Carbon Forest Management

Introduction

This info sheet describes options for managing carbon credits from plantation forests.

Carbon and forests background

Trees absorb carbon dioxide as they grow and store it as carbohydrates. In the case of a planted forest, the carbon stored at maturity is significantly greater than if the land had been left in a non-forested state.

An average radiata forest absorbs approximately 800 tonnes CO_2 per hectare over a 30 year rotation which is equivalent to approximately 2.5 tonnes per tree.

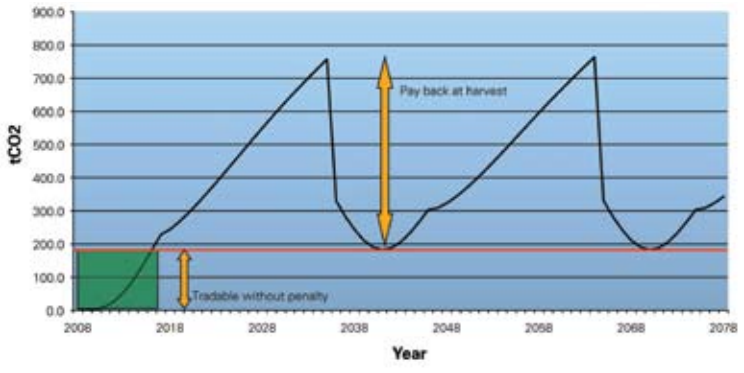
Rotations & harvest

Even-aged forests

Small plantations are usually established all at once and in one species. This results in an even aged stand which can be managed for timber in the most efficient manner, i.e. the forest is planted, pruned, thinned, harvested and replanted as a single unit.

However this even-aged regime limits opportunities for carbon forest management. Under the current rules of the New Zealand Emissions Trading Scheme, timber removed at harvest creates a carbon deficit and must be "paid back". This is demonstrated in the graph below. The black line represents accumulated carbon within an even aged stand. After the first harvest not all of the carbon volume is removed: stumps, branches and roots remain on site, slowly break down and are replaced by the new growing forest. This is why the black line does not drop back to zero at harvest. In the example shown, the first crop retains around 185 tonnes of carbon dioxide equivalent per hectare (tCO_2). Under this regime 185 tonnes per hectare would be tradable without the requirement to pay credits back at the point of harvest. This stored carbon is a one-off and once this is claimed and sold, cannot be sold again.

Total carbon in one hectare – radiata pine – even aged



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Timber vs Carbon revenue

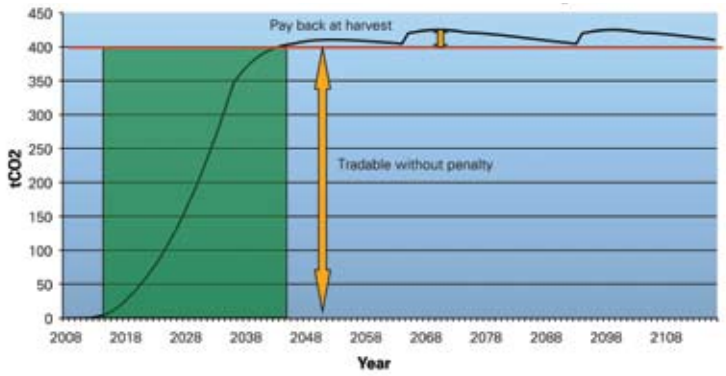
The prices of carbon and timber will influence the above situation. If the carbon price is high relative to returns from harvesting then harvesting could be delayed, or the volume of harvesting reduced (e.g. the best trees could be selectively logged instead of clear felling). Such circumstances would raise the red line, allowing a larger amount of carbon to be traded. Info Sheet 14 further discusses risks and liabilities associated with trading forest carbon.

Mixed age forests

Another way to store more carbon for trading and to avoid the requirement to repay carbon credits is to establish a new forest, or manipulate an existing forest, into a mixed aged stand. A mixed aged forest contains a broad range of age classes. There are various ways to achieve a mixed aged forest and the best approach will vary depending on the amount of available land, topography, soil types etc. In the theoretical example below, 1 hectare is planted every year for 30 years. Each year after the 30th year, one hectare is harvested and replanted. As the graph shows, the forest owner will be able to sell 400 carbon credits (tCO_2) per hectare without having to repay any of those at harvest. Such a mixed age stand provides far more carbon credits which can be sold without the need to repay at harvest than does the even-aged stand above. These credits are effectively a permanent carbon sink.

Another way to establish a mixed age stand is to plant a variety of species that grow at different rates. The ideal situation is to be growing trees that accumulate carbon at the same time as you are harvesting others. By planting a range of species on a number of occasions you can achieve a mixed aged forest to manage carbon and timber flows to best advantage.

Total carbon in one hectare – radiata pine – mixed aged forest



Further Reading

Carbon Farming Information Report www.carbonfarming.org.nz

http://www.maf.govt.nz/climatechange