FOREST CARBON INFORMATION NOTES

MODULE 1: FOREST CARBON MODELLING AND REPORTING

KEY TAKE-AWAYS

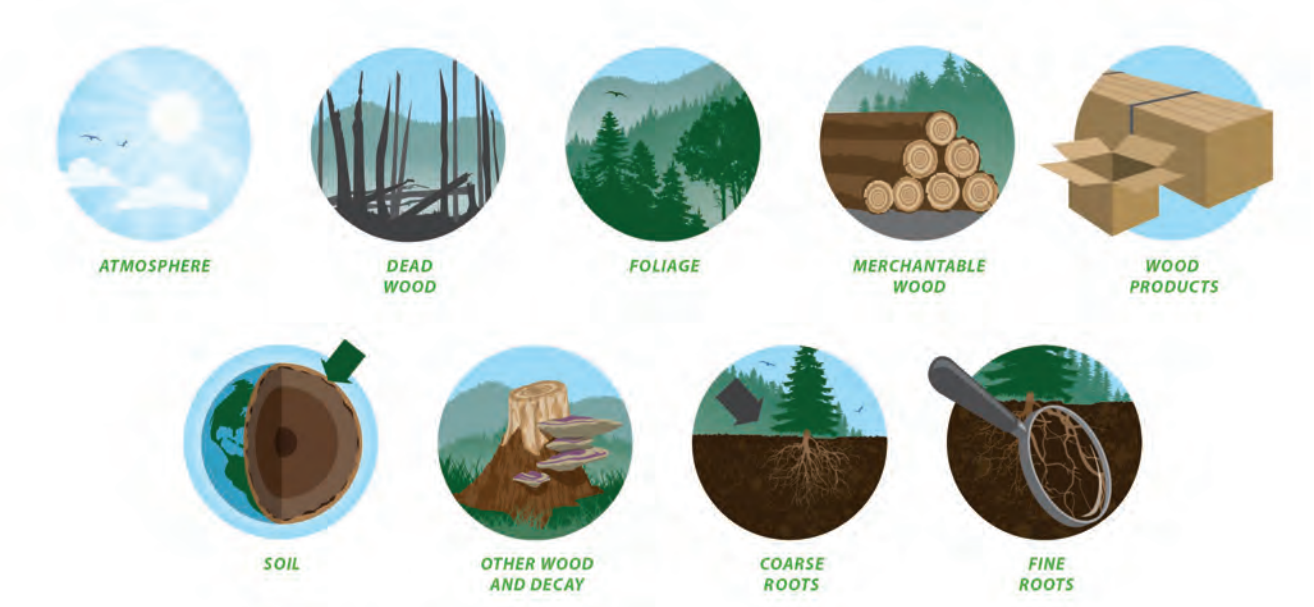
- Net carbon balance is the sum of all carbon fluxes into and out of a forested ecosystem
- A greenhouse gas (GHG) reduction benefit is calculated as the difference between two hypothetical management scenarios: a baseline and a project scenario
- GHG benefits must occur as a result of a change in management practices and not through what would have happened naturally
- GHG benefits vary between project types, both in magnitude and across time

HOW DO WE MEASURE FOREST CARBON?

Forest carbon balance is quantified in units of "tonnes of carbon dioxide equivalent" (tCO2e). This unit is used to describe the impact of all types of GHG emissions, including methane and nitrous oxides, via a common comparable unit. As different GHGs can have different effects on the Earth's warming (termed global warming potential), the standard unit tCO2e is used to express the impact of each different greenhouse gas in terms of the amount of CO2 that would create the same amount of warming.

The carbon balance of a forest ecosystem can be thought about in terms of two different concepts: carbon stocks and carbon fluxes. Carbon stocks represent the absolute quantity of carbon held within an ecosystem at a specified time. These stocks consist of different carbon pools both within the forest ecosystem, such as live biomass, soil and deadwood biomass, as well pools external to the system, such as wood products (see Figure 1).

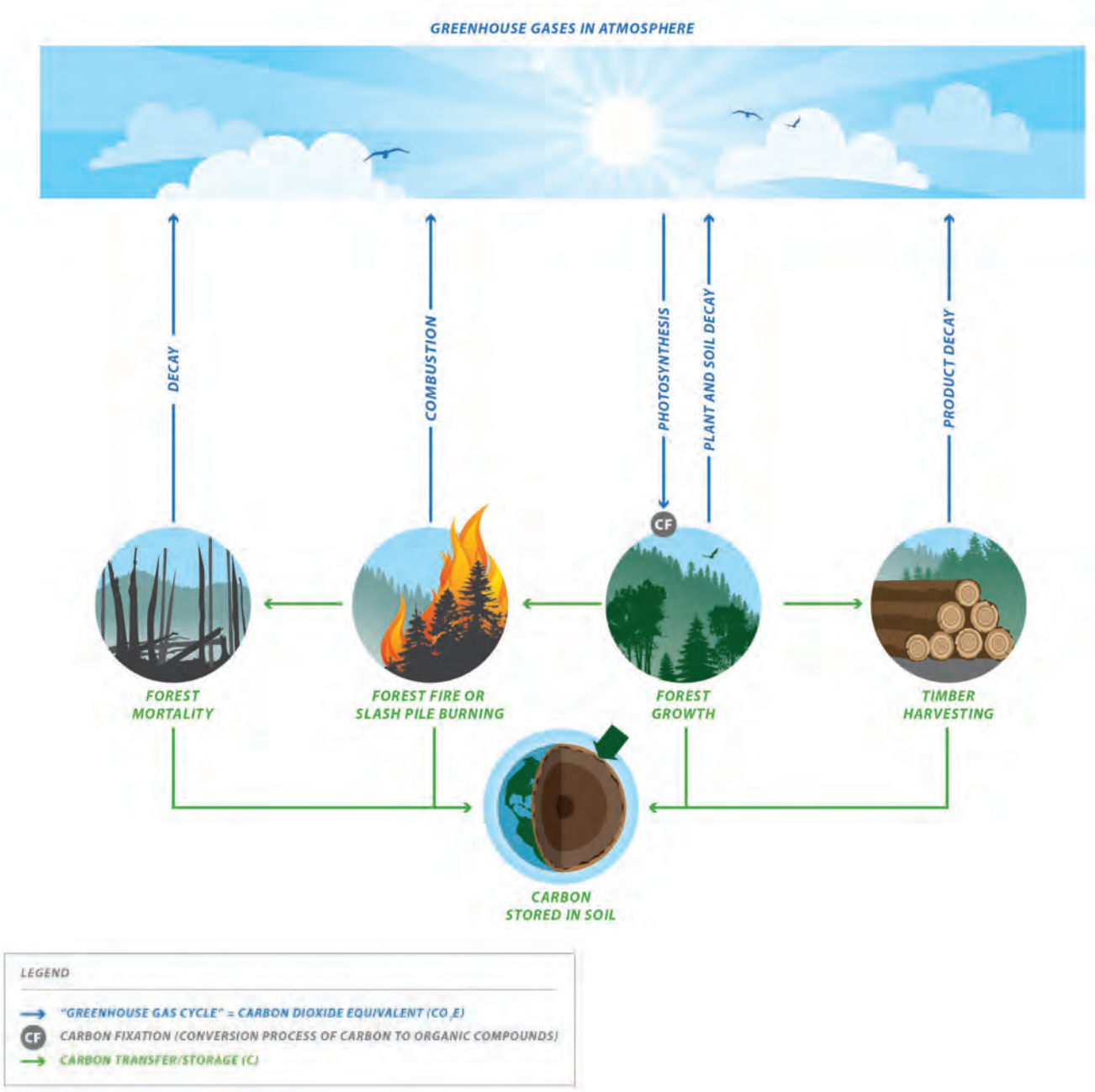
Figure 1: Carbon Stocks



WHAT ARE FOREST CARBON PROJECTS & HOW ARE GREENHOUSE GAS BENEFITS CALCULATED?

Carbon fluxes describe the transfer of carbon between pools (see Figure 2). These transfers can be between pools within the system, or into/out of the ecosystem all together. These transfers can be categorized as either sinks (i.e. "sequestration" of carbon from the atmosphere into the forest through growth) or sources (i.e. "emission" of carbon from the forest back into the atmosphere through disturbance, decay or respiration). The net impact of these transfers, termed the net carbon balance, results in a forest either being a net sink (sequestration is greater than emission) or a net source (emission is greater than sequestration) of carbon. Although cumulative tonnes are not used in national or provincial GHG reporting frameworks, they can be useful in communicating the overall GHG benefits (or impacts) of an activity. Cumulative GHG estimates smooth out the year-to-year variability of an activity or suite of activities to provide a simpler picture of the overall GHG benefit. Long term GHG benefit will potentially be impacted by future disturbances such as wildfire. Therefore, projection of future disturbances is being incorporated into the project modelling. Where appropriate, modelling includes fossil fuel emission associated with the project activity, such as the production and application of fertilizer.

Figure 2: Carbon Fluxes



This net balance is influenced by a combination of natural and human-caused processes (i.e. management). Changes in management practices can impact the net carbon balance of a forest. Forest carbon projects specifically involve changes to practices that result in an increase in net carbon balance. To assess whether a project has a net benefit, the carbon balance of two hypothetical management scenarios are considered; a project scenario (with the management changes) and a baseline scenario (without the management changes). The difference between these scenarios is the GHG benefit of that change in practices. Comparison of these scenarios ensures that the change in management or treatment is directly responsible for the resulting GHG benefit (i.e. it wouldn't have happened anyway).

Different types of management changes or FCI treatments (described in detail in the other modules) can result in GHG benefits over different time periods. GHG benefits may occur for a single year, for only a short period of time after the treatment or may not be realized for many years after an activity or treatment. For example, increased forest fibre utilization treatments result in an immediate, but short-lived GHG benefit. In contrast, reforesting a site may not produce GHG benefits for a decade or more until the trees are sapling sized and growing fast, but those benefits will continue to build up for decades into the future (see Reforestation Information Note). As such, it is important to recognize the temporal aspect of carbon balance when considering different treatment types.

Because of the different time scales over which benefits occur, the FCI will be implementing a portfolio of activities balancing short term with long term benefits to optimize carbon management and the overall effectiveness of the program. To avoid potentially misleading results that can occur from focusing on the GHG benefit gained in a specific calendar year, success is measured by the change in atmospheric GHGs that can be achieved before a future reporting benchmark (for example, calendar year 2050).

GHG benefit is accounted in two different types of metrics: annual benefit and cumulative benefit. Accounting for all other sectors besides forestry includes only annual GHG benefits. Accounting in the forest sector however, will also include estimates for cumulative tonnes of GHG benefits. Although cumulative tonnes are not used in national or provincial GHG reporting frameworks, they can be useful in communicating the overall GHG benefits (or impacts) of an activity.

FOR MORE INFORMATION

For more information, please see the FCI website.

Inquiries about the Forest Carbon Initiative may be directed to: forest.carbon@gov.bc.ca

This information note was prepared for Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) staff, the Forest Enhancement Society of British Columbia, contractors, Indigenous Nations and stakeholders to communicate the potential benefits and opportunities in mitigating climate change through such activities, and to offer robust, evidence-based advice on best practices.

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