emissions trading schemes. The Kyoto Protocol itself is a cap and trade scheme overarching all developed countries that have ratified.

This proposed “cancel compliance units” requirement of the VCS can be seen to stem from earlier thinking presented by the UK department of environment food and rural affairs (DEFRA) in a document titled *consultation on establishing a voluntary code of best practice for the provision of carbon offsetting to UK customers* released in January 2007. This document proved to be very contentious and the consultation received a large number of responses. Some form of guide, or ‘next steps’ document on this topic is expected to be released by DEFRA in 2008.

In the meantime, the new VCS has now attracted the debate on this issue. It has been argued that the interpretation the VCS has taken of *double counting* is not correct and that this is not a problem that needs preventing in such a blunt way that the effect is to eliminate the viability of the voluntary carbon market in developed countries falling under the Kyoto cap. The VCS board is giving due consideration to this point of view and have indicated they will consider an amendment to the VCS if they agree.

Figure 22. Voluntary carbon market in the compliance space



This policy debate is very relevant to the situation of the voluntary carbon market in New Zealand, and hence to possible opportunities on SILNA lands. The VCS reflects the latest effort by major international players²⁸ to set out a standard that may become the defacto

²⁷ For more details on this standard see <http://www.v-c-s.org/>

²⁸ These include the World Business Council for Sustainable Development (WBCSD) and the International Emission Trading Association (IETA).

international standard for the voluntary carbon market. For international brand reasons set out above, it is not practical for New Zealand to reject using or meeting such international standards, and just adopting NZ standards that make sense to us. But if the VCS as it stands is what is to guide voluntary actions in New Zealand, this would limit such actions just to sectors that were not covered by Kyoto accounting. The only such sector in New Zealand is pre-1990 forests (except the deforestation of these) because, as noted earlier New Zealand elected to not account for article 3.4 activities under Kyoto.

The message then for SILNA is somewhat mixed with respect to opportunities in voluntary carbon markets. It is not all bad if the VCS situation remains as is. SILNA forests are typically pre-1990 forests, so there would be opportunities for carbon stock enhancement supported by the voluntary carbon market under the VCS. But anything related to energy projects would be ruled out as the energy sector falls under Kyoto accounting. And getting credits for growing new forests would be ruled out, as this is an article 3.3 activity covered under Kyoto accounting. It is therefore clear that it is desirable for the VCS issue to be resolved such that projects under the VCS can be done in sectors covered by Kyoto accounting – as long as they meet the “real, verifiable and additional” tests in the standard.

At the time of writing (May 2008) the VCS Board had recently been briefed by one of the authors (Murray Ward) to explain why voluntary carbon market activities should remain eligible under jurisdictions covered by a binding emissions cap. The Board indicated agreement with the reasoning and is considering amendment to the VCS standard.

International Aviation and Shipping Transport

There is a separate issue that also needs to be considered. This too is very significant to SILNA forests. A substantial amount of the demand worldwide for carbon offsets stems from peoples (or products) international air travel. It can also be expected that there will be a growing demand for carbon offsets for products’ international shipping. Neither international aviation nor marine emissions are covered under Kyoto accounting. For credibility sake this means that any offset activities creating credits to ‘carbon neutralise’ these emissions must also be outside Kyoto accounting. As noted above, enhancements of existing pre-1990 SILNA indigenous forests qualifies, so SILNA landowners may have a particular opportunity to exploit here. This would not just be limited to New Zealand buyers; it would for any buyers worldwide looking for offsets for international aviation and shipping emissions. An added co-benefit for such projects would be the international value of the “Maori brand” for such vintages of carbon.

ARTICLE 3.4 OF THE KYOTO PROTOCOL

Article 3.4 of the Kyoto Protocol involves a number of land use activities, one of which is *forest management* of forests that were established prior to 1 January 1990. Article 3.4 is voluntary for the first commitment period of the Protocol for ratifying nations.

Countries cannot just select ‘bits’ of their national managed forests where they think forest management activities can lead to an increase in carbon stock (and get credits). They have to include all managed (pre 1990) forests in their accounting and will only get credits if there is an increase in aggregate carbon stock of such forests (i.e. sinks and sources).

New Zealand chose to not undertake Article 3.4 because there was a strong likelihood that, in aggregate, the national managed pre-1990 forest estate would be a net source of emissions, not a net sink.

[NB: Note that some of this is because of the expected harvesting over 2008-2012 of significant portions of pre-1990 plantation forests. There was also a concern for carbon stock losses in the indigenous forest estate due to pests and dieback of natural old-growth forest, although this is not yet fully understood as the national carbon monitoring system is not complete.]

In short, pre-1990 forests are therefore completely outside the Kyoto accounting system. For this reason they also lie outside the compliance carbon market (unless they are deforested after 1 January 1990) ²⁹

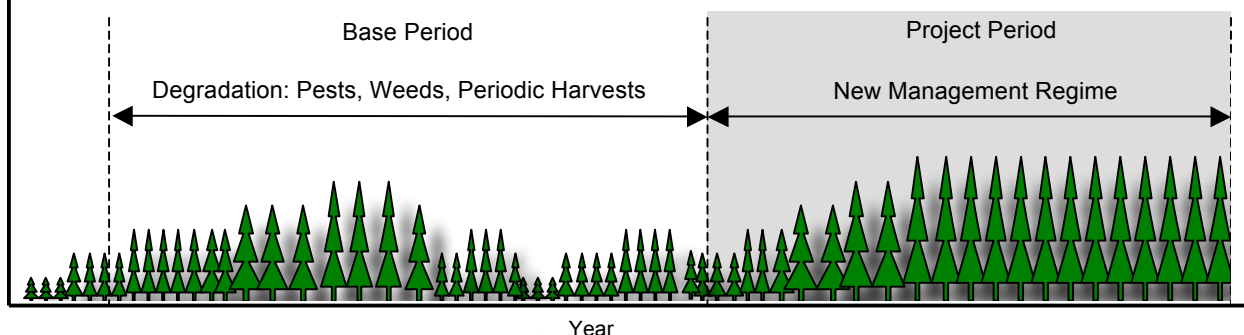
But pre-1990 forests are potentially amenable to earn credits in the **voluntary carbon market** for activities undertaken that increase carbon stocks and that are real, verifiable and additional (meaning they weren’t just going to happen anyway).

Indigenous Forests

One form of forest management that could be compatible with voluntary market carbon finance is some form of forest management intervention that enhances the rate of carbon sequestration and protects the forest as it reaches an ‘old growth’ condition. Such a management intervention could include the elimination of periodic wood harvests (e.g. for timber and firewood), and a regime of pest and weed control. The key is that the management intervention moves the forest system through a transition to higher carbon stock status compared with business as usual (see Figure 23 below).

²⁹ To some extent, it can be seen that there is an exception to this statement, in that under the NZ ETS the government proposes to provide NZ ETS compliance units (called NZUs) (which are convertible to Kyoto compliance units called NZ AAUs) to all owners of pre-1990 plantation forests as a means of compensation for possible losses in land value due to the deforestation liability provisions of the NZ ETS. This is depicted in Figure 14. ‘*Non-Kyoto Forest Harvest in CPI*’ above. This is also discussed further below.

Figure 23. Enhanced Regeneration in Non-Kyoto Indigenous Forest



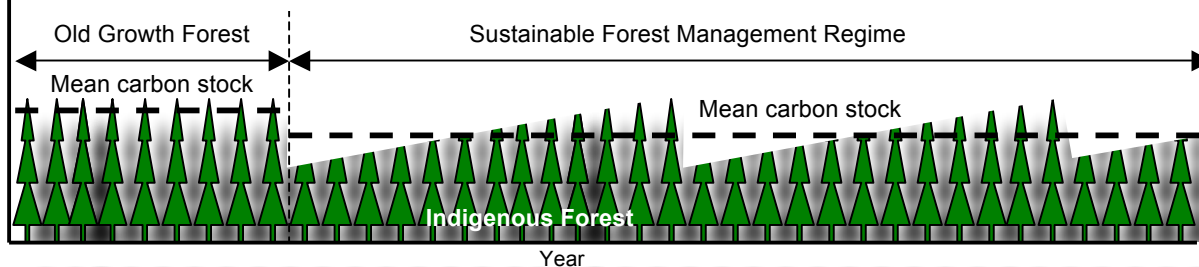
Mean carbon stocks would need to be demonstrably higher in the new management period compared with the base period for an enhanced regeneration project to be eligible for carbon finance.

Another management regime potentially eligible as a voluntary carbon market project type is avoided deforestation and avoided sustainable forest management.

Avoided deforestation is when the business as usual scenario for a natural forest is a deforestation management path (e.g. clearing for agriculture). In New Zealand the deforestation BAU scenario is generally not available because all indigenous forests that can be harvested are controlled by the Forest Amendment Act (1993). This legislation prohibits deforestation and requires that any harvesting is undertaken according to a sustainable forest management regime. SILNA forests are the only exception.

Avoided sustainable forest management is the other possibility. Here the BAU scenario would be a sustainable forest management regime (Figure 24 below) and the carbon project would avoid this thereby protecting that proportion of carbon that would have been lost to the forest under SFM. This is discussed in more detail in Chapter 8 below.

Figure 24. Sustainable Forest Management of Non-Kyoto Forest



Existing CDM Methodologies

It is now common for voluntary carbon market standards to have CDM methodologies as the core of any suite of accepted methodologies. The VCS, for example, has developed a process for the consideration and acceptance of new methodologies, but this process is yet to consider any. So the current methodologies accepted under the CDM represent the only methodologies that can be utilised for voluntary market activities under this standard.

What is a methodology? The project cycle for any CDM project starts with the submission of a new baseline and monitoring methodology if no methodology approved by the CDM executive board exists for the project type. These methodologies have to be developed by project participants. Once approved, methodologies are a public good.

Baseline methodologies have to address the challenge of quantifying a situation that would have happened had the carbon project not taken place (the business-as-usual scenario). This is something that can never be proven ex post. The approach taken needs to be relatively robust in order simulate an activity that would not have happened otherwise. Such an approach has the aim of limiting the incentive for projects to claim emission reductions that are higher than those actually achieved.

In addition to being a basis for calculating possible emission reductions (or sink enhancements) and hence how many credits would be generated, baseline methodologies are the means by which additionality is assessed in practice. If the BAU scenario “what would have happened without the carbon project” (the baseline) would result in the same or lower emissions, then the project is not considered additional. Note that this may represent the case where the same project activity would have gone ahead anyway (i.e. because it didn’t really need the financial incentive of the credits to be viable), or that a realistic alternative to the project would have the same or less emissions, not more³⁰.

The fact that voluntary carbon standards require activities to meet additionality requirements “just like the CDM” has an interesting outcome with respect to the growing of new forests. Under article 3.3 developed countries (that have taken on Kyoto targets) can get credits for growing forests since 1990 that represent fully regular commercial practice. This is not true for developing countries (with no Kyoto targets) under the CDM which is a voluntary mechanism for developing countries (as these would not pass the additionality test³¹). Accordingly, it would not be possible to create credits under a voluntary standard for regular “anyway” commercial forestry – in developed or

³⁰ E.g. A proponent of a gas-fired generating station could not claim the emissions baseline as being for coal fired generation if there is good reason to believe that, in practice, the realistic alternative to their project would likely be another gas fired generating station or perhaps a geothermal power station – and these could proceed without the incentive of carbon credits.

³¹ Any activities that “represent fully regular commercial practice” by definition can not be additional.

developing countries. The point is that carbon finance is designed to enable new additional projects to occur that would not have occurred without the carbon finance. Some attempts by NZ plantation foresters to create and sell VERs on Trademe for existing forests should be eyed with due caution in this regard.

Given the requirement by leading voluntary standards to use CDM methodologies, or propose new methodologies based on similar principles, it is instructive to look at what CDM methodologies exist that may apply to bio-based or other renewable energy projects and afforestation or forest conservation/enhancement projects and that may be suitable for application on SILNA lands. A table of possible approved methodologies as at October 2007³² is included below.

Table 3 Approved Methodologies As At 19 October 2007 (Eb35)

Sector	Method #	Description	RAI Potential ³³	Linkages	Issues
Renewable Energy	ACM0002 ver.6	Grid connected electricity generation from renewable sources	Yes in principle (e.g. Wind generation) but unlikely to be practicable		Long distance from points of energy consumption. Check rules (and associated economics) for selling electricity to the grid
	ACM0006 ver.6	Grid connected electricity generation from biomass residues	Yes – particularly for RAI electricity use and sale to grid of any surplus	Potential synergy with by-products from neighbouring timber or agriculture industry. Potential to aggregate with other SILNA owners.	Long distance from points of energy consumption. Check rules for non-grid electricity in voluntary market as part of a cross-methodology bundled approach. Road unreliable currently.
	AM0036 ver.2	Fuel switch from fossil fuels to biomass residues in boilers for heat generation	Not on RAI lands		
Renewable Energy and Afforestation and Reforestation	AM0042 ver.2	Grid connected electricity generation using biomass from dedicated plantations	Yes – bio-energy crop on lands marginal for dairying (seepage slopes and boggy areas possibly planted in willow coppice)	Could use heat by-product to warm a commercial greenhouse vegetable growing venture	Check rules (and associated economics) for selling electricity to the grid
	AR-AM0001 ver.2	Reforestation of degraded land	Yes Either plantation or PFSI type project	Potential to aggregate with several SILNA owners to form a single project to gain economies of scale re transaction costs.	May not be sufficient available land of this category
	AR-AM0002	Reforestation of degraded lands through afforestation/	Yes – future plantation resource	Potential to aggregate with several SILNA	Trade-off with PFSI activity carbon income

³² Up to date as of the EB35 meeting, 19 October 2007. See outcomes of subsequent EB meetings

³³ This table was created with just the methodology summary descriptors in mind. It does not mean that these activities (highlighted) are necessarily viable options for RAI or SILNA but that in principle they are worth exploring.

Afforestation and Reforestation	AR-AM0002	reforestation	Could be native timber such as beech	owners.	Trade-off with PFSI activity carbon income
	AR-AM0003 ver.2	Afforestation and reforestation of degraded land through tree planting, assisted natural regeneration and control of animal grazing	Yes - if post 1989 forest they fall under PFSI. If pre-1990 forest they fall under KP Article 3.4 and eligible in voluntary market. Could include native timber enrichment plantings and future sustainable harvests.	Potential to aggregate with several SILNA owners. Could include pest and weed control as “assisted regeneration”.	Difficult to demonstrate higher sequestration rates from additional pest and weed control. Probably best to include pest and weed control as an aspect of management plan for enrichment plantings for future sustainable harvesting.
	AR-AM0004	Reforestation or afforestation of land currently under agricultural use	Not on RAI but a possibility on marginal farmland on other SILNA lands		Competing with dairy investment and earnings
	AR-AM0005	Afforestation and reforestation project activities implemented for industrial and/or commercial uses	Yes Plantation forestry. Exotic or native commercial timber. If native timber - harvesting on sustainable management basis.	Best to aggregate with other SILNA owners	Management challenges associated with project spread out geographically.
	AR-AM0006	Afforestation/Reforestation with trees supported by shrubs on degraded land	Yes		
	AR-AM0007	Afforestation and reforestation of land currently under agricultural or pastoral use	Yes	Useful only for areas of marginal farmland. Potential to aggregate with other SILNA owners.	Need a total project area to be large enough to meet transaction costs.
	AR-AM0008	Afforestation or reforestation on degraded land for sustainable wood production	Yes		
	AR-AM0009	Afforestation or reforestation on degraded land allowing for silvopastoral activities	Yes but probably not much scope on SILNA land for silvopastoral agroforestry		
	AR-AM0010	Afforestation and reforestation project activities implemented on unmanaged grassland in reserve/protected areas	No		
	AR-AMS0001	Revised simplified baseline & monitoring methodologies for selected small-scale afforestation and reforestation projects	Yes		

Table 4. Small Scale CDM Project Activities (AMS)

Sector	Method #	Description	RAI Potential	Linkages/synergies	Issues
Renewable Energy	I.A ver.12	Electricity generation by the user	Yes – biomass gasification from bio-energy crop grown on lands marginal for dairying (seepage slopes and boggy areas possibly planted in willow coppice), combine with sawmill residues	Use energy locally as a means of avoiding using grid, and sell surplus to the grid	Check rules (and associated economics) for selling electricity to the grid
	I.C ver.12	Thermal energy for the user	Yes – by-product from biomass gasification to heat a commercial greenhouse	Bio-energy crop feedstock for gasification plant. Multiple benefits: methane reduction by dairy de-stocking; sequestration from bio-energy crop; energy efficiency; heat energy efficiency	Generate additional carbon credits from sequential carbon projects. Complicated methodology which cuts across different activity types.
	I.D ver.12	Renewable electricity generation for a grid	Yes – wind, bio-energy crop gasification	Heat by-product in gasification option for commercial greenhouse	Long distance from points of energy consumption
Other Project Activities	III.R	Methane recovery in agricultural activities at household/small farm level	Yes – collecting cattle manure for a small scale biogas plant	Possible linkage with neighboring dairy producers	Transport challenges because of unreliable road – possible upgrade in future would help. Also labor intensive compared with collection from dairy shed.

Project categories highlighted above include those that both fit CDM methodologies and also may (following further scrutiny in the form of a feasibility study) match conditions on RAI and other SILNA lands.

5. PAYMENT FOR ECOSYSTEM SERVICES

By Sean Weaver

Payment for Ecosystem Services (PES) is a component of the voluntary market for environmental protection. PES programs provide opportunities to engage the private sector in sustainable resource management that might include climate change mitigation activities such as forest protection and carbon sequestration. Like the voluntary carbon market, demand is driven by corporate social responsibility and market positioning among the buyer community. This market is somewhat similar to the spectrum of the voluntary carbon market interested in carbon plus co-benefits, but where the co-benefits may be as important or more important to the buyer than carbon.

Payment for ecosystem services programs are voluntary and mutually beneficial contracts between consumers of ecosystem services and the suppliers of these services. The party supplying the environmental services holds the property rights over an environmental good that provides a flow of benefits to the demanding party in return for compensation. The beneficiaries of the ecosystem services are willing to pay a price that is lower than their welfare gain due to the services. The providers of the ecosystem services are willing to accept a payment that is greater than the cost of providing the services.

A MARKET FOR MORE THAN CARBON

Carbon markets trade a single commodity (sometimes blended with co-benefits) where the core remains measurable and additional CO₂ equivalent emissions reductions or carbon sequestration. Climate change mitigation efforts include many activities that do not always fit nicely within the carbon market frame. A good example is avoided deforestation. Here no sequestration is taking place (because mature forests tend to exist in a carbon balance) and so a forest conservation project would not qualify as a sink project. Furthermore, because the 'yet-to-be-protected' forest is not currently being logged there are no emissions either. Emissions reduction schemes first require the calculation of an emissions baseline followed by new and additional management activities that reduce the rate of emissions. Either way avoided deforestation tends to fall outside the carbon market frame.

Other activities may also fit the carbon market rules in principle, but the scale of the project may be too small to meet the transaction costs of carbon market participation in either the compliance or the voluntary market. Another problem that may occur is that the project is too big to fit into the carbon market system – such as a very large forest area

where it would be too costly to accurately measure the carbon stocks for trading purposes.

Another example is where the values to be protected are far wider than carbon (including biological diversity, water resources, nutrient cycling) and where the proposed management regime is designed to protect all of them. Carbon projects that protect a carbon resource will commonly end up protecting other values by default. But there are several situations where protecting carbon is not sufficient for prudent environmental management, and the value of these systems cannot be reduced to carbon alone, and from a financial point of view the value of carbon may not be sufficient to protect these values.

For example, if carbon was the only unit of value for forest management, then a natural forest full of biological diversity and of great importance to indigenous cultures would be worth the same as the equivalent volume of carbon in a monoculture plantation. Furthermore, natural forests also generate many ecosystem services that relate to the climate system, which carbon markets cannot “see.” These include evapo-transpiration, sensible and latent heat flux, soil moisture, moderation of local precipitation, together with other values outside the climate category: biological diversity, genetic resources cultural resources, and non-wood forest products to name a few. In these situations the array of ecosystem services are the core values at stake and a project may be seeking to connect these values with sources of funding to enable these values to be protected.

A noteworthy example of the PES market in practice is the recent PES transaction between the Government of Guyana and a London based investment firm Canopy Capital in March 2008. The company made a commitment to fund a “meaningful chunk” of the US\$1.2 million annual management budget for the 371,000 hectare (917,000 acre) Iwokrama reserve.³⁴ The service being purchased includes carbon, biological diversity and the forests contribution to the hydrological cycle through evapo-transpiration. In a sense the company is buying a rain factory with carbon and biodiversity co-benefits.

Another example in New Zealand is the Government purchase of biological diversity and natural heritage (with carbon co-benefits) stored in the West Coast forests in 2000. Here the government paid the West Coast community NZ\$135 million for the protection of 130,000 hectares of lowland indigenous forest. The architect of this transaction was the lead author of this report (Sean Weaver) who framed it as an exchange of value as a form of resource management barter. This led Weaver to develop the notion of ‘Direct Barter’ as a possible mechanism for the protection of forest resources in the face of economic challenges to those same resources from the development goals of resource owners and guardians. This methodology was presented to the UNFCCC in the Vanuatu submission to the UNFCCC on the theme of Reducing Emissions from Deforestation in Developing Countries (REDD).

³⁴ See Reuters news archive:

<http://uk.reuters.com/article/environmentNews/idUKL2668925320080327?sp=true>

Direct Barter

The principle underlying carbon markets provides an opportunity to transact rainforest carbon stocks at small, medium and large scales. Formal carbon markets however, present challenges to forest protection efforts where the forest in question is either very large or very small.

In the case of very large forest areas (e.g. a biome scale area of many thousands of hectares) the area would often be too big to cost-effectively calculate carbon volumes accurately for carbon market transactions. Moreover, from a policy point of view, very large volumes of forest carbon entering the carbon market is being treated with great caution by some commentators because

- a. such volumes can drive down the carbon price and thereby
- b. flood the carbon market with cheap offsets thereby
- c. reduce the environmental integrity of the carbon market system by making it cheaper (and therefore easier) for industrial emitters to meet their compliance obligations through offsets rather than in-house emissions reductions.

In the case of very small forest areas, many would contain such low volumes of carbon that they would find it difficult to meet the transaction costs of carbon market projects and still be economically viable (e.g. the project development and transaction costs may be more than the value of the credits).

In both situations there is an option to go outside formal carbon markets and package the forest protection exercise as a Direct Barter. Here the seller is not selling carbon credits but selling a climate-related ecosystem service. Because carbon credits are not for sale the project is not providing offsets of emissions elsewhere, but instead selling an emission reduction outcome within the project boundary. The gains to the atmosphere are therefore absolute rather than relative (the latter is the case with carbon credit projects).

The buyers are governments or businesses interested in purchasing the ecosystem services on offer because of philanthropic, social/environmental policy or corporate social responsibility motivations. The size of this market is certainly smaller than carbon markets, but it is a niche that is growing with the increasing awareness of the need to protect the climate system and other ecosystem services from continued demise.

Furthermore, whereas formal carbon markets trade carbon credits for cash, Direct Barter transactions need not be restricted to the money system, but could encompass anything the two parties were willing to negotiate. For example, a rainforest owner such as a SILNA consortium may be willing to gain the equivalent value of a) the timber in their rainforests and b) the productive capacity of cleared lands by some other means, if this other means were on offer by another party. But this value could come in the form of

cash or an asset swap or a combination of cash, together with funding for conservation management, or shares, stocks, bandwidth – anything worthy of trade in the broadest sense. This means that the currency of trade is fungible across a broad spectrum of potential “currencies of trade.” This non-cash dimension of Direct Barter is perhaps more relevant to transactions between a two governments where the buyer is able to offer a trade deal, debt relief or other bilateral instrument as the currency of the transaction.

The “product” or service for sale can be presented as a portfolio of values associated with an in tact natural forest system and could include:

- Carbon reservoir protection
- Carbon sequestration
- Biodiversity conservation
- Water catchment protection
- Cloud seeding from forest evapo-transpiration
- The protection of an indigenous cultural resource

The commercial packaging of this portfolio can take the form of an ‘Asset Portfolio’ that measures the values to be protected together with a ‘Project Management Plan’ that presents a methodology and a budget for the protection of these services. The marketing of the portfolio could be undertaken through a web site dedicated to the project together with other trading platforms including TradeMe, international voluntary carbon registries such as TZ1³⁵ (provided their eligibility criteria fit the project specifications).

Because this kind of project is not selling carbon offsets but may be selling carbon emissions reduction activities (e.g. forest protection), then there is less of a need to measure the carbon volumes to the level of accuracy demanded by carbon markets. Accordingly, the carbon content of the forest can be estimated using the less expensive forms carbon stock inventory methodologies than those needed for a carbon credit transaction.

The principle behind Direct Barter simply recognises that a natural forest resource asset amounts to an actual or potential means of production for the owner. If an equivalently valued means of production were offered in exchange for the protection of this resource, then

1. the economic cost to the seller (for forest protection) is potentially zero

³⁵ The authors of this chapter have met with the designers of the TZ1 voluntary carbon trading registry in the New Zealand Exchange (NZX) to discuss options for allowing Direct Barter type products to be registered on this platform when it is launched later in 2008.

2. the economic benefits to the seller could include more rapid roll-out of alternative economic development options that may have equivalent or comparable value to the less sustainable BAU option.

The potential benefits of such a deal to the seller escalate further when the methodologies used to protect forest resources are themselves economically productive. For example, such a methodology could include a community development portfolio offering a combination of:

- non-wood forest production (e.g. tourism development, water harvesting)
- improved agricultural development on non-forest lands
- plantation forestry or agroforestry production on non-forest lands (i.e. generating carbon credits for carbon sequestration)
- capacity building for locally defined skill development (e.g. education and training for landowners to enable them to increase their future earning capacity)

Buyers want the rollout of a forest sustainability program. Sellers want development benefits from their natural resource assets. It is not difficult to imagine a buyer and a seller coming to an agreement. It is simply a matter of negotiating a price.

6. GRANT FINANCE

By Sean Weaver

This funding sector includes more traditional forms of grant funding, but where the project type (forest-based climate change mitigation) is one that is gaining a lot of attention by funding agencies as a high priority funding target. This grant sector includes private and public sector grants. These grants may be offered domestically or internationally by governments, businesses, or philanthropic agencies for projects and programmes that may not be suitable for market-based funds for project and programme development and implementation. Different grant funding sources have different eligibility criteria, and different reporting requirements. Some grants are available to commercial entities, whereas others target the not-for-profit sector. For example, private sector philanthropic grants tend to be available to registered charitable trusts.

Public sector grant schemes for carbon-type projects include government and quasi-government agencies that provide grant finance for reducing emissions. International examples include: the Carbon Trust (UK), Energy Savings Trust (UK), Foreign and Commonwealth Office Global Opportunities Fund, World Bank Forest Carbon Partnership Facility. New Zealand examples include the Foundation for Research Science and Technology (FRST), Sustainable Management Fund and Sustainable Farming Fund of the Ministry for the Environment. Private sector grants for climate change related projects can be gained through philanthropic trusts, corporate sponsorship through corporate social responsibility (CSR) initiatives, and through community organisations such as the World Wide Fund for Nature (WWF) and the Royal Forest and Bird Protection Society.

The non-market finance sector for forest-based climate change mitigation can be split into three categories for closer inspection:

1. Forest Conservation Grants
2. Carbon Market Capacity Building Grants. Non-market grant funding for capacity building to enable future participation in emissions trading.
3. Carbon Project Development Grants. Non-market funding for project development as part of a carbon project that will produce in the near future a commodity for emissions trading.

FOREST CONSERVATION GRANTS

There is an increasing awareness of the importance of forest protection for climate change mitigation and the way this is linked to other high priority agendas in the environment and conservation sectors such as water (quantity and quality) conservation, biological diversity, and other forest based ecosystem services.

Internationally, public awareness of the value of natural systems for human wellbeing has increased as a result of global scientific environmental assessments by the United Nations agencies: the comprehensive ‘Assessment Reports’ of the Intergovernmental Panel on Climate Change (1995, 2001, 2007), and the similarly comprehensive Millennium Ecosystem Assessment (2005). These assessments demonstrate the value to humanity (economically, socially, and culturally) of ecological processes and ecosystems, and the threat to these values to the extent that the 21st century is now being characterised by the world’s leading scientists as a global environmental crisis. The response measures to address this crisis are also explored in these assessments and include market and non-market mechanisms for the protection of vital ecosystem services.

These global assessments, together with a wide range of domestic (public and private) environmental policy initiatives are influencing the priorities of public and private sector grant funding agencies that focus on sustainable development, and human well-being. This then presents an opportunity for owners of natural forests to gain grant funding for protecting and enhancing the ecosystem services produced by their forests in the public interest, by framing this forest protection as climate protection combined with other high priority co-benefits.

Forest conservation begins with changing the status of a forest from a productive to a conservation purpose. The next task is to maintain the conservation values contained within the forest through pest and weed control and various other forms of management. Changing the status of the forest and the subsequent conservation management each has financial implications. The first set of financial implications relate to opportunity costs associated with shifting from an extractive or deforestation development path. The second set of financial implications relate to how to fund on-going conservation management in the absence of cost-recovery in the form of timber harvests. These financial challenges set the basic parameters for seeking grant funding where carbon finance is not a viable option or is insufficient to meet the financial needs of the conservation management path.

A forest conservation project can be designed to target grant funding by developing a budget to cover the costs of conservation path (including the opportunity costs) and then seeking grant funds to match this budget and enable the project to proceed. The sources of grant funding can now include those directed at climate protection in combination with those directed at the protection of the other co-benefits associated with the project (e.g. biodiversity and water services). The grant funding could be sought from domestic or international agencies. The fact that there is an added ‘indigenous peoples’ dimension

may increase the opportunity to attract international funding sources with an interest in this particular project type.

The design of the project could include forms of alternative sustainable commercial development (e.g. on non-forest lands) that require seed grants or investment capital to get off the ground. These alternative forms of development may be designed to address opportunity costs associated with moving away from the less sustainable BAU path, as well as providing a potential source of future funds to be directed into conservation management. The more commercially innovative the proposal, the higher the range of potential funding support. Furthermore, if the project proposal were to have significant social and economic development dimensions (e.g. boosting employment opportunities for indigenous landowners, enabling and supporting indigenous cultural practices), it opens itself up to a range of funding channels targeting economic and cultural development rather than being restricted to grants with an environmental purpose.

CARBON MARKET CAPACITY BUILDING GRANTS

Some grant schemes are particularly focused on building capacity for future participation in carbon markets. A good example is the World Bank Forest Carbon Partnership Facility (FCPF). There may be opportunities for the formation of a consortium of Maori forest owners to target (domestic or international; public or private sector) funds aimed at building this capacity through:

1. Development of a consortium-wide forest monitoring and carbon stock accounting capability including outsourcing:-
 - a. Remote sensing data base of consortium land and forest base
 - b. Forest inventory for carbon stock assessments
 - c. Development of a baseline or reference scenario for consortium forest assets
 - d. Monitoring methodologies for future carbon measurement
2. Training for consortium membership in:-
 - a. Carbon finance
 - b. Forest monitoring
 - c. Conservation management
3. Development of a consortium-wide stakeholder communication and consultation program to enable:-
 - a. The development of a consortium-wide carbon finance business plan
 - b. The development of a transparent carbon program governance structure

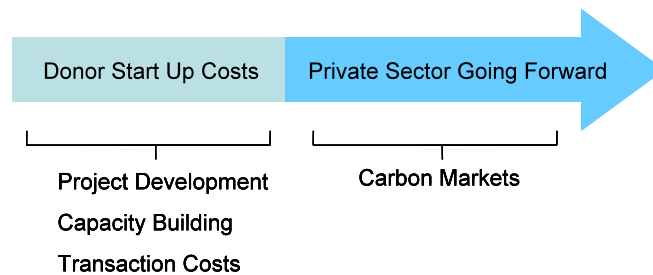
CARBON PROJECT DEVELOPMENT GRANTS

If a forest owner decides to undertake a carbon project, they will need to fund the development of the project in considerable detail in order to meet the requirements of carbon markets and certification standards. These project development costs need to be funded either through forward selling the anticipated carbon credits, through self financing, or through project development grant funding.

Grant funding for project development can help the forest owner command a higher return from the carbon credits that they eventually generate because a) they do not need to subtract the project development costs from carbon revenues, and b) they can get a higher price for their carbon if they sell them after the carbon credits have been generated (i.e. because forward contracts present higher risk for the buyer which is reflected in the sale price).

From a funder point of view, supporting the project development costs of a carbon project provides an opportunity to get more project value per dollar invested, because the overall project outcome will be partly financed through carbon credits purchased from the private sector.

Figure 25. Concept Diagram of Relationship Between Grant and Carbon Finance

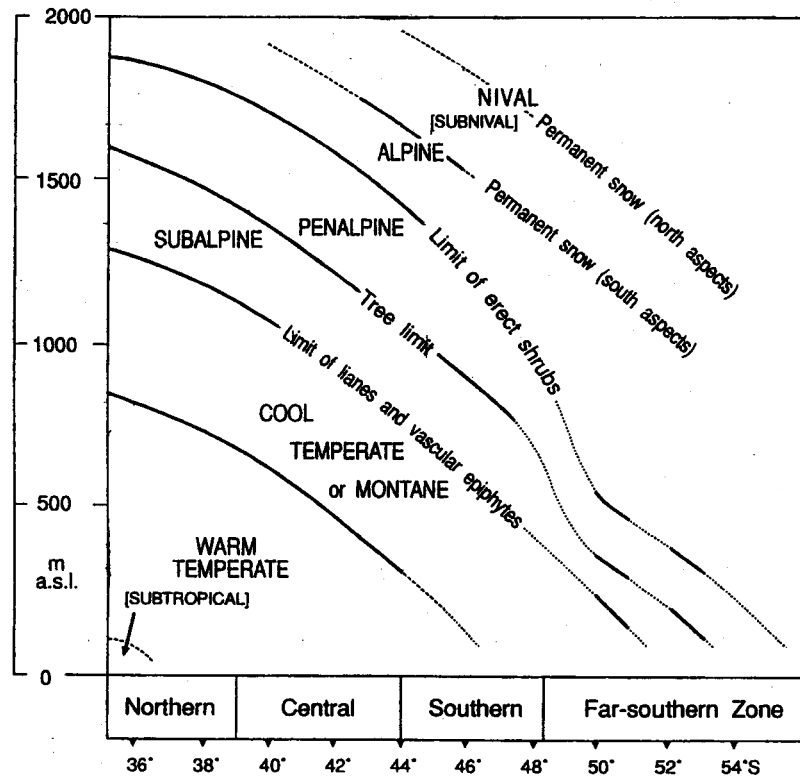


7. THE ROWALLAN-ALTON FOREST CONTEXT

By Ian Payton

FOREST DEVELOPMENT AND CARBON SEQUESTRATION

In broad terms the combined influence of temperature, moisture and nutrition (soil fertility) determines the ability of sites to support forests, shrublands, grasslands, or a more reduced form of vegetation. Temperature varies along altitudinal (low–high) and latitudinal (subtropical–subantarctic) gradients, and is also influenced by the distance from the coast (maritime–subcontinental) and the local topography (e.g., temperature inversions). Six climatic zones (warm temperate, cool temperate or montane, subalpine, penalpine, alpine and nival) are generally recognised by New Zealand ecologists (Fig. 26). Three (warm temperate, montane and subalpine) support tree growth while a fourth



(penalpine) represents the upper altitudinal limit for erect shrubs (Wardle 2002).

Figure 26. *Climatic zones in the New Zealand region. Note the decrease in altitude with increasing latitude. (After Wardle 2002).*

Moisture availability is largely determined by rainfall, but is also influenced by temperature, windiness, and the water-holding capacity of the soil. Rainfall patterns are governed by the prevailing westerly airflow and the topography of the landscape. Western areas are wetter than those in the east. Annual rainfall is greatest (10–12 m) in the headwaters of some western South Island catchments (Fig. 27) and least (<0.5 m) in the intermontane basins of Central Otago, South Canterbury, and Marlborough. In all but the driest areas moisture availability is sufficient to support forest development.

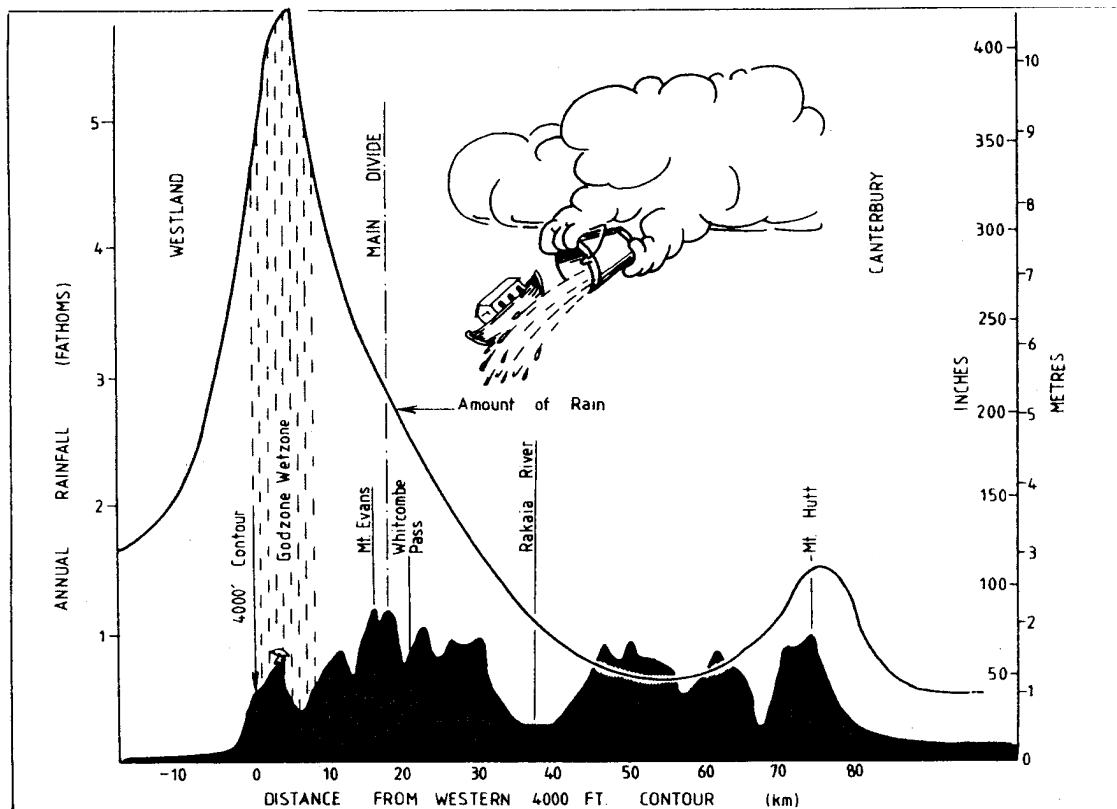


Figure 27. *Concentration of rainfall in a section across the Southern Alps. (from Chinn 1979).*

Nutrition is a product of the physical and chemical properties of the underlying parent material, the quality of the litter inputs, and the level of microbial activity in the soil. Nutrient input from the substrate is influenced by the mineral composition of the rock and the rate of weathering. Weathering is most rapid where substrates are softer and more fractured, and slower where rock types are more indurated (e.g., schist > granite on opposite sides of the Alpine Fault in Westland). Litter quality depends on the nutrient content of the fallen leaves. It is highest where broadleaved trees such as puriri and māhoe predominate, and lower under beeches, kauri, podocarps and pines. Microbial activity, which converts the nutrients in the litter into a form the plants can use, is affected by temperature (warm > cold), moisture (moist > wet or dry) and aeration (aerobic > anaerobic). Under warm, moist, aerobic conditions litterfall nutrients are rapidly incorporated into the soil. Where the soil environment is less favourable for microbial activity (e.g., cold temperatures, anaerobic conditions) rates of litter decay and nutrient release decline and deep litter layers ensue.

Plant communities are the product of the flora and fauna that live within commuting distance, and the environmental and ecological processes that help or hinder their

survival. Where they originate on bare substrates (primary succession) open scattered vegetation is progressively replaced by taller, denser communities dominated by different groups of species. In the absence of major disturbance or environmental change this process continues until the maximum biomass for the site is achieved and a 'steady state' community ensues. Where sites remain stable over long periods of time and soils become strongly leached 'steady state' communities retrogress to lower-stature, slower-growing vegetation with reduced biomass. Modelling studies (Hall & Hollinger 2000; Hall 2001; Hall & McGlone 2001) suggest that for New Zealand forests rates of biomass (and therefore carbon³⁶) accumulation are greatest during the first 100 years and decline thereafter (Fig. 28), and that the time taken to achieve maximum biomass is highly variable (155–1000 years). It is also worth noting that in forests, the stems of the large trees contribute the majority of the biomass.

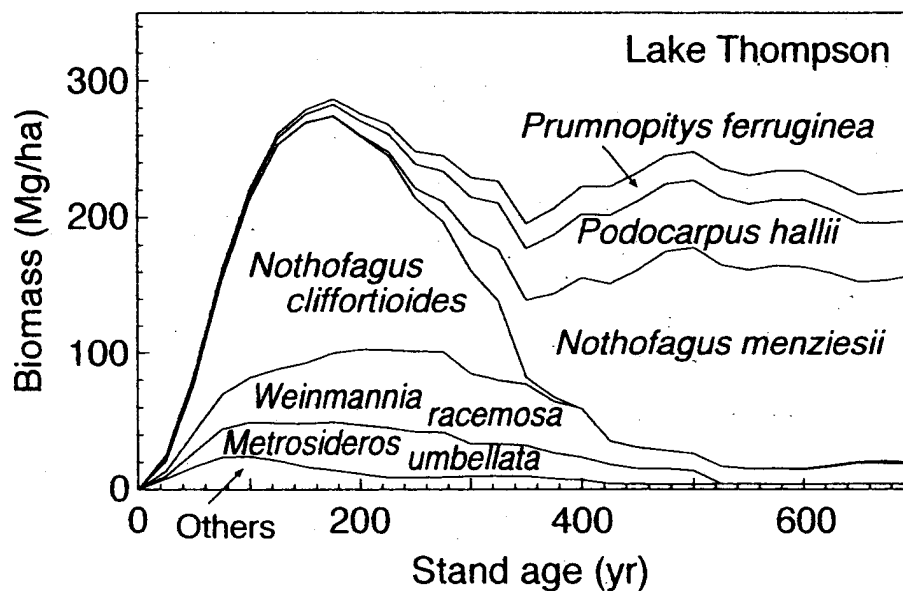


Figure 28. Modelled above-ground biomass for sites near Lake Thompson, Fiordland. (from Hall & Hollinger 2000).

Disturbance partially or completely resets the successional process. Where it removes both the vegetation and the soil (e.g., earthquake-triggered landslide) the primary succession process restarts. Where existing vegetation, but not soil, is partially or completely destroyed (e.g., fire, windthrow, canopy dieback) the secondary succession that follows is influenced by the extent of the original damage, and the ability of the remaining plants to regrow or be replaced and to successfully compete in the modified environment.

³⁶ Plant biomass is approximately 50% carbon

Plant communities readily recover from small-scale disturbances such as the death of single trees or small groups of trees. Canopy gaps are quickly filled by subdominant individuals or by the lateral growth of neighbours, and there is little lasting change to the overall composition of the vegetation. The changes associated with larger-scale disturbances (e.g., extensive windthrow or fire) are less easy to predict, because a range of factors have the potential to influence the resulting successional pathway. For example, where forests are destroyed by fire the resulting succession will be influenced among other things by the seed sources that are immediately available (not all plant species produce seed every year), the ability of these species to re-colonize the burned surface, and the presence of herbivores (e.g., hares, deer, sheep, pigs) that are attracted to the more nutrient-rich foliage typically found in plant communities recovering from fire. In many cases the composition and structure of these post-fire communities will differ markedly from that which existed before the disturbance, at least over the short to medium term which for forests is decades to centuries. Over the long term, however, plant communities will always tend towards a composition and structure that maximizes the biomass potential of the site.

ROWALLAN-ALTON INCORPORATION LANDS

The Rowallan-Alton Maori lands (13,217 ha) lie directly east of the Hump Ridge and west of the Waiau River in western Southland, and are the largest tract of Maori Land in the South Island (Burrows et al. 1992). The area is divided into approximately 150 sections, most of which remain in Maori ownership (K. McAnerngney, pers comm.). Eleven of these sections (A7 11-13 & R8 8-15) totalling 1,212 ha, are managed by the Rowallan –Alton Incorporation (RAI). The area consists of a series of coastal terraces adjoining TeWaewae Bay. Climatically, it can be described as cool temperate without moisture constraints for forest growth (annual rainfall of 1300 mm spread over 200 days³⁷). Soils are mapped as podzolised yellow-brown earths and podzols (Matauiria soils), very strongly leached with low natural fertility and poor drainage (Bruce 1984).

The original forested cover, most of which is now extensively modified, was predominantly beech - podocarp forest, with miro, rimu and silver beech the main merchantable species. Most or all of the RAI estate has been logged. Parts of the property have been intermittently farmed and there has been some exotic tree planting. The remainder of the land is gradually reverting to native forest after past farming or forestry activities. Timber resources were assessed in 1991/92 (Burrows et al. 1992, Appendix 1), to provide a basis for negotiations between the Crown and Maori land owners, should government policy on indigenous forests change.

³⁷ Figures from Burrows et al. (1992)

CARBON CREDIT OPPORTUNITIES

Afforestation

Afforestation involves establishing and growing forests on bare or cultivated land, which has not been forested in recent history

Before logging and farming activities commenced RAI lands were fully forested, which rules out carbon sequestration opportunities associated with afforestation.

Reforestation

Reforestation involves increasing the capacity of land to sequester carbon by replanting or regenerating forest biomass in areas where forests have previously been harvested.

There is little or no virgin (i.e., non-logged) old growth forest remaining on RAI land. As such it will be safe to assume that we are not dealing with forests that have attained maximum biomass (and therefore carbon) stocks. The corollary of this is that most or all of the property has the potential to sequester additional carbon in the form of plant biomass.

In order to qualify for the compliance (i.e., Kyoto) carbon market

- it will be necessary to demonstrate that the land in question was not classed as “forest land”³⁸ at 31 December 1989.
- and that a change in how the land is managed has resulted in an increase in carbon stocks – i.e., the increased carbon sequestration would not have occurred without the land management change. This is the additionality test.

In order to qualify for the voluntary (i.e., non-Kyoto) carbon market

- it will not be necessary to demonstrate that the land in question was not classed as “forest land” at 31 December 1989
- but it will still be necessary to pass the additionality test.

There are several reforestation options that could be pursued for carbon finance purposes, or for purposes that include carbon finance as part of a broader management objective. These are:

Natural regeneration to native forest

³⁸ New Zealand’s definition of forest land is 30% cover of woody species capable of growing to 5 m height *in situ*, at a scale of 1 ha and with a minimum width of 30 m. Plant communities that fall below these thresholds, and would not be expected to exceed them without human intervention, are classified as grassland (= non-forest land).

This is an option for land that is currently farmed, land has been farmed in the recent past (and is probably now head high in gorse), and land that is currently regenerating after past disturbance (e.g., logging, farming, fire). The key requirement is the need to shift from a farming to a forestry mindset, and to work with the natural successional processes rather than against them. Gorse provides a good example of the change that would be required. For the farmer gorse is a weed that gets in the way of farming activities. It is to be slashed, sprayed, crushed and burned wherever and whenever possible. More gorse is bad, less gorse is better, no gorse is best. For the forester gorse takes on an entirely different role. In regenerating native stands it acts as a nurse-crop, shading out the grass and allowing native tree seedlings to establish. In plantations gorse provides shelter for the young trees, and providing it doesn't overtop them is normally left alone. Gorse also has the added benefit of being a nitrogen-fixer.

Providing sites are sufficiently warm, moist and fertile for forest growth, which is the case on RAI land, this is the most cost-effective way of building carbon stocks. The key requirements are fencing to ensure stock are excluded and the maximum possible reduction of wild animal (e.g., deer, pig, goat) populations. Left unchecked, browsing animals will slow or stall the regeneration process.

Natural regeneration with “enrichment” planting of desired tree species

This is a variation on (i) in which seedlings of desired species (e.g., rimu, miro, totara) are planted into areas of regenerating vegetation, and nurtured while they get established. To be financially viable this option would need to include more than just carbon finance (e.g., sustainable harvesting of timber).

Silvicultural management of existing forests

There is now a well developed body of knowledge on the silvicultural management of native tree species, particularly the beeches and some of the podocarps. RAI has significant areas of regenerating forests, and smaller areas of more mature forest that could be managed for sustainable forest harvesting. Silvicultural management (e.g., pruning, thinning) improves the quality of the stand as a timber resource. As a rule it wouldn't be expected to reduce carbon stocks, except on a short-term basis (i.e., immediately after a thinning operation). Carbon finance options would need to include allowance for losses when trees are harvested. The key to success with this option is getting then right advice from people who have silvicultural experience with the tree species that are to be managed.

Plantation development of indigenous or exotic (e.g., radiata pine, Douglas fir) tree species

This involves creating a forest from scratch. Especially where it involves rapidly growing tree species such as radiata pine and Douglas fir, it is an efficient means of increasing carbon stocks. To be financially viable this option would need to

include timber harvesting, and this would need to be factored into any carbon finance calculations.

Avoided Deforestation

Deforestation is the direct human-induced conversion of forested land to non-forested land (e.g., clearance of forest for agricultural purposes).

In order to qualify for carbon finance related to avoided deforestation

- It will be necessary to demonstrate that the land in question is “forest land”, and that would be converted to “non-forest” land if access to carbon finance was not available.

Practical Considerations

Once a decision has been taken to establish a carbon sink

- Clearly define and map the areas that will be used to develop a particular type (e.g., native forest regeneration) of carbon sink. To minimise carbon measurement costs each area should be at least 50 ha.
- Identify the carbon (and any other) market you are targetting, and determine its requirements. This may include the requirement for a covenant over the land (e.g., Landcare Research’s EBEX21[®] programme uses QE II covenants) and the use of standard measurement protocols.
- Determine how you will manage the risks associated with the loss of carbon for which credit payments have been made. For example, what would you do if your carbon sink burned down, or was damaged or destroyed by other factors beyond your direct control?
- Determine the methods that will be used to measure the carbon stock and the rate at which it is increasing, and the means of analysing these data to produce a carbon stock estimate.

Most landowners will contract this work to organisations or individuals with specific expertise in carbon accounting. Landcare Research’s EBEX21[®] programme provides this service for native forest regeneration in the compliance market. Further details can be obtained from the EBEX21 website - <http://www.ebex21.co.nz>.

Inventory Methods

When it comes to measurement methodologies, the method will be dictated by the buyer. For example if there was an RAI block that could be used for compliance credits (e.g. an area that is currently covered in head high gorse) and a decision was made to deal through the NZ ETS/PFSI (the two are separate at present but there are plans to merge them) then one would need to use a methodology that meets the specifications of these schemes. As such, until a decision has been made as to where the credits are to be sold, the methodological details will need to remain very general. An issue that will always be relevant here is the trade-off between cost of measurement and precision on the one hand and the value of the credits on the other.

Furthermore, inventory cost estimates can not be made on a ‘per hectare’ basis. They are determined by the number of plots that need to be established (more plots, less variation), how much time it takes to collect the information on each plot, and extras like weather contingencies.

8. RAI & SILNA PROJECT OPTIONS

By Sean Weaver

A key purpose of this project is to generate a set of recommendations for carbon projects for the Rowallan-Alton Incorporation and SILNA landowners in general. From the analysis in previous chapters a number of potential project types appear to be available for development on RAI and SILNA lands. The purpose of this chapter is to explore each project type in further detail, to determine how they might operate in principle. This precedes a proper feasibility study which would need to be conducted in order to determine their feasibility in practice. The latter forms a core component of the intended work programme for Phase 2 of this project.

From a policy point of view, the carbon and climate-related project options that are available **in principle** for RAI and other SILNA owners include:

	Project Type	Market Type
1	Permanent Forest Sinks Initiative	Compliance Carbon Market
2	Kyoto forest exotic plantations	Compliance Carbon Market
3	Kyoto forest indigenous plantations for sustainable forest management	Compliance Carbon Market
4	Avoided deforestation	Voluntary Carbon Market
5	Avoided sustainable forest management	Voluntary Carbon Market
6	Sustainable forest management in lieu of deforestation	Voluntary Carbon Market
7	Enhanced sequestration - non-Kyoto indigenous forest	Voluntary Carbon Market
8	Mixed methodologies combining forests and energy	Compliance and/or Voluntary Carbon Market
9	Indigenous forest conservation bundling of carbon and co-benefits	PES and/or Voluntary Carbon Market
10	Grant projects	Grant finance
11	Integrated RAI management plan options	Combination

Each of these will be explored in further detail below, to further explore (in principle) their potential for development into projects to be tested for their feasibility in practice (Phase 2 work program).

PERMANENT FOREST SINKS INITIATIVE (COMPLIANCE MARKET)

The Permanent Forest Sinks Initiative (PFSI) is a voluntary measure established by the government as a funding mechanism for the establishment of permanent Kyoto forests as a form of 'carbon forestry.' Owners of new permanent forest will be able to claim tradable Kyoto-compliant emission units (RMUs) for the increase in carbon stored in their forests. Target areas for this initiative are isolated and erosion-prone lands that are marginal for farming.

While forest owners involved in this initiative will be eligible to gain Kyoto-compliant emissions units for increases in carbon stocks, they will also be liable for any carbon losses if there is a decrease of carbon stored in their forests.

Eligibility

Eligibility criteria for the PFSI:

- Areas that were 'non-forest' as of 31 December 1989
- More than one hectare in size
- Greater than 30% crown cover
- Greater than 30m wide
- Containing species capable of growing to more than 5m in height on the land in question, or
- Previously forested land awaiting replanting
- Is not situated on land that was previously cleared of significant areas of regenerating scrub
- Direct human induced.... through planting, seeding and/or the human-induced promotion of natural seed sources.
- A PFSI covenant registered against their land titles for a minimum of 50 years.

All indigenous Kyoto-forest is eligible under the PFSI, but exotic forest is only eligible if it was established after 17 October 2002 (the date when the PFSI was announced). Forest owners are responsible for meeting all costs associated with project administration, monitoring, auditing and compliance.

According to the MAF PFSI Consultation Document (MAF 2007a) eligibility can be demonstrated in the following ways:

- Aerial photographs taken at or close to 1990 that clearly show land use at that date;
- Oblique photographs taken of the land at or close to 1990 to support aerial photographs;
- Farm records and plans that show the land was not forested prior to 1990;
- Planting records or nursery receipts (for establishing compliance with the 2002 eligibility date).

MAF proposes that acceptable methods of identifying the area of land in the application include:

- GIS (geographic information system) data – an applicant will submit a geospatial data file (such as, ESRI shapefile or MAPINFO tab file) derived from GPS (global position system) track, ortho-corrected aerial photographs or a registered survey;
- Ortho-corrected aerial photographs;
- GPS coordinates – an applicant could capture the boundary of an area using a handheld GPS receiver, and then submit the text file of bounding coordinates to MAF;
- Survey plan – an applicant could submit a registered survey plan of the intended area and boundary.

Carbon Accounting

The PFSI Carbon Accounting System report (MAF 2007b: 4) employs a conservative approach to carbon measurement whereby “the carbon units allocated to a PFSI forest area in any one commitment period will be at the lower bound of the confidence interval around the estimate of the change in carbon stock (i.e. carbon sequestered in a given period), determined at the 90% probability level.”

There are different options available to landowners in terms of sampling techniques to determining carbon volumes and carbon volume change under the PFSI. The different methodologies will influence the sampling error and hence the carbon units that can be claimed. The options are:

Option 1 - Permanent plots are measured to provide estimates at the start and end of a commitment period.

Option 2 - Temporary plots are measured to provide estimates at the start and end of a commitment period.

Option 3 – Plots are measured once only to provide an estimate at the end of a commitment period, which is compared with a modelled earlier estimate.

Option 4 – Field estimates are made at the start and end of a commitment In going from Option 1 down through to Option 4, the cost of assessment will generally decrease. However the lower confidence limit (which will determine the carbon units a landowner is entitled to) also decreases.

Harvesting

Participants will be permitted to harvest up to 20% of the basal area per hectare as a cost-recovery measure. Timber volumes will need to grow back to pre-harvesting levels

before any further harvests will be possible (although this rule will no longer apply once a forest has been part of the PFSI for more than 99 years).

Transfer of Units

Once participants have demonstrated eligibility and registered their covenant, the clock starts ticking for carbon volume increments (and therefore units). This increment is aligned to their carbon inventory. Applications are not able to be backdated (i.e. an application made in 2010 will not be eligible for carbon stock changes backdated to 2008). Furthermore, units denoting verified carbon stock increments will not be transferred to forest owners prior to 31 December 2012 (the end of KP CP1). This is because the carbon units in question will not be available to the Government until after this date. Participants are also eligible to forward sell their units and hence gain their value prior to delivery of demonstrated carbon stock increments. The value of forward sold units can be used to finance the management of the carbon stock increment process *ex ante*.

RAI/SILNA Opportunities

There may be opportunities for RAI/SILNA owners to operate projects under the Permanent Forest Sinks Initiative but this will depend on the availability of eligible forests. The key will be to first identify eligible areas on RAI and other SILNA lands and then explore the potential to aggregate land parcels together to generate a ‘project’ of a sufficient size to meet the transaction costs of participating positively in this instrument. The identification of eligible forests would form part of a feasibility study proposed for Phase 2 of this project. NB: for forests that are not eligible under the PFSI (because they are not-Kyoto forests) there may be opportunities to pursue an equivalent project on non-Kyoto forests under the voluntary carbon market (see “Enhanced Sequestration For Non-Kyoto Indigenous Forest” below).

KYOTO FOREST EXOTIC PLANTATIONS (COMPLIANCE MARKET)

As mentioned in Chapter 3, plantations for clear-fell forestry are eligible for participation in emissions trading so long as the project involves Kyoto forests, and is of a scale sufficient to overcome the transaction costs of a carbon project. Also mentioned in Chapter 3 was the need to ensure that the financial planning associated with the project is designed to minimize risk associated with carbon price and interest rate fluctuations during the project cycle. A 28 block aggregate project is one possibility for the development of new permanent forest. The next challenge will be to identify 28 blocks of land that are a) Kyoto forests or eligible to become Kyoto forest, and b) with trees of sufficient age to be capable of sequestering significant volumes of carbon during KP CP1. It would be strategically prudent to consider the development of this project type even if the sequestration rates are unlikely to be high during KP CP1, because there is the post-2012

management period to consider – even though the post-2012 international agreement and associated rules for the forest sector are still under negotiation.

KYOTO FOREST INDIGENOUS PLANTATIONS FOR SFM (COMPLIANCE MARKET)

It is worth considering the development of indigenous plantations using carbon finance as part of the business model for Kyoto indigenous forests (i.e. post-1989 forest). National policy on indigenous forest plantations is still under-developed – particularly with respect to the harvesting rates permissible for planted indigenous forest. One possibility is to undertake a project to test government policy by establishing a new indigenous forest (e.g. beech) for eventual sustainable forest management. From a strategic point of view it is also worth considering:

- a. the future price of carbon, which is likely to rise and the political demand increases for deeper cuts in emissions reduction targets through the first and second quarter of the century
- b. the future value of climate-friendly indigenous timber (i.e. post-1989 forest that has sequestered new carbon from the atmosphere), and
- c. the potential market value of co-benefits including additional biological diversity habitat, water catchment protection, and the Maori brand in an international market context.

The current rules governing indigenous production forestry is based on the assumption that such forests were established and grown by nature. If new indigenous forests are established and purpose grown for harvesting, it may be possible to argue for forestry rules that enable a higher volume of timber to be harvested per hectare from such forests, compared with what is permitted under current legislation.

This is an interesting theme for current forestry policy development and advocacy, particularly because the existing rules governing sustainable forest management of indigenous forests were developed prior to climate change policy playing such a central role in the land use and forestry sector. The new interest in climate change mitigation and the role of forests in assisting the government to meet its current and future intergovernmental emissions reduction targets changes the underlying context for national forest policy, and may provide room to argue for amendments to current legislation to enable this kind of forestry management to be supported.

The argument could go something like this:

If we invested in the establishment and management of a new indigenous forest plantation, and designed it as a new permanent forest for climate change mitigation purposes, we should be able to harvest more timber per hectare compared with a naturally grown (non-Kyoto) forest. This is because we need a better incentive to turn

marginal farm land (carbon source) into permanent indigenous forests (carbon sink and reservoir) that have greater co-benefits than exotic plantations (biological diversity and high grade timber).

In the absence of any such changes in legislation, it is worth undertaking a feasibility study (including cost-benefit analysis) of indigenous plantations for SFM and carbon revenues, and also explore the options for pursuing policy changes to enable this kind of activity. The receptiveness of the government to such management scenarios is likely to be higher now than in the period prior to the government taking on fixed binding targets for emissions reduction.

AVOIDED DEFORESTATION (VOLUNTARY MARKET)

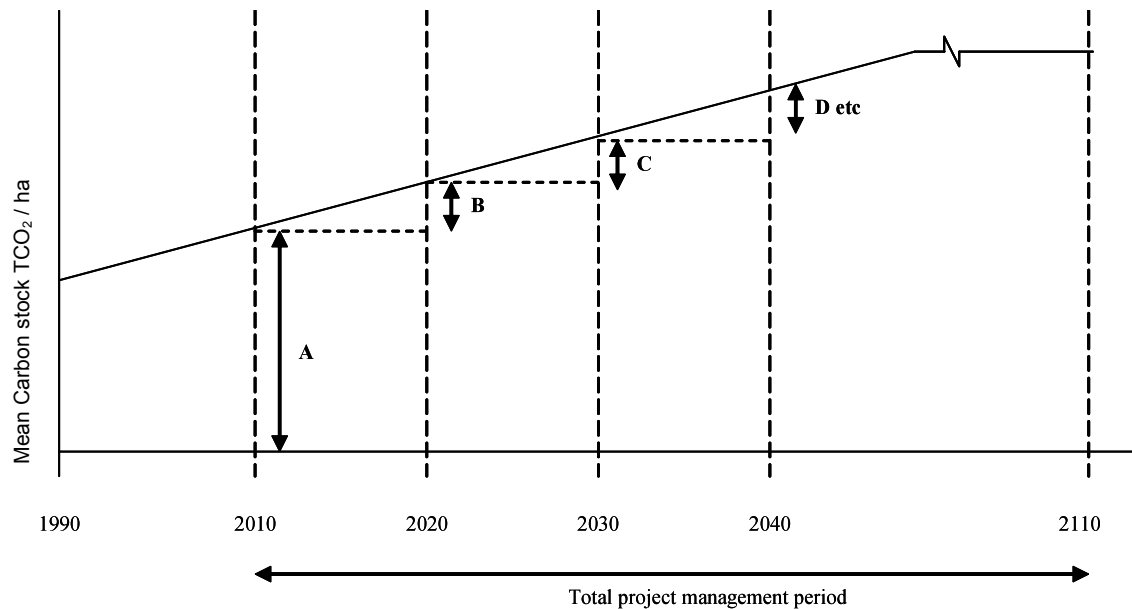
This type of project would be undertaken under compliance carbon markets³⁹ and would target the carbon sequestration taking place in regenerating indigenous forests as well as the carbon storage in the same forests (i.e. carbon that was already in the forests at the start of the project period). Because SILNA forests are able to be clear felled for conversion to agriculture or plantation forestry such a project would amount to an avoided deforestation project if it can be demonstrated that without the carbon finance the deforestation would have occurred (the BAU scenario). The volume of carbon eligible for crediting would therefore include:

- a. the total volume of standing carbon in above ground living biomass for those areas where deforestation was avoided, and
- b. the carbon sequestered and then stored during the total project management period (e.g. 100 years).⁴⁰

³⁹ Given the unique situation where SILNA landowners have the right to deforest, this could first be tested in the compliance market, in the form of compensation from the Government (“tonne for tonne”) in AAUs for those SILNA landowners could be seen to have reasonably expected to deforest and convert land to higher value land use.

⁴⁰ This ex ante crediting would not be appropriate in compliance markets, but could be undertaken in voluntary markets. This is confusing because avoided deforestation in SILNA forests could (technically, and at present under current policy circumstances) be undertaken either in the compliance market or the voluntary market.

Figure 29. Scenario depicting carbon credit potential for regenerating indigenous forest



Key: 2010 = project start date; A = avoided deforestation carbon volume measured by inventory in 2009; B = sequestered carbon (2010-2020) measured by inventory in 2020 or modelled ex ante; C = sequestered carbon (2020-2030) etc.

Total Management Period

The total project management period could be determined as a period over which time the forest area is protected from anthropogenic carbon removals. At the end of the total management period a new negotiation would need to take place to protect the carbon stocks. The length of this period would affect the value of the carbon credits for the avoided deforestation. The longer the total management period, the higher the value of the carbon credits to the buyer because it represents a more permanent contribution to climate change mitigation and would have a higher level of credibility to the buyer's clients.

Generation of Credits

The generation of the carbon credits is a methodological issue relating to carbon stock inventory requirements sufficient to produce a carbon stock calculation to the satisfaction of the carbon market in question. Given that CDM methodologies tend to be the default standard, one would expect to use the IPCC LULUCF Good Practice Guidelines (Penman, et al. 2003) as the basis for making these calculations.

The value of these credits in the carbon market relates to a number of factors on both sides of the transaction:

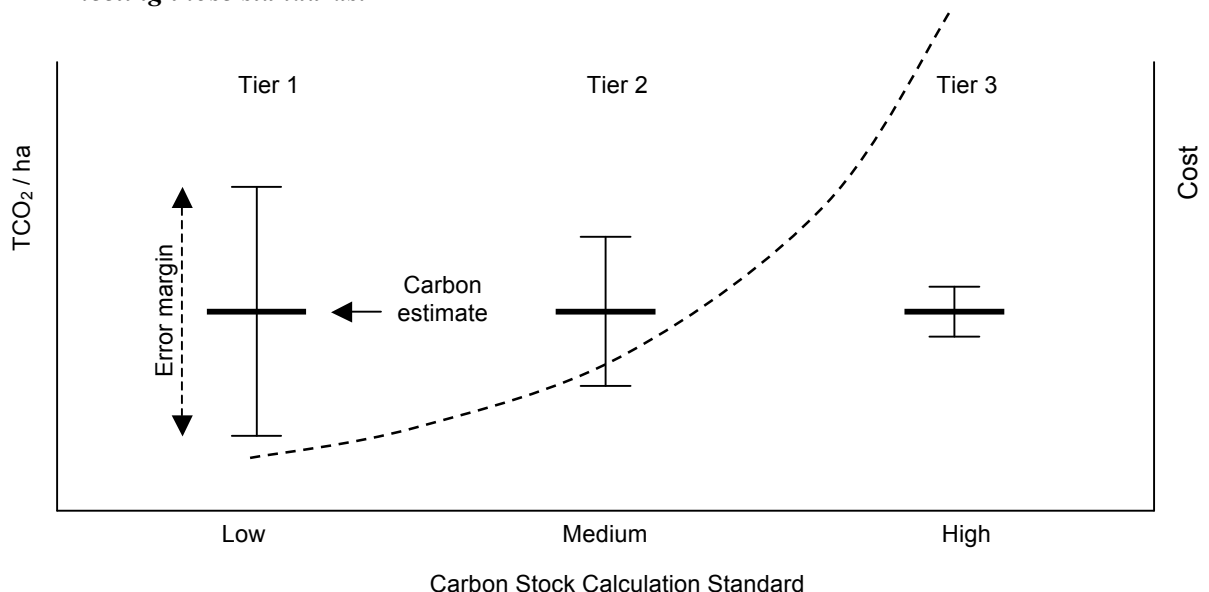
1. Carbon quality
2. Opportunity costs
3. Buyer willingness to pay
4. Going rate of carbon for this vintage and project type
5. Quality of co-benefits

Carbon Quality

The quality of the carbon to be transacted is a measure of the carbon market standard and associated methodology used to generate the credits. A lot of this relates to the accuracy of measurement of emissions to be avoided. High standards translate into high quality and associated high credit value. However, high quality credits are more expensive to generate than carbon credits of a lower quality (i.e. higher transaction costs), and a project developer and resource owner will need to undertake a cost-benefit analysis to make an informed judgment as what standard should be targeted for the credits generated.

For example, a rough estimate of the carbon content of an indigenous forest can be made by means of remote sensing/mapping, comparison of forest type to a known benchmark forest type (in terms of carbon volume), and a brief (cheap) inventory. This approach could meet Tier 1 of the three tier methodological standards set out by the Intergovernmental Panel on Climate Change (IPCC LULUCF Good Practice Guidelines). The accuracy of Tier 1 carbon stock estimates is such that there is a very high error margin. This means that you can generate a carbon stock estimate but you can only be confident at the very low end of the very wide spectrum. A carbon buyer will only be willing to pay for carbon they are confident is there, which is the carbon estimate at the lower end of this spectrum (even though there may be much more carbon in the forest in actuality).

Figure 30. Concept diagram of carbon stock assessment standards in relation to the cost of meeting those standards.



To generate a more accurate carbon stock calculation one needs to spend more money to execute a more rigorous methodology capable of generating an estimate with a narrower margin of error. For the generation of carbon offset credits (i.e. credits that translate into “permission for the buyer to pollute the equivalent amount”) it is important that no more credits are issued than carbon actually protected - otherwise a project will be issuing pollution permits above and beyond the volume that is actually offset. There is always an incentive for the seller to overestimate the volume of carbon sequestered or protected (to generate more credits) and for the buyer to underestimate the volume of offsets they need to buy (making their climate change responsibility cheaper). In the middle of all this is a carbon market that seeks to instil confidence in the traded commodity.

A project developer is wise to undertake a cost-benefit analysis to determine the market standard to be used for a carbon project. It may be more cost effective to go for a low or medium standard given the transaction costs of generating the highest quality credits. But the lower the standard used, the lower the carbon volumes that can be credited from a given carbon pool.

Opportunity Costs

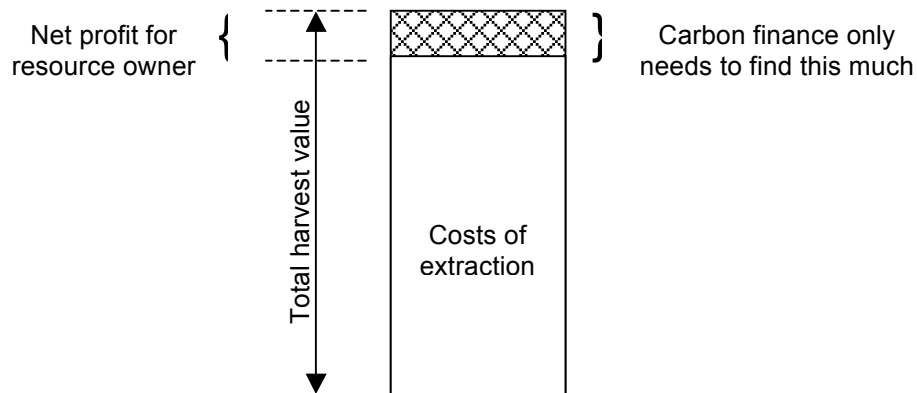
From a seller point of view, a carbon credit transaction is only worth undertaking if it provides more benefits than the BAU scenario. As such, it is important to consider the net value of opportunity costs for the BAU scenario. This relates to the net value of deforestation and the productive opportunities that this would entail, in comparison with an “avoided deforestation” or “avoided sustainable forest management”⁴¹ project.

This refers to the net value of the BAU scenario to the resource owner – not to downstream elements in the supply chain (i.e. this does not include the value of timber in a sawmill, but the value of the timber at the farm gate in the form of royalties or resource payments normally made by a third party operator to the resource owner).

Also, if a logging concession exists for the area of forest in question, then additionality is easy to demonstrate (i.e. the carbon is under threat in the BAU case), the project becomes a concession buy-back, and the value of the purchase (i.e. the value of the credits) needs to compete with the anticipated profit margin for the concession owner. The value of carbon finance does not need to compete with the total value of the timber extracted from the forest because the costs of extraction also need to be taken into account.

⁴¹ See next section for a description of ‘avoided sustainable forest management’.

Figure 31. Concept diagram of carbon finance requirement for indigenous forest protection in comparison with an extractive BAU scenario for timber at the farm gate.



Co-Benefits

Carbon buyers in the compliance market are not buying co-benefits, but carbon offsets as required under regulation. The voluntary carbon market is a different market space and buyers have a range of motivations from carbon offsets (in the same manner as compliance buyers) to corporate social responsibility (as indicated earlier). For this reason the voluntary carbon market can be seen as a spectrum as depicted in Figure 6 in Chapter 2. Some buyers are motivated to purchase more than just carbon and seek to own a portfolio that includes other ecosystem services such as biological diversity, water quantity and quality for example.

A carbon credit product can only be assigned a co-benefit value if the co-benefits have been measured and incorporated into the project design and methodology. As with carbon, it is important to demonstrate that the baseline scenario (BAU) is different from the actual project scenario with respect to the co-benefit in question. In the case of biological diversity it is necessary to undertake an assessment of the value of this “commodity” within the project boundary, and show how the management regime of the project is able to protect these services better than BAU.

Some voluntary carbon market standards have sought to address the inclusion of co-benefits in a systematic fashion capable of engendering buyer confidence in such co-benefits on offer. One of these is the CCB Standard (a standard developed by the Climate Community and Biodiversity Alliance). Under the CCB Standard a project must meet certain project design criteria in order to gain certification. One of these is a biological diversity monitoring program; another is resource owner participation in project design where the owner is a community of indigenous forest owners.

The question for a project developer and resource owner is whether the additional carbon credit value in gaining such a standard warrant the costs of undertaking these additional project development activities. Again, this comes down to a cost-benefit analysis and in some cases it may transpire that it is not cost effective to attempt to add co-benefits to a

project in any formal sense apart from identifying the project in the indigenous forest protection category.

It is important to recognize that all activities undertaken by experts in project development (carbon stock assessment, biodiversity assessments and monitoring) need to be paid for and add to the burden of project development costs.

If a project is well designed to protect the carbon, several co-benefits will be protected at no additional cost even if they may not be recorded in the project data set. This is particularly true if the management requirements to protect the carbon are de facto management requirements for other “commodities” (e.g. biological diversity and water quality may both be protected as a consequence of protecting a forest for the purpose of carbon storage and sequestration).

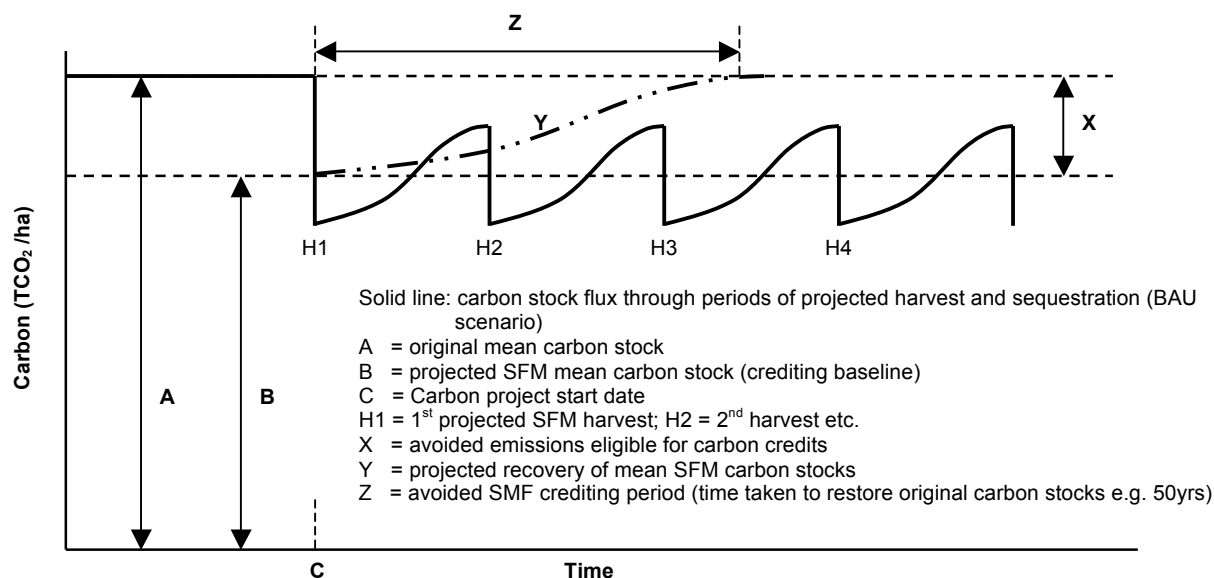
For this reason it is important (where possible) to produce cost curves for each dimension of a carbon project (market standard, co-benefits) in order to arrive at an optimal design from a financial point of view.

AVOIDED SUSTAINABLE FOREST MANAGEMENT (VOLUNTARY MARKET)

Avoided deforestation protects a standing carbon stock from being removed. Avoiding carbon removals from selective harvesting under a sustainable forest management (SFM) regime can also have the effect of avoiding emissions by the volume of SFM removals that would have taken place under the baseline (BAU) scenario.

Most of the above ground carbon in a forest is stored in the large tree size classes. Sustainable forest management usually involves the removal of a selection of the largest trees over a given time period, thereby removing significant volumes of carbon from the site. If the forest is left to recover, sequestration occurs which increases carbon volumes. If left long enough, carbon volumes will return to the pre-harvest (old-growth) level. Sustainable forest management regimes, however, usually do not wait till carbon stocks have been restored to their original level (as this would take too long) and instead re-harvest after carbon stocks have recovered to an optimal (threshold) level from an economic point of view. This has the effect of lowering the total size (and usually age) structure of the forest by a certain proportion. Subsequent harvests can then occur whenever the forest recovers to the optimal threshold level, thereby sustaining the total biomass of the managed forest (albeit at a slightly lower volume than the old growth natural condition). This is depicted in Figure 32 which shows the SFM scenario. The key thing from an avoided SFM carbon project point of view is that the carbon content of the sustainably managed forest will be lower than the old growth natural forest system. This difference in carbon volume between the two management regimes (total conservation vs SFM) is in theory able to be transformed into carbon credits, so long as this volume can be verified, and the carbon project is additional (i.e. avoiding a SFM regime would not have happened without the carbon finance).

Figure 32. Concept diagram of avoided sustainable forest management project



As seen in Figure 32 above the volume of carbon eligible for carbon credits for an avoided SFM project is the difference between the mean carbon stock without harvesting (A) and the lower mean carbon stock as a consequence of harvesting (B).

For purposes of addressing additionality (as required in the voluntary market) the carbon project needs to demonstrate the difference between the carbon stocks (and therefore emissions) when comparing the BAU (SFM project) with an avoided SFM scenario. One way of doing this is to survey the project forest to identify a harvesting regime for the forest as if a SFM project were to take place. This would follow the methodology criteria for a SFM plan or permit under the Forest Amendment Act (1993) and associated regulations. As such, the project development costs of an avoided SFM project would include the costs of developing a SFM plan/permit proposal as a starting point in order to establish the project crediting baseline.

An avoided SFM carbon project would be suitable in old growth SILNA forests where it cannot be demonstrated that the BAU scenario encompasses deforestation. This might be particularly relevant for forests on lands unsuitable for agriculture and where there are high biological diversity co-benefits at stake. Such a project would develop a vintage of carbon that had high biodiversity co-benefit value which could command a higher carbon price than a project that did not involve such high biodiversity values. This additional value from the biodiversity co-benefits would need to be measured by means of a biodiversity inventory and monitoring regime in the project methodology.

SUSTAINABLE FOREST MANAGEMENT IN LIEU OF DEFORESTATION (VOLUNTARY MARKET)

Because SILNA forests are still able to deforest indigenous forest, there is an option to avoid deforestation by means of implementing a sustainable forest management regime. The economics of this change in land use have been a key issue for SILNA forest owners ever since the Forest Amendment Act (1993) was brought in, here the net present value of SFM is lower than clear-felling.

The voluntary carbon market may provide circumstances that enable the value of SFM in lieu of deforestation to be more profitable/feasible. Here, potential carbon revenues arise from the difference in per hectare carbon volumes between clear felling and SFM, with more carbon stored in the forest under SFM. The loss of timber revenues arising from leaving that timber in the forest can potentially be met (partially or fully depending on the carbon price) through carbon credits. This would also depend on the transaction costs of a carbon project on a per hectare basis, but this would be worth examining in more detail in a detailed feasibility study. Such a study would also look at the resource availability for this option (including the potential to aggregate over a range of SILNA owners, and the forestry rules associated with this activity type given the developments in the ETS, and clarifying the legal situation regarding the clear-felling option.

ENHANCED SEQUESTRATION FOR NON-KYOTO INDIGENOUS FOREST (VOLUNTARY MARKET)

This project type is similar to the PFSI project type but differs in that it applies to non-Kyoto indigenous forests (i.e. pre-1990) and is a voluntary carbon market activity. The key from a project eligibility point of view is to demonstrate that some form of management intervention is better at sequestering and storing carbon than without the management intervention. The management intervention could include the protection of the area which would otherwise have been converted to a lower carbon volume activity (so long as the BAU option to be avoided is permitted under current law and regulation), or the enhancement of forest regeneration by means of management of weeds and pests in addition to possible enrichment planting and maintenance.

This project type is also very similar to indigenous plantations destined for SFM, but would take place in a non-Kyoto forest. The key here would to demonstrate that a) the management intervention improved the rate of carbon sequestration against a BAU projected baseline (i.e. a modelled projection of regeneration rates without the management associated with a carbon project), and b) the mean carbon stocks after SFM harvesting are higher than the mean carbon stocks without this management. This option may work if the BAU situation comprises a degraded forest that continues to degrade or fails to regenerate because of a variety of BAU factors including periodic harvesting of timber for fuel wood, pests and weeds.

MIXED METHODOLOGIES COMBINING FORESTS AND ENERGY (VOLUNTARY MARKET)

Carbon finance enhances the opportunity to design and undertake integrated approaches to climate-friendly resource management and development. Focusing on carbon market options in the widest sense enables the consideration of integrating forestry, agriculture, and energy project types in a single integrated management plan for a single land holding or for an aggregated consortium of resource owners with a common purpose (e.g. SILNA owners, Maori owners).

The resource types potentially available for an integrated climate-friendly management plan on RAI land includes productive agriculture land, marginal agricultural land, new plantation forestry, indigenous forest management (including forest conservation). For example, the RAI estate supports many areas of productive dairy grazing land, some areas of boggy grazing land less suitable for dairy grazing, regenerating scrub, regenerating forest, and tall forest. Some of these lands may be more suitable for a bio-energy crop than dairying. All of the forests may be suitable for the kind of forest project types mentioned above.

Accordingly, it is worth considering the following scenario for an integrated carbon market/climate friendly management plan for this estate as a model for an aggregated project across the SILNA lands:

1. Forest based carbon projects (various project types depending on the outcome of a feasibility study for each in Phase 2 of this project)
2. De-stocking of marginal (boggy) dairy grazing lands (de-stocking means reducing carbon emissions from dairy grazing and eligible in principle for carbon finance)
3. Biochar soil conditioner additions to productive farmland as a form of carbon sequestration.
4. Planting de-stocked dairy lands in a bio-energy crop such as coppicing willow (growing a wood crop is a form of carbon sequestration and eligible in principle for carbon finance)
5. Generating electricity from the harvested bio-energy crop through gasification (electricity generation that avoids fossil fuel combustion is eligible in principle for carbon finance – see Tables 3 and 4 on Pages 47-49 above, and Appendix 3 for technical aspects of energy project options).
6. Utilising the heat bi-product of biomass gasification to heat commercial greenhouses (using a bio-fuel instead of a fossil fuel to heat a commercial greenhouse is eligible in principle for carbon finance)

Aggregating the above integrated project types through a consortium of resource owners would help build economies of scale and lower the transaction costs per carbon unit generated.

INDIGENOUS FOREST CONSERVATION BUNDLING OF CARBON AND CO-BENEFITS (PES MARKET)

PES market activities can be designed to suit the circumstances of the seller in terms of the resources to be incorporated into a marketable product, and the methodology for protecting these resources or services. Once a 'product' has been developed in the form of a management plan for the protection of such services and an associated budget, the 'product' can be marketed in order to attract the interest of potential buyers. The key is whether the 'product' serves the interest of the buyer in terms of their desire for a demonstration of corporate social responsibility, and whether the price is right. The best way to test this is to give it a go.

Marketing a PES 'product' can take the form of approaching potential buyers directly, such as large businesses that either have a geographical connection to the land in question or the land owners, or large businesses internationally that may be attracted to the brand of the product.

Another marketing approach is to use the internet by developing a marketing web site for the product/project, and advertising it on generic trading web sites such as TradeMe.

Thirdly, a PES product can potentially be marketed through a voluntary carbon market network such as the TZ1. This is because PES transactions are not necessarily devoid of carbon units, as carbon can form part of the ecosystem services portfolio spread. The point is that the 'product' comprises a suit of to-be-protected co-benefits in a portfolio. The standard of the carbon units is a matter for negotiation between the project developer and the carbon market standard in question. For example, a voluntary carbon market standard (e.g. CCB) may certify a PES product for a volume of carbon units at the low end of the error margin for the carbon volume calculation. This calculation could be made using low resolution carbon measurement techniques (which are the cheapest), enabling x number voluntary carbon units to be 'produced'. This may produce a relatively small number of units per hectare (i.e. much lower than each hectare is likely to contain, but at the bottom end of a wide error margin for a carbon volume calculation produced at low cost). The price per unit may be higher than the standard price for similarly branded units because of the substantial co-benefit spread associated with them (i.e. very conservative estimate of carbon volumes, bundled together with lots of biological diversity, water quality, and cultural co-benefits). Alternatively, the carbon value may be relatively low for a project of this type, but carbon value may be only one part of the overall funding strategy because other services are being traded (water and biological diversity).

GRANT PROJECTS (NON-MARKET)

Grant funding for forest conservation and/or climate-friendly development is worth considering but would be dependent on first establishing a grant funding database suitable to this project type, and then simply developing a funding proposal based on a fully costed project. The project types have been covered in Chapter 6 above and there is little scope to expand on this here apart from indicating that this would form one of the components of the Phase 2 work programme (see Chapter 9 below).

INTEGRATED RAI MANAGEMENT PLAN OPTIONS (VARIOUS MARKETS)

The various options presented in this chapter so far have focused on carbon project types in the broadest sense. Broader still is the option for climate-friendly resource management of the RAI estate (and similar land types within the broader SILNA lands). Such climate-friendly resource management may be eligible for certain forms of carbon finance – such as those mentioned in the section on mixed methodologies in the voluntary carbon market. But there are also opportunities to explore integrated management planning that include, but go beyond, carbon.

The RAI estate presents an example of a land holding that offers several opportunities for climate-friendly development that takes best advantage of carbon finance but also goes a step further. One scenario for such climate-friendly resource management to be built into the RAI business model is as follows:

	Project Type	Description
1	Carbon	Implementation of the most suitable project types as determined by project-specific feasibility studies in Phase 2 of this project.
2	Dairying	Improvements in dairy grazing management that reduce environmental (including climate) impact using nitrogen inhibitors, best practice in nitrogen management, best practice in riparian (stream) management and water quality, best practice management for pest control, avoiding unnecessary burning of scrub, de-stocking unsuitable pasture (with conversion to bio-energy cropping)
3	Tourism	Invest in improvements to the tourism infrastructures on site to take advantage of its strategic position at the end of the road for the Hump Track. This could include a seasonal café for track walkers and day trippers. Improved day tripping infrastructures including interpretation of natural features, cultural resources, and climate friendly development projects on the land.
4	Education	Establish a resource and cultural heritage educational programme/opportunity for landowners, their close associates, and their future generations to gain an intimacy with the land and ways to manage it in harmony with the climate and other systems. Establish a link with a university programme exploring climate-friendly resource management. Such links could include Maori resource management training programmes, as well as general resource management training programmes from appropriate institutions (universities, schools, polytechnics) where students come to this estate to observe and study the projects. This could include offering postgraduate research project opportunities as a means of gaining project monitoring research outcomes at low cost whilst providing capacity building

		<p>research opportunities for students.</p> <p>Educational projects that required visits to the land could use upgraded tourism infrastructures (lodge, interpretation, and catering facilities).</p> <p>There are also opportunities to host regular hui on the site as a focus for on-going community education and dialogue about this kind of project and approach to resource management.</p>
5	Volunteers	<p>It may be possible to attract volunteers to the RAI estate (and/or a larger SILNA consortium) through a form of “carbon woofing” where volunteers (including young tourists from the current woofing market) provide a free labour pool for projects that require unskilled labour. Under the woofing approach volunteers work for 4 hours a day in exchange for food and accommodation. There may also be an opportunity to attract skilled volunteers if the project were well marketed (e.g. through a web site).</p>

These kinds of integrated management could form the basis for an upgrade of the RAI business plan which could be monitored as it is rolled out as a means of sharing both the concept and the process of implementation. Such monitoring would be a requirement for various forms of external financial assistance (market and non-market funding) and also would provide a valuable resource for assisting other landowners in adopting similar approaches to the management of their resource set.

PROJECT GOVERNANCE

High quality project governance is essential to the success of any attempt to undertake the kinds of projects and project combinations that are explored here. Given the importance of good governance at the project level it is important to allocate sufficient funds to this purpose and include this in fund raising efforts.

From a practical point of view it may also be worth considering the development of a project-specific governance structure that increased eligibility for the broadest set of funding support. One way of doing this is to engage an existing, or establish a new, charitable trust for the purpose of both project governance and fund raising.

Whether pursuing a business or a charitable trust model it is also essential that the implementation of any project combination operates under a clear and transparent set of governance and business rules so that project ownership and decision structures and procedures are clearly identified at the beginning of the implementation process. This includes project owner control over the relationship to external stakeholders including technical advisors, funders, and other project partners.

CAPACITY BUILDING

These kinds of initiatives are new to all stakeholders – including the technical advisors, and especially resource owners. Learning-by-doing is necessary in this sector because the game is new for all players. But there is an opportunity to ensure that an initiative like this also builds capacity in the participant community to enable them to sustain the initiative beyond the initial phases. This is where capacity building becomes important and is best included as an integral dimension of any implementation phase.

The role of technical advisors is potentially important here – initially to provide technical capability not possessed by the resource owners, but also to transfer this capability to the resource owners as a means of the latter gaining more and more independence from external support in the future.

An implementation model that involves co-management between external technical advisors and internal coordinators is recommended, whereby the role of external stakeholders is gradually phased down as internal capability increases. This transitional phasing of external and internal capability needs to be built into implementation budgets so that they are not left to chance.

Another important dimension of capacity building during an implementation phase is formal education of internal stakeholders. It is recommended that high level training is included as an aspect of any implementation phase for this project. One option is presented in the Phase 2 Initial Proposal in the following chapter.

Lastly, and perhaps most importantly, capacity building and project management for an implementation phase will benefit greatly from a high quality communication structures and processes. Given that such structures and processes need to fit the needs and priorities of resource owners, it is appropriate that a mechanism be provided for these needs and priorities to be designed by the resource owners, and built into a framework or ‘roadmap’ for Phase 2 and beyond.

9. PHASE 2 INITIAL PROPOSAL

By Sean Weaver

Phase 1 of this project was designed to generate a list of potential carbon project types for RAI/SILNA lands given the existing policy and market environment.

The initial proposal for Phase 2 involves undertaking detailed feasibility studies of preferred options arising from Phase 1, and a consultation process with landowners to build capacity for carbon market participation and explore options for future project activities.

FEASIBILITY STUDIES

Feasibility studies will involve a detailed project appraisal for each project type identified in Phase 1 as suitable (in principle) for RAI/SILNA forest owners. The purpose in Phase 2 is to move from what options are potentially available **in principle** to options that are most suitable **in practice**.

In terms of addressing the realities of implementing potential projects in practice, it will be necessary to consider broadening the scale of potential projects to include a consortium approach within the landowner type under consideration: SILNA lands in Western Southland in the first instance, SILNA lands in general, and Maori lands. The reason for this stems from the necessity to consider economies of scale in order to meet transaction costs for participation in carbon markets and/or to gain access to a more viable scale of resource to enable carbon markets to have any significant impact on business planning. For example, an aggregated forest project will require several land owners to form a consortium, where the lands within the project boundary may be spread geographically but integrated in terms of project design.

A feasibility study will be undertaken for each of the following project types:

1. Compliance Carbon Market Options (Article 3.3 activities):

- Permanent Forest Sinks Initiative
- New (post 1989) exotic plantation permanent forest for sequential clear cutting
- New (post 1989) indigenous plantations (e.g. beech) for either
 - Sequential clear cutting
 - In situ sustainable forest management or
 - Smaller scale strip/block rotations in permanent planted forest

2. Voluntary Carbon Market Options:

- Avoided deforestation
- Avoided sustainable forest management
- Enhanced sequestration in indigenous forests
- SFM in lieu of deforestation
- Indigenous plantations as in A. above but using voluntary carbon market methodologies (e.g. in non-Kyoto forests)
- Mixed methodologies combining forests, pasture, and energy

3. PES Market Options

- Indigenous forest protection maximizing co-benefits, where project type and/or scale is unsuitable for carbon market activities. Possible examples include:
 - projects where ecosystem values above and beyond carbon are too significant to frame merely as co-benefits of a carbon project
 - projects where the scale or benefit-cost for carbon market participation deems it inappropriate for carbon market and more suitable for direct barter type project

4. Grant Options

- Forest Conservation Grants
- Carbon Market Capacity Building Grants. Non-market grant funding for capacity building to enable future participation in emissions trading.
- Carbon Project Development Grants. Non-market funding for project development as part of a carbon project that will produce (in the near future) a commodity for emissions trading.

The feasibility studies will examine each project type and involve the following steps:

- a. Resource availability assessment. If project types pass this assessment they will be evaluated according to the subsequent criteria (b to f below)
- b. Design initial project methodology (including project scale)
- c. Evaluation of market trends for project type and scale (where data exist)
- d. Cost-benefit analysis
- e. Potential for integration/synergy with other project types
- f. Recommendations

CONSULTATION & TRAINING

This whole project is designed as a learning-by-doing exercise. Such learning can be enhanced by means of a well designed praxis (action and reflection). Hence, consultation

and training will involve undertaking hui/training workshops with target landowners including RAI owners (i.e. the lead entity for this initiative), SILNA, and potentially a broader category of interested Maori resource owners.

The purpose of these hui are to build capacity among the target community for participating in carbon/PES market activities, as well as provide an opportunity for landowners and external partners to communicate exchange insights for project types, needs and aspirations regarding development, and modalities for potential project implementation. Here resource owners can define what they want to gain from any activities undertaken within the context of this project.

Another key purpose of these hui are to clarify the project governance structure for going forward, given that this project in general, and future project activities in particular will be owned, controlled, and governed by the resource owners. It is important to clarify the project ownership structure, together with decision structures, operational procedures, and terms of engagement between participating Maori entities and external partners such as technical advisors (e.g. the technical authors of this report). This can be determined by means of negotiating a set of governance rules, defined in a MOU between participating parties, resulting from stakeholder dialogue and resource owner agreement.

Training will include climate change science and policy, carbon and PES markets, and project-based technical training. Climate change science and policy training will provide a context for dialogue on strategic responses to the challenges of climate change for Maori forest owners – including climate change mitigation, adaptation, and linkages with other priorities for Maori development (e.g. strategies associated with an oil and carbon constrained economy). This will help to set the context for a Maori forest-owner response to global challenges that will be affecting them in coming years and decades.

Training in carbon and PES markets will focus on a) building a general understanding of the global and national situation with respect to carbon and climate-related finance (e.g. as elucidated in this report), and b) specific opportunities for strategic business planning when taking these markets into account.

Technical training will focus on project-based targeted training/capacity building to enable self management and implementation of future carbon projects. An example includes carbon inventory and carbon accounting training for forest-based resources.

* * *

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