

Carbon Sinks – A rural Opportunity?

Paper Prepared for EDS Conference – A Conflict in Paradise: the transformation of Rural New Zealand

12th June 2008

Clayton Wallwork
Carbon Farming Group
PO Box 36-568
Christchurch, 8146
Ph 0800 123 733

Summary

While there are opportunities in the rural landscape for carbon forest sinks, there are two main aspects to consider. The first is that the Emissions Trading Scheme is not yet legislated, therefore the rules are uncertain. The second, if a forest is established for the purposes of generating carbon credits, it should be managed in a way that minimises the risk of future harvesting liabilities, such as multiple age class or species composition.

Background

There are a number of ways of permanently absorbing and storing carbon dioxide, but the only option currently available under the Kyoto protocol and the proposed New Zealand Emissions Trading Scheme is by establishing new forests on previously unforested land.

A forest sink is where carbon is sequestered (or absorbed) and stored in a newly established forest. There must be a net measurable gain in carbon stocks in the forest over time. These gains, once verified, can be used to offset emissions in other emitting sectors such as liquid fuels.

A common greenhouse gas unit is one tonne of carbon dioxide (tCO₂). Other greenhouse gases are measured in equivalences to Carbon Dioxide, or tCO₂. In a forestry context, if a tree at maturity is assumed to hold 1m³ of log timber, and 1m³ of wood holds around 0.5 tonnes of Carbon (this conversion includes branches, roots, needles etc), then the CO₂ captured by that tree can be calculated by multiplying the Carbon figure by 44/12 (= 3.667, the ratio of CO₂ molecules to Carbon atoms when combined with Oxygen).

$$1 \times 0.5 \times 3.667 = 1.8\text{tCO}_2$$



One tree = 1.8 tonnes of CO₂

Policy

Forestry programs to generate ETS-qualifying credits are not 'real' until the ETS legislation is passed. Legislation may or may not pass before this year's election. The information that follows is based on the proposed policy under the forestry provisions of the Emissions Trading Scheme, as at 28th of May 2008.

Forestry rules under the Proposed Emissions Trading Scheme

Below is a summary of the key points under the forestry provisions of the proposed Emissions Trading Scheme (ETS).

- All credits and liabilities may be devolved to the landowners of post 1990 (Kyoto) forests.
- Under the ETS there is no restriction on species or harvesting regime.
- Unlike other sectors participation in the ETS for forestry is voluntary.
- Harvesting incurs an emission liability which has to be accounted for during the emission period in which they occur.
- All claims for forestry under the ETS can be made from 1 January 2008. The first accounting period will be 31 December 2009. This two year gap will allow for the development of legislation and carbon accounting methodology.
- Carbon stocks can be assessed either annually or every five years (or associated Kyoto commitment period).
- All costs of direct administration by the crown will be recovered from landowners of forests. The table below details the proposed costs outlined in draft regulations.

Proposed administrative fees for forests participating in the ETS (GST Incl.)

	1-99ha	100-499ha	500-4999ha	5000+
Application fee	\$494	\$2,411	\$6,412	\$12,424
Emission Return Fee	\$244	\$1,358	\$5,824	\$7,836

Afforestation Grant Scheme

An Afforestation Grant Scheme is available to landowners who wish to establish a forest on Kyoto compliant land but do not wish to join the ETS. This is a tender process which may assist the afforestation of plantation forests, planted indigenous forest or natural reversion. Under this program the government will retain all NZU's generated by the new forest, but will also cover all liabilities.

Permanent Forest Sink Initiative

The existing Permanent Forest Sink Initiative (PFSI) will remain as a functioning program under the ETS umbrella. The PFSI is the only currently legislated program available to landowners. Many elements of the PFSI will transfer to become general forestry provisions under the ETS. The point of difference between the proposed ETS and the PFSI is the PFSI has "higher" permanence standards required (such as continuous cover harvesting). The PFSI also involves a guaranteed allocation of AAU's and the option to opt out after 50 years, provided that all claimed credits are repaid to the crown. Changes to the PFSI mean all qualifying forests (exotic and indigenous) are eligible to enter the program from 1990.

East Coast Forestry Project

The East Coast Forestry Project (ECFP) will continue as an independent erosion control program. If a landowner receives an ECFP grant and chooses to enter the PFSI the ECFP grant remains the same. If however a landowner who wishes to participate in the ETS the ECFP grant is likely to be reduced. The reason given for this by MAF is that the ETS doesn't have the harvesting restrictions of the PFSI and landowners may realise income from the harvested timber.

A landowner will not be able to claim the ECFP and the AGS on the same forest.

Deforestation

A nominal allocation (around 39 NZUs) will be allocated per hectare of pre 1989 (non-Kyoto) planted forests to provide for deforestation liabilities. However, to put that in perspective one hectare of mature plantation forest is likely to contain at least 800 NZUs. Anyone undertaking deforestation of mature forest will need to source a large number of credits to offset the liability.

Deforestation occurs where the forest is harvested and not replanted, and the land use changes from forestry to another use e.g. dairying.

A lower allocation per hectare for indigenous forest deforestation is suggested. 8.1 million NZUs will be potentially available for the approximate 2 million hectares of privately owned indigenous forest. This equates to around 4 NZUs per hectare.

Large scale deforestation has been discouraged under the ETS. There are a few exceptions however, those being:

1. Where the total forest area belonging to a legal entity is less than 50 hectares, they can deforest without penalty.
2. Any areas cleared under 2 hectares will be exempt
3. Weed control of forested areas if it recognised as a problem, e.g. the tree species is generally encountered as wildings.
4. Third party deforestation, eg line companies. Where deforestation is imposed by third party the deforestation liability is transferred to that party.

Forestry in Practice under the ETS

The following assumes the ETS progresses forward through the legislative process as current policy is written.

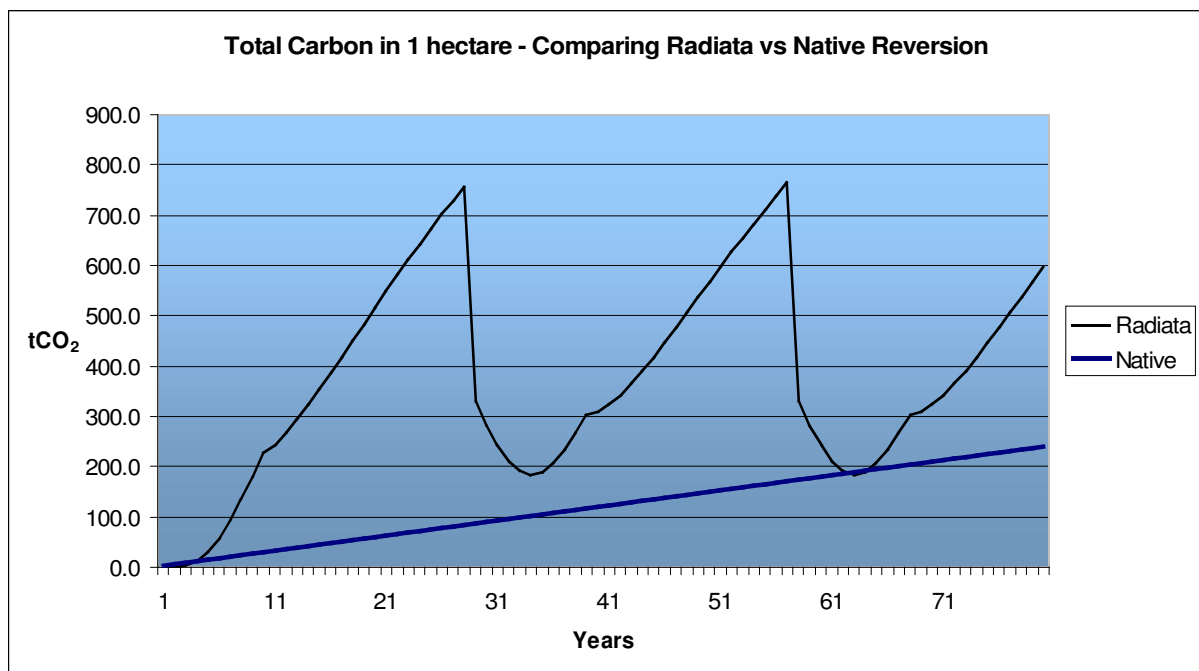
Theoretical carbon models

To gain an understanding of how forests absorb carbon and how this relates to the ETS, theoretical carbon models are presented in the graphs below.

Carbon Sequestration

Carbon sequestration is directly proportional to the volume of forest growth. In the graph below carbon sequestration rates are plotted over time to indicate the variability between two types of forest. The first is a fast growing radiata forest managed on a clearfell basis and the other is a more gradual native regenerating forest, with no intention to harvest. The radiata figures have been derived from Paul, Kimberly & Beets (2008)¹ who prepared carbon sequestration tables for the Ministry of Agriculture and Forestry. The native reversion figures are based on the draft ETS forestry regulations for carbon monitoring which use a flat rate of 3 tonnes of carbon dioxide per hectare per year.

Graph showing carbon sequestration rates over time for radiata pine and natural reversion



The table above shows carbon stocks of a radiata forest are much more dynamic than that of a naturally reverting forest, reaching a peak of around 740 tonnes of

¹ Paul, T. Kimberly, M. Beets, P. (2008) *Indicative Forest Sequestration Tables, Prepared for Ministry of Agriculture and Forestry, SCION, Rotorua.*

carbon dioxide after 28 years, sharply dropping away after harvest. On the other hand native reversion is a slow but steady increase in carbon stocks. It will take around 250 years to reach 740 tonnes of carbon dioxide.

Claiming carbon credits

Because of the harvesting rule under the ETS requiring the forest owner to pay back all carbon removed at the point of harvest, the ability to claim carbon with a plantation forest can be limited, particularly for small forest owners.

Because of economies of scale, most commercial forests are planted in even aged groups of over 20 hectares or more. For small forest owners this means their whole forest will be established in one year.

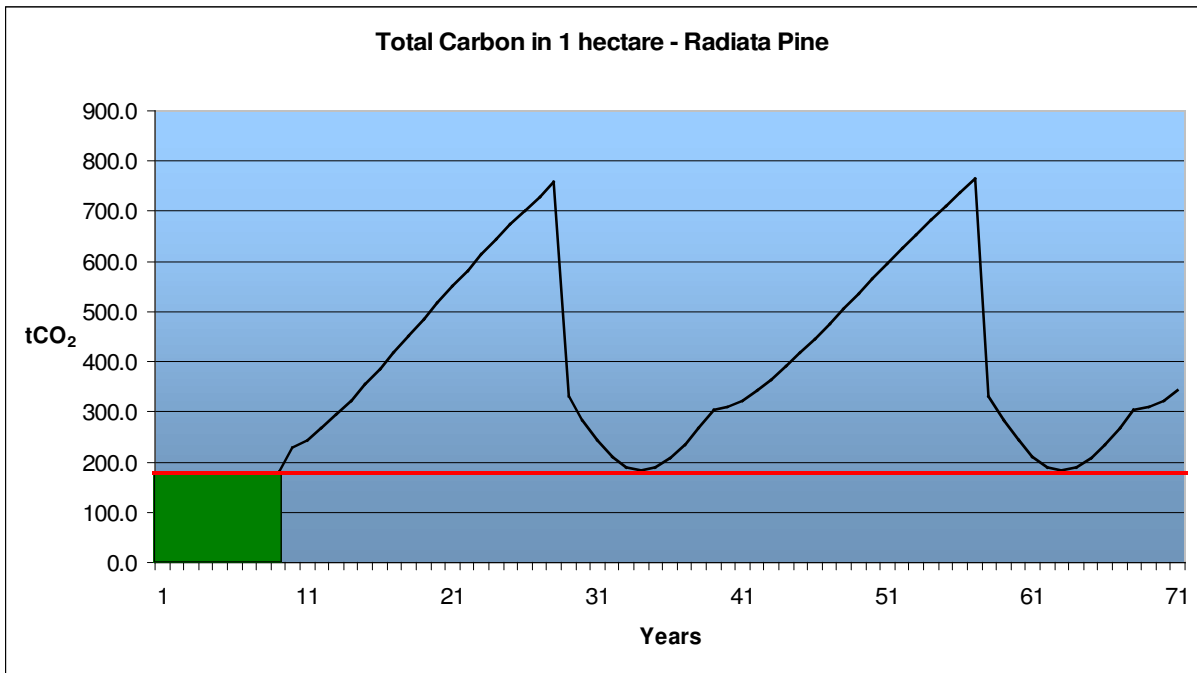
With an even aged forest the owner (under current ETS policy) must pay back all measurable emissions at the point of harvest.

At the point of harvest the carbon stocks do not go back to zero. Harvest emissions are only measured in the timber that is removed from the forest. This leaves branches, stumps, roots, litter etc on site. This is estimated to be around 25% of total carbon stocks just prior to harvest.

If a forest owner did not want to face the penalty of paying back NZU's (credits) at the point of harvest they would only claim the residual amount between harvest cycles.

This is represented in the graph below. The red line indicates the level at which NZU's can be claimed without incurring any penalty after harvest. In this example this is around 187 NZU's. The green box represents timeframe in which the 187 credits can be claimed, approximately 9 years.

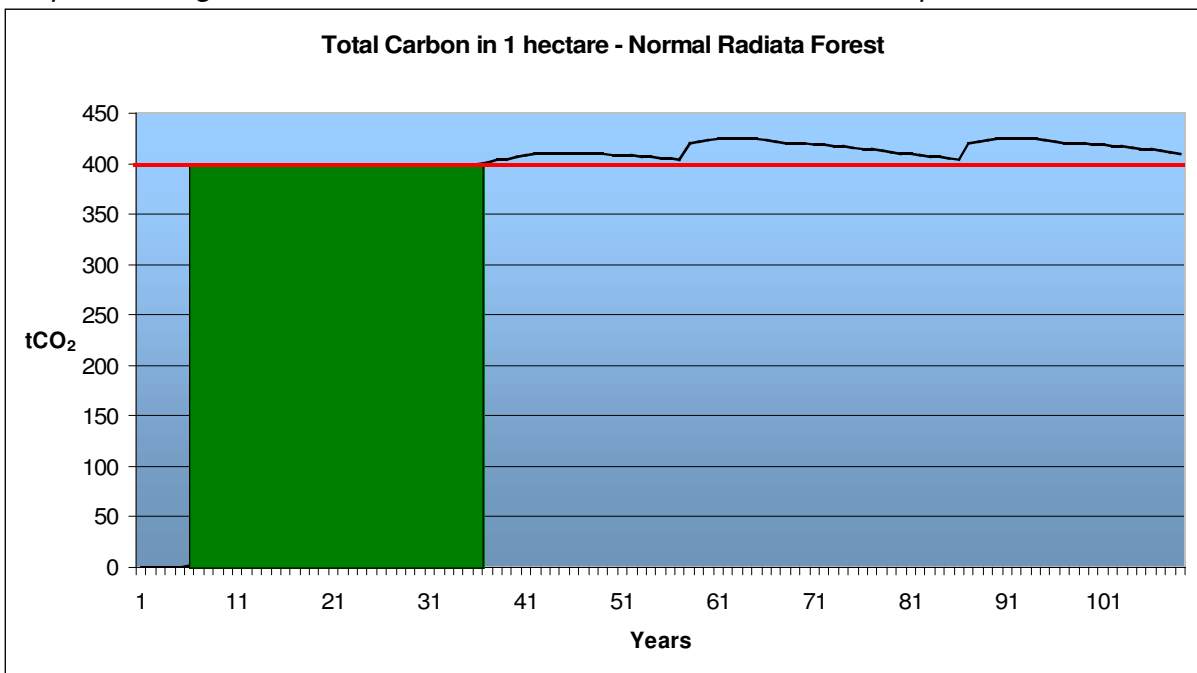
Graph showing "safe" carbon to be claimed (green) without incurring a penalty at harvest.



The implications of ETS and Kyoto policy means that this forest owner can claim the 187 NZU's only once throughout the life of the forest.

One way to increase this window of opportunity is to establish what is called a "normal forest". A normal forest is where the area planted equals the area harvested. To establish a normal forest the theory is to plant a consistent area each year over the rotation of the forest species. In this instance one hectare per year is planted for 28 years. The figures have then been represented on a per hectare basis for comparison with the graph above.

Graph showing the carbon stocks in a normal forest, shown on a per hectare basis.



With a normal forest the “safe” red line is raised to around 400 NZU’s per hectare, and the time frame (green box) is also extended out to around 36 years.

Forest planted between 1990 and before 1999

Any owners of even aged forest planted between 1990 and 1999 under the scenario above will receive no benefit from entering the forestry provisions of the ETS. These forests would be older than the 9 year safe NZU claiming window. Any credits claimed in these forests would be negated by having to pay back all at harvest time.

Opportunities

There are two main opportunities when considering forestry under the proposed ETS. The first is to sell units generated for a financial gain. The other is to generate credits to control the cost of having to offset emitting activities such as farming.

Sell carbon credits

It is generally recognised that if you have good reasons to establish a forest for commercial, aesthetic, environmental, or other reasons then opting into the forestry provisions and selling NZU's would make the venture more profitable. Establishing a forest solely to make money out of selling credits could be possible but would be rather risky given current uncertainties in the legislation.

Offset Emissions

Businesses facing future costs through offsetting greenhouse gas emissions could establish a forest themselves or in partnership with others to secure a certain supply of credits at fixed price. This could protect themselves against potential market fluctuations in supply and price in the future.

Conclusion

There are a number of uncertainties and risks in establishing carbon sinks. This is a result of an incomplete legislative process and not yet developed costs and procedures.

Under current policy there may be opportunities for larger forest owners who will be able to manage the harvest liability by establishing multiple aged “normal” forests.

Opportunities for smaller even aged forests are severely limited by the provision to pay back credits at the point of harvest.