GLOBAL CONSERVATION STANDARD

Global Conservation Standard

Methodology Number 1: Carbon Forestry -Above Ground

June 2011

Contents

Abbreviations

CA	Conservation Area
CAR	Corrective Action Request
CBZ	Commercial Buffer Zone
CCU	Conservation Credit Unit
CHP	Comprehensive Harvest Plan
CMP	Conservation Management Plan
CO_2	Carbon Dioxide
FAO	Food and Agriculture Organization of the United Nations
GIS	Global Information System
GPS	Global Positioning System
HCV	High Conservation Values
IPCC	Inter-Governmental Panel on Climate Change
NGO	Non-Governmental Organization
OCF	Options and Choices Foundation
P&C	Principles and Criteria
PIN	Project Information Note
PSP	Permanent Sample Plot
REDD	Reduced Emissions from Deforestation and Forest Degradation
SFM	Sustainable Forest Management
TP	Technical Panel
UNFCCC	United Nations Framework Convention on Climate Change

Definitions

* Definition adopted from ISO 14064-2

Additionality*	Whether a GHG project has resulted in emission reductions or removal enhancements in addition to what would have happened in the absence of that project
Baseline Scenario*	Hypothetical reference case describing general conditions for what would have occurred in the absence of the project
Carbon Dioxide Equivalent*	Unit for comparing the radiative forcing of a GHG to the one of carbon dioxide
Commercial Buffer Zone	Area where supporting activities to the Conservation Area are implemented. This area shall also be used for observing direct local influence on land use.
Conservation Agreement	Legally binding agreement for landscape conservation under the global conservation standard
Conservation Area	The area that will be protected by the project
Conservation Credit Unit	Unit used to describe the volume of credits originating from the Global Conservation Standard
Crediting Period	Period of time during which the project generates Conservation Credit Units
GHG Program*	International, national, sub-national governmental or non-governmental authority that registers, accounts or manages GHG emissions, removals, emission reduction or removal enhancements
Greenhouse Gas (GHG)*	Gaseous constituent of the atmosphere that absorbs and re-emits infrared radiation
Monitoring	Continuous measurement and recording of benefits from GCS project activities
PIN Assessment Report	Physical verification of PIN statements and quantification of year-one benefits to the project proponent(s)
Project Area	The aggregate of Conservation Area and Commercial Buffer Zone
Project Duration	The duration of time for which the licensee / land holder has a valid Conservation Agreement with the GCS
Project Start Date	Date of signature of the Conservation Agreement
Project Validation Report	Official findings of the validation study carried out by an accredited third party to the Standard

Major CAR	The absence or complete breakdown of an element of the management system. Major CARs shall be closed out within 1-month of notice. No action on Major CARs shall result in suspension from activities
Minor CAR	A single observed non-conformance which can be restored. Minor CARs shall be closed out within the agreed schedule of work within 3-months of notice. Minor CARs can become Major CARs if no action is taken to address the CAR within the specified schedule
Stakeholder*	Persons or organizations that have an interest in, or are affected by, a project being developed
Uncertainty*	Parameter, associated with the result of quantification, which characterizes the dispersion of the values that could be reasonably attributed to the quantified amount

1 Methodology Number 1: Forestry Carbon

Various sub-national activities are underway that seek to produce offsets credits certified to different standards. The fact that these offset credits can be used to compensate activities in developed countries leads to a complex determination process of additionality and baseline. Most offset credits accrue where degradation pressures are highest whereas areas that are not subject to significant pressures are not honored due to the requirement of additionality. In addition, the baseline deteriorates and less offsets are likely to be produced that leads to increasing opportunity costs and decreasing benefits.

The GCS addresses these issues and provides a simplified approach to monetize protected areas through a structured program designed to identify, quantify, verify, protect and monitor Conservation Areas based on a landscape approach considering the land-use of neighboring areas. The standard increases the capacity to conserve through an economic incentive through the issuance and sale of CCUs. The Standard is third-party verified and complementary to a multitude of offset projects. Protected areas will receive reliable long-term financial incentives, independently from any hypothetical baseline scenario.

The Conservation Agreement is internationally legally binding, signed between the project proponent(s) and the GCS Foundation. The minimum agreement duration is 30-years and a maximum agreement period of 90-years with the option to renew based on performance. A Stakeholder Foundation is established to manage a percentage of the revenues derived from the sale of CCUs to focus in-country financing toward reforestation, agroforestry and energy crop development.

Forests provide large volumes of ecosystem services from carbon sequestration activities, biodiversity habitats and protection to the collection and purification of water through watershed services. To-date, the most widely understood ecosystem service application is carbon sequestration and carbon offset activities. In the “traditional” sense, carbon offset activities work on the basis of identifying a baseline activity and a “with project” scenario and the difference between the two determine the “carbon flows” and the resulting carbon credits generated by the project.

As additionality in the traditional sense is not applicable under the GCS and therefore so is the argument for producing carbon flows. Instead, carbon forestry under the GCS accounts for current “carbon stocks” (the amount of carbon hosted at the time of the quantification). Methodology Number 1: Carbon Forestry-Above Ground only deals with “above-ground” carbon pools accounted for in above-ground vegetation within a defined forest. Each above-ground carbon pool hosts carbon dioxide (CO_2) which are which are equivalent to one CCU (1 tCO_2 = 1 CCU). However, the GCS is to be compatible with carbon offset project types and there is no possibility of conflict of interest or double counting.

This methodology serves as a tool to comply with GCS Principle 5 (Environmental Service Quantification) and gives guidance on how to account for carbon conservation and security in forest ecosystems.

It covers the issues of methodology application, year one methodology, year two onwards methodology, sampling and accounting.

1.1 Carbon Units

Carbon within the Methodology Number 1: Carbon Forestry-Above Ground project framework is measured in tons of Carbon Dioxide (tCO_2).

One ton of Carbon Dioxide is the equivalent of one CCU.

1 tCO_2 = 1 CCU.

1.2 Forest Strata and Crown Cover

Forest quality strata are defined as the current status of the forest volume relative to the potential forest volume of an undisturbed virgin forest on the same site quality. Methodology Number 1: Carbon Forestry uses 4 distinct levels of site quality based on tree canopy crown cover:

Strata 1: Natural Forest
Defined forest area that contains greater than or equal to ($\geq$) 75% crown cover

Strata 2: Secondary Forest
Defined forest area that contains 50-74% crown cover

Strata 3: Degraded Forest
Defined forest area that contains 25-49% crown cover

Strata 4: Severely Degraded Forest
Defined forest area that contains 10-24% crown cover

1.3 GCS Carbon Forestry Quantification Process

Under Methodology Number 1: Carbon Forestry, there are two distinct yet complementary stages to carbon forestry quantification: 1) PIN Carbon Stock Estimation / Verification, 2) Monitoring, Quantification and Reporting.

During the development of a GCS project, it is essential that finance is available during the inception of the project to directly establish the CMP, PSPs and define the framework for the comprehensive measurement of the volume of carbon held within a forest area. To accomplish this within a generic yet scientific manner, the GCS has developed Methodology Number 1: Carbon Forestry-Above Ground to facilitate the two-pronged approach.

In doing so, a percentage of estimated CCUs shall be released into the project proponent(s) holding account. This will enable the GCS to fund the project while adopting scientifically sound quantification principles.

Following the success of the year-one validation and verification from an accredited Third-Party, the GCS shall issue the Certificate of Compliance and the residual estimated volume of year-one CCUs.

Beginning in year-two, CCUs are released into a project proponent(s) holding account after carbon validation and verification of established PSPs from an accredited Third-Party. The number of CCUs shall be based on the actual volumes of carbon stored at any one time in the Conservation Area. This is otherwise known as the “stock approach” to carbon estimation.

1.4 Carbon Forestry Above-Ground Procedures

Below is the methodology procedure for the development for carbon forestry-above ground applications under the GCS.

Year One

1. Submission of PIN to TP
2. TP Review by TP
3. PIN Assessment / Stock Estimation / Verification
4. PIN Assessment Report by TP
5. Signing of Conservation Agreement
6. Establishment of Registry Account
7. Development of WP by project proponent(s)
8. Risk Association by Strata
9. Sampling Intensity Determination
10. Leakage Determination
11. PSP Establishment
12. GIS Imagery Application
13. Monitoring and Reporting
14. Third-Party Validation and Verification
15. TP Acceptance of Validation / Verification Report

Year Two

16. Monitoring and Carbon Quantification
17. Reporting

The following contents of this methodology pertains only to steps in the procedure that require technical guidance on the identification, quantification and monitoring of above-ground carbon through forestry conservation activities.

2 Year One Carbon Estimation

2.1 PIN Assessment / Stock Estimation / Verification by TP

Project proponent(s) shall submit the PIN to the GCS and the TP shall check for completeness. Incomplete submissions shall not be accepted and will be notified by the TP accordingly. The TP shall address completed PINs during the subsequent TP meeting and decide whether to proceed to the “PIN Assessment” Stage of the registration process.

Provided the PIN is accepted, the TP shall undertake the “PIN Assessment” to confirm the legitimacy of the documentation as well as undertake a site / aerial assessment to assess forest strata and canopy cover. The TP shall evaluate the data and systems by the project proponent(s) as reported in the submitted PIN to ensure volumes reported are accurate. Field assessment includes the validation of forest areas based on forest type and crown cover as defined in the PIN.

The GCS shall utilize verified information on forest type, quality and size with IPCC data to formulate the basis of the carbon calculations. Methodology Number 1: Carbon Forestry-Above Ground is only associated with aboveground biomass.

A first-order estimate of existing carbon stocks shall be undertaken along Tier-1 criteria of the IPCC (Eggleston, Buendia et al. 2006). Based upon the spreadsheet calculation (Methodology 1 Appendix A Spreadsheet), the TP will determine the total volume of the CCUs issued in year one.

Methods used in the PIN Carbon Stock Estimation / Verification include the review of project documentation as well as site inspection of conservation management activities.

The process below shall be followed by the TP during the PIN Assessment:

1. Verify Submitted Documentation
2. Conduct Site / Aerial Assessment
3. Stratify, Size and Map the Area
4. Complete the PIN Assessment Report
5. Input Data into the Carbon Estimation Spreadsheet

2.1.1 Verify Submitted Documentation

Partial documents (key pages) submitted to the GCS as subsequent and supporting information shall be requested in full by the TP at the time of the PIN Assessment to review the documents in entirety. The review shall examine for consistency and validity of stated claims.

2.1.2 Conduct Site / Aerial Assessment

The following is required to conduct the Site / Aerial Assessment:

- Fixed wing aircraft (4-6 seat and top wing only) or helicopter (4-5 seat)
- Global Positioning System (GPS)
- Compass
- High resolution camera
- High resolution video camera
- Approved map of the Project Area

The aerial assessment consists of the usage of a fixed-wing aircraft or helicopter to assess the forest strata of the Conservation Area flying at an altitude that is both safe and provides optimum clarity for the assessment. Flight times should be less than or equal to (≤) 6-hours or as appropriate to the size of the area.

Involving 2 persons, one shall operate the "still" camera and the other the video camera. One person is responsible for mapping during the fly over to be determined amongst the individuals. The cameras shall be in sync to the time of the GPS to enable "picture tracking" and flight path syncing with computer software. Time sync is to be completed before departure.

Prior to taking off, the PIN Assessors shall liaise with the pilot and ground teams to pre-determine their flight path. The flight path must be inputted into both the pilot's and PIN Assessment team's GPS unit prior to take off. Air traffic control shall be notified for flight path and clearance requirements.

For ease of flight navigation, it may be applicable for the individuals to request the presence of the project proponent(s) to assist in the identification of key areas within the Project Area.

The flight itself shall be broken down in two main elements: 1) perimeter assessment and, 2) transects within the Conservation Area.

1. Perimeter Assessment

Using existing maps and local knowledge, the perimeter of the Conservation Area shall be flown to determine the exact location of the area and determine the forest strata along the boundary.

2. Transects within the Conservation Area

Using natural features as key reference points, transects (determined prior to departure and designed to provide the greatest amount of coverage with the fewest amount of transects) shall be flown in an orderly fashion required by the PIN Assessment team.

2.1.3 Stratify, Size and Map the Area

Throughout the fly over of the Project Area, the assessors shall continuously stratify the forest according to stratification levels outlined in Section 1.1. After completion of the aerial reconnaissance, the assessors shall confirm the work using electronic mapping software to determine the size of the area and produce a definitive stratification map as accurately as possible. The map shall be submitted in conjunction with the PIN Assessment Report.

2.1.4 PIN Assessment Report and Carbon Estimation

Further to the identification of the forest strata levels and their size, using Tier-1 criteria of the IPCC (Eggleston, Buendia et al. 2006), the size of the strata(s) determined during the PIN Assessment shall be inputted into the Methodology Spreadsheet to compute the volume of carbon stocks in the Conservation Area. The newly defined areas and the carbon stock levels shall be highlighted in the PIN Assessment report and submitted to the TP for review and approval.

2.2 Risk Association by Strata

Further to the PIN approval, the project proponent(s) shall sign the Conservation Agreement, a registry account shall be established (by the GCS) and a Work Plan developed.

Once complete, the project proponent(s) are required to identify the risk association by strata within their Conservation Area. This will determine the number of PSPs to establish in the Conservation Area for data collection purposes.

Evaluation of risk can be ascertained by review of satellite imagery in the CA and CBZ, as well as through social evaluation of local communities that may experience potential significant impacts on the Conservation Area.

In general, areas that are degraded or severely degraded can demonstrate they are high risk as they tend to be more accessible (road, river), closer to local communities and or are part of the development of transportation and energy infrastructure, commercial or shifting communal agricultures. Areas that have well developed natural forests tend to be low risk due to larger distance from local communities and poor access.

As an example, this is often the case in highland forest when compared to lowland forest. Highland forests are least disturbed in comparison to lowland forest due to steep areas and limited access. Currently, Methodology Number 1-Carbon Forestry-Above Ground is using forest quality by strata as the main element of its risk assessment.

High Risk:
Based on observed significant impacts and potential for encroachment by communities on the Conservation Area; Usually consists of degraded areas that have been repeatedly logged in areas that are accessible.

Forest Strata Association: Degraded & Severely Degraded Forest

Medium Risk:
Based on observed partial or inconsistent demand for forest resources that could be obtained from the Conservation Area. May contain areas that have had some history of logging or encroachment but still have significant standing timber volumes.

Forest Strata Association: Secondary Forest

Low Risk:
Based on insignificant or no observed demand for use of forest resources from the Conservation Area. Usually contain areas of well-developed natural forests with poor accessibility.

Forest Strata Association: Natural Forest

2.3 Sampling Intensity Determination

The goal of sampling is to obtain reliable inventory data through the strategic placement of a relative number of PSPs to represent the area in its entirety. This is obtained through the placement of a series of PSPs in each forest type identified in the Conservation Area (MacDicken 1997, Muller-Dombios and Ellenberg 1974, Commonwealth of Australia, 2001). This has resulted in the GCS quantifying the number of PSPs to the amount of risk association determined by strata.

The GCS has identified sampling limitations to meet realistic budgets and manpower within a Project Area (Cacho, O.J., Wise, et. Al 2003). This methodology suggests that Project Areas limit the number of sample plots that can be measured and maintained on an annual basis. It is anticipated that the maximum amount of PSPs to be 400 plots however in areas where there are very large, the project proponent(s) in guidance of technical foresters shall determine the realistic number of PSP to be established. Projects are required to establish PSPs in all strata identified by the PIN assessment team and verified through GIS and field surveys.

Below is the guidance for the number of PSPs in a Conservation Area:

Natural Forest	(Low Risk)	1 sample plot for every 300ha of strata
Secondary Forest	(Medium Risk)	1 sample plot for every 200ha of strata
Degraded and Severely Degraded	(High Risk)	1 sample plot for every 100ha of strata

It is important to note that scale and sampling intensity are compatible. It is the responsibility of the project proponent(s) to determine the realistic number of PSPs to be developed on the ground with the understanding that the data will be complemented with GIS Applications and aerial surveillance.

2.4 PSP Establishment

PSPs are established using circular plots of 20m radius whereby all trees greater than or equal to (≥) 10 cm diameter (DBH) are located, numbered, marked and measured to 0.1 cm accuracy using a standard forestry diameter tape.

PSPs must be located with some element of randomness within each forest strata that is also functional in respect to accessibility for re-measurement. In strata where there is high risk, a higher concentration of PSPs is expected to be located where there are historical or current risks to the Conservation Area (i.e. road access to project site). PSPs are to be numbered and mapped along with GPS coordinates.

PSP center point must be located with GPS coordinates (WGS Datum) and clearly marked. All trees starting from 0° to 359° shall be measured for diameter at the standard 1.3m above ground level. All living trees 10cm DBH and above within 20m of center point shall be recorded. Every second tree that is on the boarder of the 20m radius shall be measured. First boarder tree shall be measured 2nd shall be skipped 3rd measured etc.

Marking of location for DBH measurements must be clearly painted on each tree following measurement to identify re-measurement locations. Measurement records include: bearing, distance from center point (meters), species and DBH (cm). All PSP data needs to be recorded using a forestry diameter tape and entering the findings in the form provided in Appendix I: PSP Template for Carbon Monitoring. All data must be transferred into electronic format using Excel data sheets. Measurement of all established PSPs shall be conducted annually.

2.5 Timber DNA Database

The timber DNA database will be established simultaneously to the establishment of the PSPs through the integration of approved third party validation frameworks. The procedures for developing the DNA inventory will be established as per the approved regulatory framework.

2.6 GIS Monitoring Application

Evaluate the project Conservation Area by satellite imagery as deemed necessary to evaluate risk within the CBZ. This includes obtaining imagery at the scale of 1:25,000 for Project Areas as necessary. Satellite imagery should be used to identify newly encroached areas. Measurements to evaluate existing volume of forest following encroachment are to be conducted by strip plots 10m x 100 m with a minimum of 20 plots or as deemed required to obtain a credible average volume. Satellite Imagery is to be conducted annually along with the monitoring process.

2.7 Leakage Determination

A second layer of carbon monitoring concerns the development outside the Conservation Area. This is to qualify how additional the conservation activity is to continued inaction, and whether it produces carbon leakage in surrounding areas.

The following steps shall be taken:

1. Determine the country deforestation rate in the host country, as officially communicated to FAO, UNFCCC or other relevant organizations of the UN system. If available and appropriate, the provincial deforestation rate can be used, if the PIA is defined to represent the province level.

2. Using GIS, classify the CBZ along the categories "natural forest under different stages of management or degradation", "planted forests" and "non-forested land".

3. At the beginning from the second year, compare:

   - The development of the deforestation rate in the host country, and
   - The development of the deforestation rate within the CBZ.

4. Longer time series are usually more reliable; five-year running averages will be preferred, as soon as data becomes available

5. In the event that the deforestation rate in the CBZ increases by more, or decreases by less than in the average of the PIA, the project is likely to produce negative leakage. Under this scenario, project proponents are immediately required to refer to the TP to agree corrective action. Should the situation persist at the verification date, the differential between the actual deforestation rate and the hypothetical value underlying the PIA deforestation trend will be debited from the respective year(s) CCUs.

6. In case, no negative leakage is determined, applying the CBZ deforestation rate in the Conservation Area will allow reporting the amount of carbon not released during the monitoring period.

7. Annual leakage determination will start in the second year of implementation of the project. This report may include explanations on the forest situation within the CBZ, like the occurrence of dry periods, thunderstorms, pests, wildfires or other factors outside the influence sphere of the project participants.

   As different from REDD activities, the fact that there is deforestation or degradation pressure on the area does not constitute a requirement for the generation of CCU. It is however an indication, whether the activity has been effective. Even though there might not be an immediate relief of pressure on the area, the ongoing protection may become effective once in the future deforestation and degradation move near the Conservation Area.

2.8 Carbon Stock Measurement

Based on the PSP data, determine the carbon inventory for the Conservation Area. Record all trees, corresponding and DBH to determine volume of carbon in the PSP. The PSP template is located in **Appendix I**.

3 Year Two

3.1 Monitoring, Quantification and Reporting

Methodology Number 1: Carbon Forestry-Above Ground uses data obtained from the PSPs only and data collected outside of the PSPs cannot be used unless officially recognized by the TP and the Third-Party accredited body.

Physical monitoring shall be determined by the project proponent(s) and shall be detailed in the CMP. This may be coupled with aerial surveillance using the same procedures as outlined in Section 2.1.2.

Only an appointed accredited Third-Party validator and verifier can collect and submit data from the PSPs for monitoring use. Carbon monitoring will be undertaken annually and will be summarized in an annual report.

4 References

Commonwealth of Australia. (2001). Field Measurement Procedures for Carbon Accounting. Bush for Greenhouse, Report 2, Version 1. Australian Greenhouse Gas Office, Canberra.

Cacho, O.J.., Wise, R.M., and MacDicken, K.G. (2003). Carbon Monitoring Costs and their Effect on Incentives to Sequester Carbon through Forestry. Published in “Mitigation and Adaptation Strategies for Global Change” **154**: 273–293, 2004. Kluwer Academic Publishers, Amsterdam.

Eggleston, H. S., L. Buendia, et al., Eds. (2006). Agriculture, Forestry and Other Land Use, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the IPCC National Greenhouse Gas Inventories Programme. Hayama, Kanagawa.

MacDicken, K. G. (1997). A Guide to Monitoring Carbon Strage in Forestry and Agroforestry Projects. Arlington, VA, USA, Winrock International: 87.

Mueller-Dombois, D.and H Ellenburg. (1974). Aims and Methods of Vegetation Ecology. Wiley & Sons. 557 pp.

PSP Template for Carbon Monitoring

Date:	
Name of Organization:	
Recorders Name:	
PSP Number:	
GPS Coordinate (WGS):	

#	Tree #	Species	DBH (cm)	Bearing (°)	Distance (m)	Remarks
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
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