



## FACTSHEET

# Carbon sequestration in woody vegetation

There are many benefits that trees can provide on-farms. One of these includes their ability to store carbon. This factsheet covers some of the commonly asked questions.

### What is carbon sequestration?

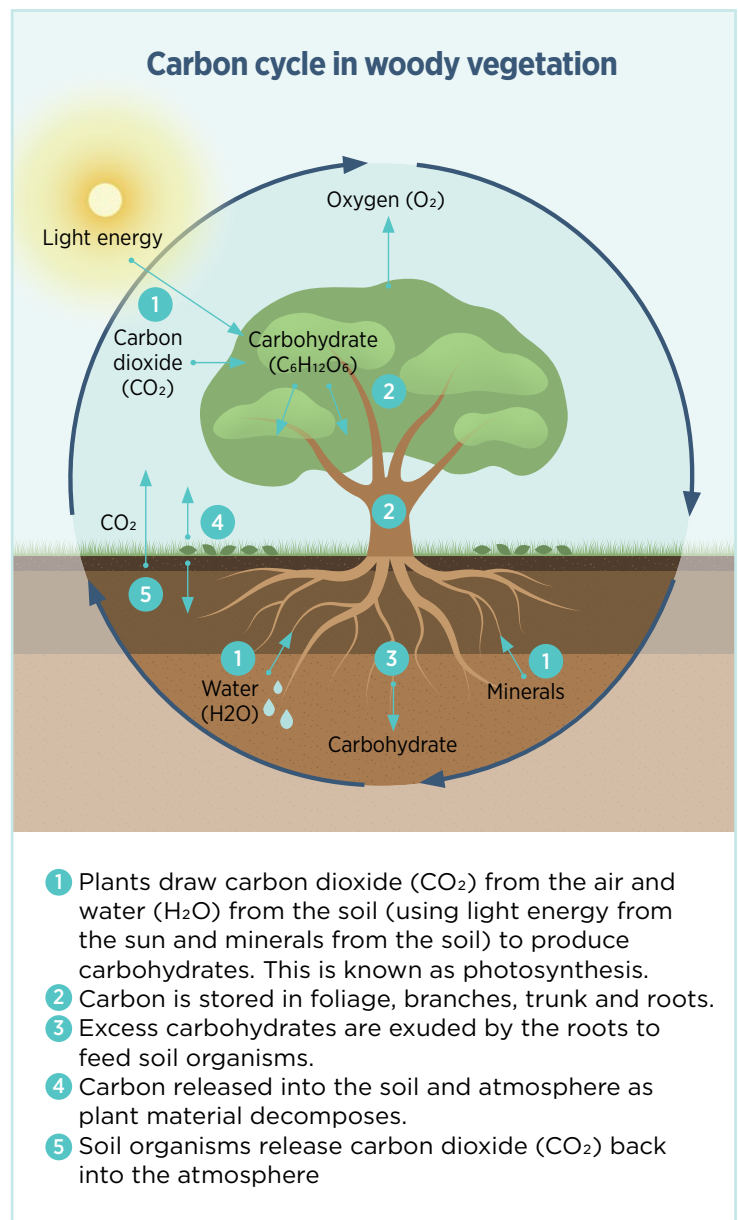
Carbon sequestration is when carbon dioxide is removed from the atmosphere and stored for the short or long term. This can be done as part of the biological carbon cycle or via other means such as carbon capture technology.

### What is carbon offsetting?

Carbon offsetting is when people use carbon sequestration to 'offset' the addition of carbon (or other greenhouse gas) emissions to the atmosphere. By offsetting emissions, the warming impact of equivalent additional greenhouse gas emissions is theoretically neutralised.

### What is carbon sequestration in woody vegetation?

As plants grow, they absorb carbon dioxide from the atmosphere. They can store some of this carbon in parts of their structure that help keep them upright including their trunk, branches, and roots. Simply put carbon sequestration in woody vegetation is the carbon stored in the 'woody' bits of plants, rather than their leaves.



## How is carbon sequestration from woody vegetation estimated?

There are two different ways to calculate carbon sequestration in woody vegetation. The first is the **total amount** of carbon stored in the plant or forest at any one point in time. The second is to calculate the **change in the amount** of stored carbon over a period of time (1 year for example).

A forest continues to increase its carbon stores as long as the amount of carbon removed from the atmosphere is greater than the carbon lost to the atmosphere as a result of decomposition (which releases carbon). Often, once a forest is at maturity, the system is in balance and is no longer sequestering more carbon than it is losing. If a forest is harvested, then it becomes a source of emissions from the logs removed (regardless of the end use of that wood) as well as the rotting material left behind.

Different types of forests remove carbon from the atmosphere at differing rates. This is mostly related to the speed at which a tree grows and is dependent upon its species, stage of growth, climate and soil where it is established. As a general rule, exotic trees tend to remove carbon from the atmosphere more quickly but older native forests can store more carbon in total.

MPI (Te Uru Rakau) has produced some lookup tables to help estimate the carbon stocks for forests that are eligible for the NZ Emissions Trading Scheme (ETS). The following data is required to estimate the sequestration of a forest block:

- Plant species (or dominant species in a mixed species forest)
- Geographic region the forest is located in
- Age of forest

These tables are commonly used to estimate carbon stocks and sequestration on-farm. You can find a link to these tables at [www.beeflambnz.com/farmplan](http://www.beeflambnz.com/farmplan) on the 'Responding to a changing climate' page.

## What is 'additionality'?

'Additionality' is a term used to describe how a project demonstrates whether the carbon removals being rewarded are 'additional' to what would have happened naturally without human intervention. It often involves establishing a baseline to measure change from. This could be a point in time or a naturally occurring rate. Credits can be received for additional removal above the baseline.

## Why is carbon sequestration important?

Carbon sequestration on-farm can help provide additional income from selling carbon credits if the forest is entered into the NZ ETS or through the voluntary carbon market or other schemes. It can also be used to support the marketing of meat products. These reasons however may not be the only justification for protecting, enhancing and planting multi-beneficial forests on-farm.



## How do I calculate sequestration?

The calculation of stored carbon and annual sequestration can be difficult to measure directly and requires specialist knowledge. At an individual farm level, however, it can be done more simply by using figures that have come from research and are provided in the Carbon MPI look-up tables for forestry and the Emissions Trading Scheme. It is important to remember that the look up tables give you a value of tonnes of carbon dioxide per hectare.

You can do this yourself following the criteria in the MPI look-up table document (using tables for your particular region and tree species) or you can use tools such as OverseerFM, Farmax8 or the B+LNZ GHG calculator to calculate the annual sequestration for you. It is important to remember to add the deforestation of trees as a source of carbon dioxide emissions in the year that the forest is harvested.

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Example

### Current Areas of Woody Vegetation

Vegetated area type and description (native, exotic, shrubland)	Approx age or year of planting	Area (ha) Pre-1990	Area (ha) Post-1989	Approx canopy cover (%)	Annual sequestration if known (kg CO <sub>2</sub> provided from some calculators)	ETS eligible? Y/N	State (declining, static, improving)
<i>Planted pine plantation-exotic</i>	<i>19 years (planted 2002)</i>		<i>18</i>	<i>100%</i>		<i>Y</i>	<i>Improving</i>
<i>Regenerating manuka in step south facing middle country- native</i>	<i>25</i>		<i>20</i>	<i>70%</i>	<i>114</i>		<i>Improving</i>
<i>Old growth Kahikatea-native</i>	<i>100+</i>	<i>35</i>				<i>N</i>	<i>Static</i>
<i>Shelter belts</i>	<i>15 years</i>		<i>3.4</i>	<i>80%</i>		<i>N</i>	<i>Improving</i>
<i>TOTAL</i>		<i>35</i>	<i>41.4</i>		<i>114</i>		

The MPI Look-Up tables cover five different forest types so if you can split your forest areas into those specific forest types the sequestration rates are more accurate. The types are:

- Pinus radiata
- Douglas fir
- Exotic softwoods
- Exotic hardwoods
- Indigenous forest



## Are there options to increase sequestration?

You may have options on your farm to sequester carbon through additional areas of woody vegetation – exotics or natives, permanent forest or plantation forestry. See the table below for examples. This can also enhance biodiversity outcomes for your farm and depending on location, support healthy freshwater outcomes by reducing erosion risk or providing riparian habitat.

Areas for consideration	Some suggested actions on-farm to achieve the list on the left. These are not exhaustive and are for guidance only
Increased sequestration	<ul style="list-style-type: none"><li>• Retiring less productive areas (where applicable) and let the land regenerate or plant in natives or exotic forestry</li><li>• Planting shelter belts for improved animal production and sequestration</li><li>• Collaborate with neighbours and council to form catchment groups for a cohesive catchment approach to planning riparian plantings or other areas such as eco-corridors</li><li>• Planting of riparian areas and retiring critical source areas for dual sequestration and water quality outcomes</li><li>• Control pests, diseases, and weeds in planted and native bush areas to maximise survival and sequestration</li><li>• Space planting for erosion control which can also provide shade</li></ul>

### Further information can be found here:



**B+LNZ Factsheets:** on the B+LNZ Knowledge Hub [www.knowledgehub.co.nz](http://www.knowledgehub.co.nz)



#### **B+LNZ Farm Plan: Environment Module**

- You can download the Farm Plan, with the 'Responding to a changing climate' chapter at [www.beeflambnz.com/farmplan](http://www.beeflambnz.com/farmplan)



#### **Websites**

- <https://www.nzfoa.org.nz/plantation-forestry/carbon-sequestration>
- <https://www.agmatters.nz/topics/on-farm-forestry/>
- MPI's 'lookup tables' <https://www.mpi.govt.nz/forestry/forestry-in-the-emissions-trading-scheme/emissions-returns-and-carbon-units-nzus-for-forestry/calculating-the-amount-of-carbon-in-your-forest-land/carbon-tables-for-calculating-carbon/>

