Carbon Accounting versus Project Financing[1]

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It is often the case that the accounting for the environmental value of greenhouse gas (GHG) mitigation projects gets confused with the arrangements for project financing or commercialization of credits. This short paper aims at clarifying the differences between these two issues.

1) Environmental accounting of carbon storage

The objective of "carbon accounting" is to determine the environmental (i.e. atmospheric) value of GHG mitigation projects. Given that sinks projects are based on both the amount of carbon sequestered (i.e., absorbed from the atmosphere) and the duration of storage, accounting systems need to be able to reflect the temporal nature of this type of project (as opposed to emission reduction projects, where accounting is based only on the amount of carbon emissions avoided). Different accounting systems have been proposed for calculating the GHG mitigation potential of forestry projects:

a) stock change method
b) average storage capacity
c) ton-year based accounting methods.

Methods (a) and b) are solely based on the value of removal of carbon from the atmosphere, credited as and when it occurs. Irrespective of the duration of storage, any subsequent carbon release (for instance from harvests) would have to be compensated for in full by the project developer. For the example in Figure 1, according to method (a) the project will be given 100 tC credits between T_1 and T2, and will have to return 100 tC immediately after harvesting at T3. If, method (b) is used, the project receives 50 tC (the average storage) and, as long as the project ensures that any area harvested is immediately replanted, will not have to return any credits as long as the project lasts. Given that there is no definition on project duration, this could mean forever.

Method (c) is based on the scientific assumption that if a tonne of carbon is stored for a certain period of time, it eventually counters the effect of the emission of 1 tonne of carbon, i.e. reaching 'equivalence' to avoided emissions. It also allows for the calculation of the environmental value of carbon storage for periods shorter than this period of time. This timeframe has been calculated to be either 55 years (which will be used throughout this paper) or 100 years, depending on the scientific assumptions used. Because the method recognizes the actual environmental value of carbon storage over a finite period time, there is no associated obligation to maintain these carbon stocks for a long period of time, and no liability for their subsequent release. So, in Figure 2, if 100 tC are fixed and stored for 55 years, the carbon stored can be released with no detriment to the atmosphere. If carbon is stored for a shorter timeframe, the project would receive a smaller amount of credits, proportionally to the duration of carbon storage (for example, 60 tC if carbon is stored for 30 years, as opposed to 100 tC, if is stored for 55 years). In the case of Figure 1, if the average storage of 50 tC/ha is maintained for 55 years, there will be no liability for the release of carbon at the end of the final harvest at Te (= 55 years).

2) Financial transactions based on carbon credits

While environmental benefits accrue depending on when a unit of carbon is removed or released to the atmosphere and the duration of carbon storage, financial transactions can occur at any point in time, before, during or after the project lifetime. In order to maintain the environmental integrity of the system, however, it must be ensured that:

- Only after credits carbon has been fixed (or its emissions avoided) credits can be used for the purposes of compliance to Kyoto targets (i.e., to compensate for emissions taking place elsewhere); never before.

[1] http://www.foresttrends.org/keytrends/trends_forestservices.htm#4

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- If financial transactions take place before the full environmental benefit of the carbon credits is fulfilled (i.e., that an equivalent amount of carbon is stored for a given amount of time), there must be contractual obligations to ensure that storage will take place, or determining responsibility for the liability associated with storage periods shorter than contracted.

A variety of financing options exist, which ensure that these elements are in place:

- Regulatory bodies only authorize credits to be sold after a corresponding amount of carbon is fixed in vegetation and stored for a minimum project duration as determined by international policy (e.g., Te in Figures 1 and 2). While safe from an environmental point of view, considering that the timeframes proposed for minimum project duration currently vary from 55 years to perpetuity, this requirement could be greatly discouraging for project developers.

- Regulatory bodies only authorize credits to be sold after a corresponding amount of carbon is fixed in vegetation but before storage for this minimum timeframe. In this case, there must be an associated contractual arrangement establishing an obligation to store this amount of carbon for an agreed timeframe (i.e., in perpetuity, 55 years, etc., whichever period is chosen by policy makers) and/or allocating a liability for the emissions associated with its release before the end of the established project duration.

- In the case of the point above, a policy decision has to be made to determine how to calculate the magnitude of this liability. One option is, 1) that it could be calculated according to the stock change method, allocating full liability for any carbon release (e.g., the project in Figure 1 has to return 100 tC in T_3, somewhat discouraging this type of activity); or 2) using the ton-year approach to calculate the amount of credits to be returned in the case of short duration periods (the *Stock change crediting with ton-year liability adjustment method).* In this case, the project in Figure 1 would have received 16.4 tC credits until T_3, and no liability for carbon release at T_3; in the case of the project in Figure 2 returns only 60 tC if terminated in 30 years.

- Advance sales of "streams of carbon credits" – to date, most projects have been developed in partnership with parties interested in the rights to the carbon credits that the project will generate during its lifetime, effectively assuming the position of "equity investors" in the project. In many cases, such payments occur at the onset of the project, to be used for project establishment. Only the credits actually generated may be used for the purposes of compliance to Kyoto targets.

- Futures contracts, call or put options (options to buy or sell) – these sorts of derivatives are already been sold by specialized environmental brokers, enabling project developers to sell credits before they are actually generated. Indeed, for the purposes of compliance to Kyoto targets buyers will only be able to use credits after they are fixed, and associated contractual arrangements for liability have to be in place.

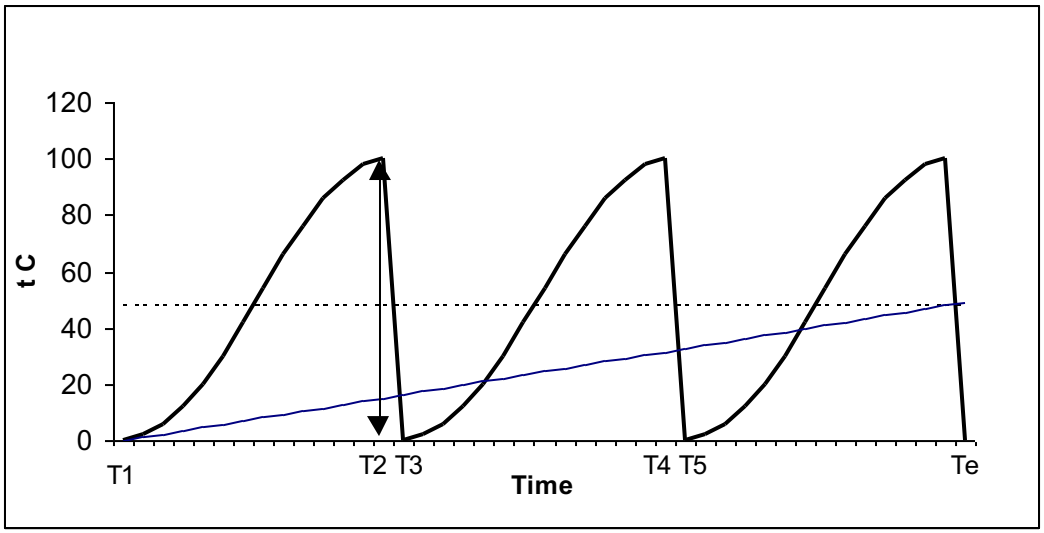

Figure 1. Projection of carbon stored in a tree plantation project over three rotations. For simplicity, it is assumed that the baseline is zero, that harvesting leads to an immediate release of all carbon stored, and that equilibrium of carbon pools is reached in the first rotation cycle. The curve illustrate carbon storage over time, the horizontal line shows the average storage calculated for the project, and the dotted line shows the environmental value (its GHG mitigation effect) of storage along time, calculated using the ton-year method.

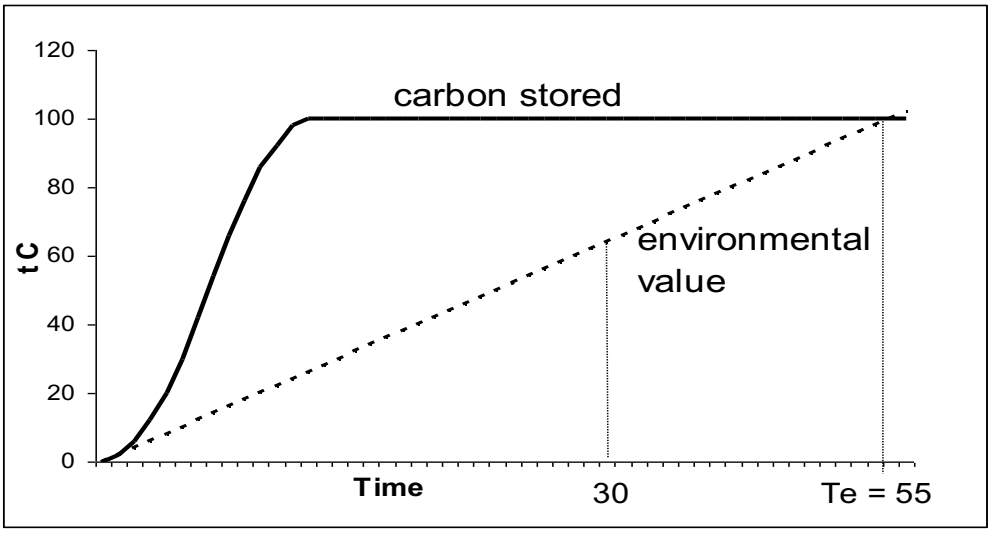

Figure 2. Projection of carbon stored in an afforestation project (with baseline assumed to be zero), illustrating the concept of *ton-years*. The project accomplishes an environmental value (its GHG mitigation effect) equivalent to the total amount of carbon stored in any given year, multiplied by an equivalence factor, E_f. In terms of carbon crediting, if the *stock change crediting with ton-year liability adjustment* method is used, credits could be given as carbon is stored (solid line), and in case of any event leading to the release of carbon stored, the amount of credits to be returned would be calculated as the difference between the solid and the dotted line at that point in time.