

Agriculture, Forestry and Other  
Land Use (AFOLU) Requirements

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# 1 | Introduction

This document provides the VCS Program requirements for the development of Agriculture, Forestry and Other Land Use (AFOLU) projects and methodologies, including requirements on project area, project crediting period, eligible project categories, GHG sources and carbon pools, baseline determination, leakage calculation and GHG emission reductions and removals calculation. Eligible AFOLU project categories include Afforestation, Reforestation and Revegetation (ARR), Agricultural Land Management (ALM), Improved Forest Management (IFM), Reduced Emissions from Deforestation and Degradation (REDD), Avoided Conversion of Grasslands and Shrublands (ACoGS) and Wetlands Restoration and Conservation (WRC). The purpose of the document is to assist project proponents, project developers, methodology developers and validation/verification bodies in developing and auditing projects and methodologies.

In addition to the requirements set out in this document, AFOLU projects and methodologies shall adhere to all applicable VCS requirements and rules set out in the VCS Program documents. In particular, readers are referred to the *VCS Program Guide*, the *VCS Standard* and the *AFOLU Non-Permanence Risk Tool*. Where external documents are referenced, such as the *IPCC 2006 Guidelines for National GHG Inventories*, and such documents are updated, the most recent version of the document shall be used.

The basis of this document was the VCS 2007.1, the Guidance for Agriculture, Forestry and Other Land Use Projects and the Tool for AFOLU Methodological Issues, developed by the VCS AFOLU Advisory Group (a group composed of working groups of leading experts in each of the six AFOLU project categories) in 2007 and 2008 through an extensive peer review process. During 2010, after considerable public input and with oversight from the VCS AFOLU Steering Committee, the two documents were combined and revised by the VCS Association. More than thirty independent reviewers, including preeminent risk experts, investors, validation/verification bodies, NGO representatives and project developers supported these efforts and provided detailed feedback during the evolution of these AFOLU rules and requirements.<sup>1</sup>

This document will be updated from time-to-time and readers shall ensure that they are using the most current version of the document.

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<sup>1</sup> The AFOLU advisory group members, current AFOLU Steering Committee members and contributors to this document may be found on the VCS website.

# 2 | AFOLU Program Specific Issues

## 2.1 AFOLU NON-PERMANENCE RISK AND POOLED BUFFER ACCOUNT

- 2.1.1** Non-permanence risk in AFOLU projects is addressed through the use of a project risk analysis, using the *AFOLU Non-Permanence Risk Tool*, which determines a number of credits to be deposited in the AFOLU pooled buffer account. The pooled buffer account holds non-tradable buffer credits to cover the non-permanence risk associated with AFOLU projects. It is a single account that holds the buffer credits for all projects.

Buffer credits are cancelled to cover carbon known, or believed, to be lost. As such, the VCUs already issued to projects that subsequently fail are not cancelled and do not have to be “paid back”. All VCUs issued to AFOLU projects (as with all projects) are permanent. The VCS approach provides atmospheric integrity because the AFOLU pooled buffer account will always maintain an adequate surplus to cover unanticipated losses from individual project failures and the net GHG benefits across the entire pool of AFOLU projects will be greater than the total number of VCUs issued.

The full rules and procedures for AFOLU projects with respect to non-permanence risk are set out in Section 3.7.

- 2.1.2** The AFOLU pooled buffer account is subject to periodic reconciliation, and operational procedures for reconciling this account will be defined by the VCSA within two years of the first issuance of VCUs generated by AFOLU projects. Reconciliation will be based on a review of existing AFOLU verification reports and an assessment of project performance. This process will identify the projects that have failed or underperformed and seek to identify their common characteristics. The risk analysis criteria and buffer withholding percentages, set out in VCS document *AFOLU Non-Permanence Risk Tool*, will be adjusted accordingly to ensure that there are always sufficient buffer credits in the AFOLU pooled buffer account to cover project losses. Any changes to the tool will not be retroactive (ie, they will apply only to future non-permanence risk assessments).
- 2.1.3** Project risk analyses will be subject to periodic review by the VCSA and operational procedures for sampling and reviewing such analyses will be defined by the VCSA within two years of the first issuance of VCUs generated by AFOLU projects. This process will consist of a review of a sample of AFOLU project risk reports to identify any inconsistencies in the process and application of the *AFOLU Non-Permanence Risk Tool* and assessment of same by validation/verification bodies. The risk analysis criteria and risk ratings set out in the tool may be adjusted, to ensure consistent and accurate application of the tool. Any changes to the tool will not be

retroactive (ie, they will apply only to subsequent non-permanence risk analyses).

## 2.2 AFOLU LEAKAGE ASSESSMENTS

- 2.2.1** Project market leakage assessments will be subject to periodic review by the VCSA and operational procedures for sampling and reviewing such analyses will be defined by the VCSA within two years of the first issuance of VCUs generated by AFOLU projects. This process will consist of a review of a sample of AFOLU projects' leakage assessments to identify any inconsistencies in the process and application of the leakage requirements in Section 4.6 and assessment of same by validation/verification bodies. The leakage requirements set out in Section 4.6 may be adjusted, to ensure consistent and accurate application. Any changes to the leakage requirements will not be retroactive (ie, they will apply only to subsequent leakage assessments).

# 3 | Project Requirements

## 3.1 GENERAL REQUIREMENTS

- 3.1.1** As set out in the *VCS Standard*, default factors and standards used to ascertain GHG emission data and any supporting data for establishing baseline scenarios and demonstrating additionality shall be publicly available from a recognized, credible source, such as *IPCC 2006 Guidelines for National GHG Inventories* or the *IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry*. See the *VCS Standard* for the full rules and requirements for the use of default factors and standards.
- 3.1.2** Where projects are located within a jurisdiction covered by a jurisdictional REDD+ program, project proponents shall follow the requirements in this document and the requirements related to nested projects set out in VCS document *Jurisdictional and Nested REDD+ Requirements*.
- 3.1.3** Implementation of the project activities shall not lead to the violation of any applicable law, regardless of whether or not the law is enforced.
- 3.1.4** Where an implementation partner is acting in partnership with the project proponent, the implementation partner shall be identified in the project description. The implementation partner shall identify its roles and responsibilities with respect to the project, including but not limited to, implementation, management and monitoring of the project, over the project crediting period.
- 3.1.5** Project proponents shall identify potential negative environmental and socio-economic impacts and shall take steps to mitigate them. Additional standards such as the Climate, Community & Biodiversity Standards (CCBS) or Forest Stewardship Council (FSC) certification may be applied to demonstrate social and environmental benefits beyond GHG emissions reductions or

removals.

VCUs may be tagged with additional standards and certifications on the VCS project database where both the VCS and another standard are applied. The VCS website provides the list of standards that are accepted as VCU tags and the procedure for attaining such VCU tags.

- 3.1.6** Activities that convert native ecosystems to generate GHG credits are not eligible under the VCS Program. Evidence shall be provided in the project description that any ARR, ALM, WRC or ACoGS project areas were not cleared of native ecosystems to create GHG credits (eg, evidence indicating that clearing occurred due to natural disasters such as hurricanes or floods). Such proof is not required where such clearing or conversion took place at least 10 years prior to the proposed project start date. The onus is upon the project proponent to demonstrate this, failing which the project shall not be eligible.
- 3.1.7** Activities that drain native ecosystems or degrade hydrological functions to generate GHG credits are not eligible under the VCS Program. Evidence shall be provided in the project description that any AFOLU project area was not drained or converted to create GHG credits. Such proof is not required where such draining or conversion took place prior to 1 January 2008. The onus is upon the project proponent to demonstrate this, failing which the project shall not be eligible.
- 3.1.8** Projects may include multiple project activities where the methodology applied to the project allows more than one project activity and/or where projects apply more than one methodology, as set out in the *VCS Standard*. Such projects shall comply with the respective project requirements of each included AFOLU category. For example, projects that combine agroforestry or enrichment planting with community forestry in a single project, where farmers integrate these activities within a single landscape, shall follow an ARR methodology for planting activities and an IFM methodology for community forestry activities (except where the activities have been combined in a single methodology). Similarly, projects that integrate avoided grassland and shrubland conversion and improved grazing practices shall follow an ACoGS methodology for grassland or shrubland protection activities and an ALM methodology for improved grazing practices (except where both activities have been combined into a single methodology). Avoided conversion projects in landscapes that contain both forest and non-forest shall follow a REDD methodology for forested lands and an ACoGS methodology for non-forested lands. For each activity covered by a different methodology, the geographic extent of the area to which the methodology is applied shall be clearly delineated.
- 3.1.9** ARR or IFM projects with harvesting activities shall not be issued GHG credits above the long-term average GHG benefit maintained by the project. The long-term average GHG benefit shall be calculated as set out in Section 4.5.5.
- 3.1.10** For all IFM, REDD, WRC and ACoGS project types, the project proponent shall, for the duration of the project, reassess the baseline every 10 years and have this validated at the same time as the subsequent verification. Baseline projections for deforestation and/or degradation, land conversion, forest management plans and wetland hydrological changes beyond a 10-year period

are not likely to be realistic because rates of change in land-use and/or land or water management practices are subject to many factors that are difficult to predict over the long term, hence the need for periodic reassessment of the baseline. The following shall apply with respect to the baseline reassessment:

- 1) The reassessment will capture changes in the drivers and/or behavior of agents that cause the change in land use, hydrology, sediment supply and/or land or water management practices and changes in carbon stocks, all of which shall then be incorporated into revised estimates of the rates and patterns of land-use change and estimates of baseline emissions.<sup>2</sup>
- 2) The latest approved version of the methodology or its replacement shall be applied at the time of baseline reassessment.
- 3) The project description shall be updated at the time of baseline reassessment following the requirements set out in the *VCS Standard* Section 3.9.5(2)(d).
- 4) Ex-ante baseline projections beyond a 10 year period are not required.

**3.1.11** Where ARR, ALM, IFM or REDD project activities occur on wetlands, the project shall adhere to both the respective project category requirements and the WRC requirements, unless the expected emissions from the soil organic carbon pool or change in the soil organic carbon pool in the project scenario is deemed below *de minimis* as set out in Section 4.3.3, or can be conservatively excluded (as set out in Section 4.3.4), in which case the project shall not be subject to the WRC requirements.

## 3.2 PROJECT START DATE

**3.2.1** As set out in the *VCS Standard*, the project start date of an AFOLU project shall be the date on which activities that lead to the generation of GHG emission reductions or removals are implemented. Such activities may include preparing land for seeding, planting, changing agricultural or forestry practices, rewetting, restoring hydrological functions, or implementing management or protection plans.

## 3.3 PROJECT CREDITING PERIOD

**3.3.1** The project crediting period rules are set out in the *VCS Standard*. Projects shall have a credible and robust plan for managing and implementing the project over the project crediting period.

**3.3.2** For ARR or IFM extension of rotation age or low-productive to high-productive projects with harvesting, the length of the project crediting period shall be set to include at least one complete harvest/cutting cycle. In the case of selectively cut IFM projects, where trees are individually selected for harvest, the harvest/cutting cycle is the allowable re-entry period into the harvest area as determined by legal and regulatory requirements, and/or common practice.

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<sup>2</sup> Brown, S., M. Hall, K. Andrasko, F. Ruiz, W. Marzoli, G. Guerrero, O. Masera, A. Dushku, B. DeJong, and J. Cornell, 2007. Baselines for land-use change in the tropics: application to avoided deforestation projects. *Mitigation and Adaptation Strategies for Global Change*, 12 (6):1001-1026.

## 3.4 PROJECT LOCATION

**3.4.1** The project location shall be specified in the project description in terms of its project area. The spatial extent of the project shall be clearly specified to facilitate accurate monitoring, reporting and verification of GHG emission reductions and removals and to demonstrate that the project meets the eligibility criteria of the relevant project category. The project location description shall include the following information:

- 1) Name of the project area (eg, compartment number, allotment number and local name).
- 2) Maps of the project area.
- 3) Geodetic coordinates of the project area boundary, provided in the format specified in the *VCS Standard*.
- 4) Total size of the project area.
- 5) Details of ownership.

Where the project area is comprised of multiple polygons (parcels), the project location details of each polygon/parcel shall be included in the project description.

**3.4.2** The project proponent shall demonstrate control over the entire project area with documentary evidence establishing conclusively one or more rights of use accorded to the project proponent as set out in the *VCS Standard*, noting the following:

- 1) For non-grouped projects, the entire project area shall be under the control of the project proponent at the time of validation, or shall come to be under the control of the project proponent by the first verification event. Where the project proponent does not yet have control over the entire area at validation, the entire project area (that shall be specified in accordance with Section 3.4.1) is to be validated as if it were under control and the project is ready to be implemented. Where less than 80 percent of the total proposed area of the project is under current control at validation, the following applies:
  - a) It shall be demonstrated that the result of the additionality test is applicable to the project area at the time of validation and to the entire project area to come under control in the future.
  - b) The monitoring plan shall be designed such that it is flexible enough to deal with changes in the size of the project.
  - c) The project shall be verified within five years of validation. At verification, the size of the project becomes fixed.
  - d) Where the area fixed at verification is smaller than intended at validation, areas that at verification have not come under control of the project shall be considered in the leakage management, mitigation and accounting. This requires the selection, at validation, of a methodology with appropriate leakage methods that may be used in the event the entire area does not come under control of the project.

- 2) Where the project intends to add instances (see specification for instances in the *VCS Standard*) of the project activity (eg, additional polygons/parcels), the project shall follow the requirements for grouped projects set out in the *VCS Standard* and below in Section 3.8.

#### 3.4.3 WRC projects shall demonstrate that:

- 1) There is no hydrological connectivity to adjacent (non-project) areas: or
- 2) It is not possible for hydrologically connected areas to have a negative impact on the hydrology within the project area that could cause a significant increase in GHG emissions: or
- 3) Where projects are hydrologically connected to adjacent areas that may have a negative impact on the hydrology within the project area, projects shall demonstrate that such impacts will not result in a significant increase in GHG emissions, as follows:
  - a) Peatland projects shall establish a buffer zone to ensure that potential negative impacts to the hydrology in the project area, such as causing the water table in the project area to drop or otherwise negatively impacting the hydrology, are mitigated. The buffer zone may be inside or outside the geographic boundary of the project area. Where it is outside of the project area, the buffer zone shall be adjacent to the project geographic boundary and binding water management agreements with land holders in the buffer zone shall be in place by the time of the first verification. The size and shape of the buffer zone shall be sufficient to avoid such negative impacts on the project area, which may be demonstrated through peer reviewed literature or expert judgment.
  - b) All other wetland projects shall establish a buffer zone as set out in Section 3.4.3(3)(a) above, or implement project activities or establish a mitigation plan to ensure that impacts to the hydrology (eg, interrupted water or sediment supply) do not result in a significant increase in GHG emissions. Emphasis shall be placed on hydrological connectivity that is immediately adjacent to the project area. Coastal wetlands shall consider hydrological connectivity originating from adjacent lands and shall follow the applied methodology with respect to oceanic impacts.

Where a project activity to mitigate impacts from hydrological connectivity causes an increase in GHG emissions in the project area or buffer zone, such emissions shall be included in GHG accounting where above *de minimis* (as set out in Section 4.3.3).

## 3.5 PARTICIPATION UNDER OTHER GHG PROGRAMS

### 3.5.1 Projects registered under both the VCS Program and an approved GHG program shall comply with the rules set out in the *VCS Standard*, in addition to the following:

- 1) All and any (VCS) monitoring and verification reports shall state the total amount of credits (GHG credits and, where applicable, buffer credits) issued under the other GHG program.
- 2) The project shall prepare a non-permanence risk report in accordance with VCS document *AFOLU Non-Permanence Risk Tool* and a validation/verification body shall undertake a full validation of same in accordance with the VCS rules. The non-permanence risk analysis shall

be based upon the project as a whole, though the buffer withholding shall apply to the net change in carbon stocks for which credits are sought under the VCS Program.

- 3) Where temporary GHG credits (eg, tCERs or ICERs) have been issued to the project, VCU's may be issued to the project only in accordance with the rules and requirements set out in VCS document *Registration and Issuance Process*.
- 4) Where a loss event or a reversal occurs, the project shall comply with the rules for reporting a loss event and holding/cancelling credits set out in Section 3.7.7 and VCS document *Registration and Issuance Process*. Such reporting, holding and cancelling shall apply to the proportion of credits (GHG credits and buffer credits) granted to date under the VCS Program. For example, if 50 percent of the total credits (GHG credits and, where applicable, buffer credits) related to the project have been issued under the VCS Program and a loss event results in a reversal of GHG emission reductions or removals achieved, buffer credits would be cancelled to cover 50 percent of the reversal. An example calculation is available on the VCS website.

**3.5.2** Projects may not register under both the VCS Program and a non-approved GHG program.

## 3.6 LEAKAGE MANAGEMENT, MITIGATION AND ACCOUNTING

**3.6.1** The potential for leakage shall be identified, and projects are encouraged to include leakage management zones as part of the overall project design. Leakage management zones can minimize the displacement of land use activities to areas outside the project area by maintaining the production of goods and services, such as agricultural products, within areas under the control of the project proponent or by addressing the socio-economic factors that drive land use change. Activities to mitigate ecological leakage in WRC projects may include the establishment of a leakage management zone inside the project boundary.

**3.6.2** Activities to mitigate leakage and sustainably reduce deforestation and/or forest or wetland degradation are encouraged and may include the establishment of agricultural intensification practices on non-wetlands, lengthened fallow periods, agroforestry and fast-growing woodlots on degraded land, forest under-story farming, ecotourism and other sustainable livelihood activities, sustainable production of non-timber forest products, and/or sustainable aquaculture. Leakage mitigation activities may be supplemented by providing economic opportunities for local communities that encourage forest or wetland protection, such as employment as protected-area guards, training in sustainable forest use or assisting communities in securing markets for sustainable forest products, such as rattan, vanilla, cacao, coffee and natural medicines, or wetland products, such as rattan, fish and shellfish.

**3.6.3** Where projects are required to account for leakage, such leakage evaluation shall be documented in the appropriate section of the project description and/or monitoring report, as applicable.

**3.6.4** Market leakage assessments shall occur at validation and verification. The rules and

requirements for the assessment of market leakage are set out in Section 4.6 below.

- 3.6.5** Any leakage shall be subtracted from the number of GHG emission reductions and removals eligible to be issued as VCUs.

### 3.7 NON-PERMANENCE RISK

- 3.7.1** Projects with tree harvesting shall demonstrate that the permanence of their carbon stock is maintained and shall put in place management systems to ensure the carbon against which VCUs are issued is not lost during a final cut with no subsequent replanting or regeneration.
- 3.7.2** WRC projects shall demonstrate that the permanence of their soil carbon stock will be maintained. The maximum quantity of GHG emission reductions that may be claimed by the project is limited to the difference between project and baseline scenario after a 100 year time frame, as set out in Section 4.5.29.
- 3.7.3** Projects shall prepare a non-permanence risk report in accordance with VCS document *AFOLU Non-Permanence Risk Tool* at both validation and verification. In the case of projects that are not validated and verified simultaneously, having their initial risk assessments validated at the time of VCS project validation will assist VCU buyers and sellers by providing a more accurate early indication of the number of VCUs projects are expected to generate. The non-permanence risk report shall be prepared using the *VCS Non-Permanence Risk Report Template*, which may be included as an annex to the project description or monitoring report, as applicable, or provided as a stand-alone document.
- 3.7.4** Buffer credits shall be deposited in the AFOLU pooled buffer account based upon the non-permanence risk report assessed by the validation/verification body(s). Buffer credits are not VCUs and cannot be traded.
- 3.7.5** Projects shall perform the non-permanence risk analysis at every verification event because the non-permanence risk rating may change. Projects that demonstrate their longevity, sustainability and ability to mitigate risks are eligible for release of buffer credits from the AFOLU pooled buffer account. The full rules and procedures with respect to the release of buffer credits are set out in VCS document *Registration and Issuance Process*.
- 3.7.6** Assessment of non-permanence risk analyses may be conducted by the same validation/verification body that is conducting validation or verification of the project and at the same time as the validation or verification of the project, as applicable. The rules and requirements for the process of assessment by validation/verification body(s) are set out in Section 5 below.
- 3.7.7** Where an event occurs that is likely to qualify as a loss event (see VCS document *Program Definitions* for definition of loss event) and VCUs have been previously issued, a loss event report shall be prepared and submitted to the VCS registry administrator, as follows:
- 1) The loss event report shall be prepared using the VCS Loss Event Report Template. It shall

include a conservative estimate of the carbon stocks lost from the project (ie, losses to stocks on which GHG credits have previously been issued to the project), based on monitoring of the full area affected by the loss event.

- 2) The loss event report shall be accompanied by a loss event representation signed by the project proponent and representing that the loss estimate is true and accurate in all material respects. The template for the loss event representation is available on the VCS website.
- 3) The loss event report shall be submitted to the VCS registry administrator within two years of the loss event. Where a loss event report is not submitted within two years of the date the loss event occurred, the project shall no longer be eligible to issue VCUs.
- 4) The VCS registry administrator shall put buffer credits from the AFOLU pooled buffer account on hold, in an amount equivalent to the estimated loss stated in the loss event report.

**3.7.8** At the verification event subsequent to the loss event, the monitoring report shall restate the loss from the loss event and calculate the net GHG benefit for the monitoring period in accordance with Section 4.7.2 and the methodology applied. In addition, the following applies:

- 1) Where the net GHG benefit of the project, compared to the baseline, for the monitoring period is negative, taking into account project emissions, removals and leakage, a reversal has occurred (see VCS document Program Definitions for definition of reversal) and buffer credits equivalent to the reversal shall be cancelled from the AFOLU pooled buffer account, as follows:
  - a) Where the total reversal is less than the number of credits put on hold after the submission of the loss event report, the VCS registry administrator shall cancel buffer credits equivalent to the reversal. Any remaining buffer credits shall be released from their hold status (though remain in the AFOLU pooled buffer account).
  - b) Where the reversal is greater than stated by the loss event report, the full amount of buffer credits put on hold with respect to the submission of the loss event report shall be cancelled, and additional buffer credits from the AFOLU pooled buffer account shall be cancelled to fully account for the reversal.
- 2) Where the net GHG benefit for the monitoring period is positive, taking into account project emissions, removals and leakage (ie, all losses have been made up over the monitoring period), a reversal has not occurred and buffer credits put on hold after the submission of the loss event report shall be released from their hold status (but shall remain in the AFOLU pooled buffer account).

**3.7.9** At a verification event, where a reversal has occurred, the following applies:

- 1) Where the reversal is a catastrophic reversal (see VCS document Program Definitions for the definition of catastrophic reversal), the following applies:
  - a) The baseline may be reassessed, including any relevant changes to baseline carbon stocks and, where reassessed, shall be validated at the time of the verification event

subsequent to the reversal. Note that allowing baseline revisions after catastrophic reversal supersedes any methodological requirements for a fixed baseline.

- b) The same geographic boundary shall be maintained. The entire project area, including areas degraded or disturbed by the catastrophic event, shall continue to be a part of project monitoring. GHG credits may not be claimed from any increased rate of sequestration from natural regeneration after a catastrophic reversal until the loss from catastrophic reversals is recovered. At the subsequent VCU issuance, GHG credits from the project equal to the additional number of buffer credits cancelled after the reversal from the AFOLU pooled buffer account on behalf of the project (ie, above what has been previously contributed by the project) shall be deposited in the AFOLU pooled buffer account. For example, if the project previously contributed 100 buffer credits and 150 credits were cancelled from the AFOLU pooled buffer account after a reversal, the project would deposit an additional 50 buffer credits (to replenish the pool at large) in addition to the amount required by the risk analysis at the current verification event. Buffer credits deposited to replenish the pool after a reversal (50 in the example above) shall never be eligible for release back to the project, as set out in Section 3.6.5. In addition, buffer credits shall be deposited in the AFOLU pooled buffer account based upon the non-permanence risk analysis determined in accordance with VCS document *AFOLU Non-Permanence Risk Tool*, as assessed by the validation/verification body(s).
- 2) Where the reversal is a non-catastrophic reversal (eg, due to poor management or over-harvesting), no further VCUs shall be issued to the project until the deficit is remedied. The deficit is equivalent to the full amount of the reversal, including GHG emissions from losses to project and baseline carbon stocks.
- 3.7.10** The same geographic boundary shall be maintained. The entire project area, including areas degraded or disturbed by the non-catastrophic event, shall continue to be a part of project monitoring. Projects may not claim GHG credits from any increased rate of sequestration from natural regeneration after a reversal until the loss from catastrophic reversals is recovered. As set out in VCS document *Registration and Issuance Process*, where projects fail to submit a verification report within five or ten years from the previous verification event, a percentage of buffer credits are put on hold under the conservative assumption that the carbon benefits represented by buffer credits held in the AFOLU pooled buffer account may have been reversed or lost in the field. Where projects fail to submit a verification report within 15 years from the previous verification event, buffer credits are cancelled under the same assumption. The full rules and requirements with respect to the cancellation and holding of buffer credits are set out in VCS document *Registration and Issuance Process*.
- 3.7.11** The remaining balance of buffer credits is cancelled at the end of the project crediting period.

## 3.8 GROUPED PROJECTS

- 3.8.1** Grouped projects are projects structured to allow the expansion and crediting of a project activity subsequent to project validation. AFOLU grouped projects shall follow the requirements for grouped projects set out in the *VCS Standard*.
- 3.8.2** AFOLU non-permanence risk analyses, where required, shall be assessed for each geographic area specified in the project description (for requirements related to geographic areas of grouped projects see the *VCS Standard*). Where risks are relevant to only a portion of each geographic area, the geographic area shall be further divided such that a single total risk rating can be determined for each geographic area. Where a project is divided into more than one geographic area for the purpose of risk analysis, the project's monitoring and verification reports shall list the total risk rating for each area and the corresponding net change in the project's carbon stocks in the same area, and the risk rating for each area applies only to the GHG emissions reductions generated by project activity instances within the area.
- 3.8.3** Activity-shifting, market leakage and ecological leakage assessments, where required, shall be undertaken as set out in Section 4.6, and the methodology applied, on the initial group of instances of each project activity and reassessed where new instances of the project activity are included in the project.

# 4 | Methodology Requirements

## 4.1 GENERAL REQUIREMENTS

- 4.1.1** In addition to the requirements for methodologies set out in the *VCS Standard*, methodologies shall establish criteria and procedures in accordance with this Section 4.
- 4.1.2** As set out in the *VCS Standard*, default factors and standards used to ascertain GHG emission data and any supporting data for establishing baseline scenarios and demonstrating additionality shall be publicly available from a recognized, credible source, such as *IPCC 2006 Guidelines for National GHG Inventories* or the *IPCC 2003 Good Practice Guidelines for Land Use, Land-Use Change and Forestry*. See the *VCS Standard* for the full rules and requirements for the use of default factors and standards.
- 4.1.3** Where a methodology combines AFOLU project categories, the methodology shall adhere to all sets of requirements pertaining to each and every project category covered, either separating activities, or where activities cannot be separated, taking a conservative approach to each requirement.

- 4.1.4** Biofuel crop production activities are eligible as a project activity only to the extent that they generate measurable long-term increases in aboveground, belowground, and/or soil carbon stocks or substantially reduce soil carbon losses. Biofuel crop production on undrained or rewetted wetlands shall follow the WRC requirements. Although a number of biofuel crops require drainage, some forms of biomass production on wetlands (eg paludicultures on peatland) are compatible with rewetting and may even lead to organic matter accumulation. This activity is feasible, for example, with crops that grow on wet peatlands and that do not consume the peat body, such as alder, papyrus and willow. Biofuel crop production activities on drained wetlands or on wetlands cleared of, or converted from, native ecosystems are not eligible.

## 4.2 ELIGIBLE AFOLU PROJECT CATEGORIES

There are currently six AFOLU project categories under the VCS Program, as further described below. Proposed methodologies shall fall within one or more of these AFOLU project categories.

### Afforestation, Reforestation and Revegetation (ARR)

- 4.2.1** Eligible ARR activities are those that increase carbon sequestration and/or reduce GHG emissions by establishing, increasing or restoring vegetative cover (forest or non forest) through the planting, sowing or human-assisted natural regeneration of woody vegetation. Eligible ARR projects may include timber harvesting in their management plan. The project area shall not be cleared of native ecosystems within the 10 year period prior to the project start date, as set out in Section 3.1.6.

Note – Activities which improve forest management practices such as enrichment planting and liberation thinning are categorized as IFM project activities.

### Agricultural Land Management (ALM)

- 4.2.2** Eligible ALM activities are those that reduce net GHG emissions on croplands and grasslands by increasing carbon stocks in soils and woody biomass and/or decreasing CO<sub>2</sub>, N<sub>2</sub>O and/or CH<sub>4</sub> emissions from soils. The project area shall not be cleared of native ecosystems within the 10 year period prior to the project start date. Eligible ALM activities include:
- 1) Improved Cropland Management (ICM): This category includes practices that demonstrably reduce net GHG emissions of cropland systems by increasing soil carbon stocks, reducing soil N<sub>2</sub>O emissions, and/or reducing CH<sub>4</sub> emissions, noting the following:
    - a) Soil carbon stocks can be increased by practices that increase residue inputs to soils and/or reduce soil carbon mineralization rates. Such practices include, but are not limited to, the adoption of no-till, elimination of bare fallows, use of cover crops, creation of field buffers (eg, windbreaks or riparian buffers), use of improved vegetated fallows, conversion from annual to perennial crops and introduction of agroforestry practices on cropland. Where perennial woody species are introduced as part of cropland

management (eg, field buffers and agroforestry), carbon sequestration in perennial woody biomass may be included as part of the ALM project.

- b) Soil N<sub>2</sub>O emissions can be reduced by improving nitrogen fertilizer management practices to reduce the amount of nitrogen added as fertilizer or manure to targeted crops. Examples of practices that improve efficiency while reducing total nitrogen additions include improved application timing (eg, split application), improved formulations (eg, slow release fertilizers or nitrification inhibitors) and improved placement of nitrogen.
  - c) Soil CH<sub>4</sub> emissions can be reduced through practices such as improved water management in flooded croplands (in particular flooded rice cultivation), through improved management of crop residues and organic amendments and through the use of rice cultivars with lower potential for CH<sub>4</sub> production and transport.
- 2) Improved Grassland Management (IGM): This category includes practices that demonstrably reduce net GHG emissions of grassland ecosystems by increasing soil carbon stocks, reducing N<sub>2</sub>O emissions and/or reducing CH<sub>4</sub> emissions, noting the following:
- a) Soil carbon stocks can be increased by practices that increase belowground inputs or decrease the rate of decomposition. Such practices include increasing forage productivity (eg, through improved fertility and water management), introducing species with deeper roots and/or more root growth and reducing degradation from overgrazing.
  - b) Soil N<sub>2</sub>O emissions can be reduced by improving nitrogen fertilizer management practices on grasslands as set out in Section 4.2.2(1)(b) above.
  - c) N<sub>2</sub>O and CH<sub>4</sub> emissions associated with burning can be reduced by reducing the frequency and/or intensity of fire.
  - d) N<sub>2</sub>O and CH<sub>4</sub> emissions associated with grazing animals can be reduced through practices such as improving livestock genetics, improving the feed quality (eg, by introducing new forage species or by feed supplementation) and/or by reducing stocking rates.
- 3) Cropland and Grassland Land-use Conversions (CGLC): This category includes practices that convert cropland to grassland or grassland to cropland and reduce net GHG emissions by increasing carbon stocks, reducing N<sub>2</sub>O emissions, and/or reducing CH<sub>4</sub> emissions, noting the following:
- a) The conversion of cropland to perennial grasses can increase soil carbon by increasing belowground carbon inputs and eliminating and/or reducing soil disturbance. Decreases in nitrogen fertilizer and manure applications resulting from a conversion to grassland may also reduce N<sub>2</sub>O emissions.
  - b) Conversion of drained, farmed organic or wetland soils to perennial non-woody vegetation, where there is substantial reduction or elimination of drainage, is an eligible practice but shall follow both the WRC and ALM requirements.

- c) Grassland conversions to cropland production (eg, introducing orchard crops or agroforestry practices on degraded pastures) may increase soil and biomass carbon stocks. Only conversions where the crop in the project activity does not qualify as forest are included under ALM. Land conversions of cropland or grassland to forest vegetation are considered ARR activities. Projects that convert grasslands shall demonstrate that they do not have a negative impact on local ecosystems as set out in Section 3.1.6 and 3.1.6.

Note - Project activities relating to manure management are eligible under sectoral scope 15 (livestock, enteric fermentation, and manure management), not sectoral scope 14 (AFOLU).

## Improved Forest Management (IFM)

- 4.2.3** Eligible IFM activities are those that increase carbon sequestration and/or reduce GHG emissions on forest lands managed for wood products such as sawtimber, pulpwood and fuelwood by increasing biomass carbon stocks through improving forest management practices. The baseline and project scenarios for the project area shall qualify as *forests remaining as forests*, such as set out in the *IPCC 2006 Guidelines on National GHG Inventories*, and the project area shall be designated, sanctioned or approved for wood product management by a national or local regulatory body (eg, as logging concessions or plantations).
- 4.2.4** Various sanctioned forest management activities may be changed to increase carbon stocks and/or reduce emissions, but only a subset of these activities make a measurable difference to the long-term increase in net GHG emissions compared to the baseline scenario. Eligible IFM activities include:
- 1) Reduced Impact Logging (RIL): This category includes practices that reduce net GHG emissions by switching from conventional logging to RIL during timber harvesting. Carbon stocks can be increased by:
    - a) Reducing damage to other trees (eg, by implementing directional felling or vine cutting);
    - b) Improving the selection of trees for harvesting based on inventoried knowledge concerning tree location, size and quality;
    - c) Improving planning of log landing decks, skid trails and roads (eg, in peatland forests this could include avoiding the use of canals, which drain the peat and increase GHG emissions, to extract the logs); and/or
    - d) Reducing the size of logging roads, skid trails, and log landing decks.
  - 2) Logged to Protected Forest (LtPF): This category includes practices that reduce net GHG emissions by converting logged forests to protected forests. By eliminating harvesting for timber, biomass carbon stocks are protected and can increase as the forest re-grows and/or continues to grow. Harvesting of trees to advance conservation purposes (eg, the removal of diseased trees) may continue in the project scenario. LtPF activities include:

- a) Protecting currently logged or degraded forests from further logging.
  - b) Protecting unlogged forests that would otherwise be logged.
- 3) Extended Rotation Age / Cutting Cycle (ERA): This category includes practices that reduce net GHG emissions of evenly aged managed forests by extending the rotation age or cutting cycle and increasing carbon stocks. Because trees are typically harvested at an economically optimal rotation age before they are fully mature, extending the age at which the trees are cut increases the average carbon stock on the land. There is no fixed period of years over which the extension should occur, but generally the longer the period, on the order of 5 to 20 years, the more the average carbon stock increases. ERA activities may also include extending the cutting cycle or harvest schedule in uneven-aged forest management that may have similar effects as extending rotation age in even-aged forest management. Though such activities may have a limited carbon benefit, where methodologies are able to establish criteria and procedures for the credible monitoring of such activities, they are eligible. Examples of extending cutting cycles are:
- a) Increasing the minimum diameter limit of cutting thresholds.
  - b) Extending the re-entry period for selective harvesting.
- 4) Low-Productive to High-Productive Forest (LtHP): This category includes practices that increase carbon sequestration by converting low-productivity forests to high-productivity forests. Carbon stocks can be increased by improving the stocking density of low-productivity forests, noting the following:
- a) Low-productivity forests usually satisfy one of the following conditions:
    - i) They qualify as forest as defined by the host country for its UNFCCC national inventory accounting, but contain minimal to no timber of commercial value.
    - ii) They are in a state of arrested succession, where regeneration is inhibited for extended periods of time, following either a catastrophic natural event to which the forest is maladapted thus causing massive mortality, or ongoing human-induced disturbance, for example uncharacteristically severe fire or widespread flooding, animal grazing, or burning.
    - iii) They have a very slow growth rate or low crown cover.
  - b) Improving the stocking density of low-productivity forests can be achieved through the following activities:
    - i) Introducing other tree species with higher growth rates.
    - ii) Adopting enrichment planting to increase the density of trees.
    - iii) Adopting other forest management techniques to increase carbon stocks (eg, fertilization or liming).

Note - Activities that reduce GHG emissions from unsanctioned forest degradation (eg, illegal logging) are considered REDD activities. Projects focusing solely on the reduction of forest fires

are not eligible under IFM. Activities that degrade wetlands to increase forest production are not eligible.

## Reduced Emissions from Deforestation and Degradation (REDD)

- 4.2.5** Eligible REDD activities are those that reduce net GHG emissions by reducing deforestation and/or degradation of forests. Deforestation is the direct, human-induced conversion of forest land to non-forest land. Degradation is the persistent reduction of canopy cover and/or carbon stocks in a forest due to human activities such as animal grazing, fuelwood extraction, timber removal or other such activities, but which does not result in the conversion of forest to non-forest land (which would be classified as deforestation), and qualifies as *forests remaining as forests*, such as set out under the *IPCC 2003 Good Practice Guidance*. The project area shall meet an internationally accepted definition of forest, such as those based on UNFCCC host-country thresholds or FAO definitions, and shall qualify as forest for a minimum of 10 years before the project start date. The definition of forest may include mature forests, secondary forests, and degraded forests. Under the VCS, secondary forests are considered to be forests that have been cleared and have recovered naturally and that are at least 10 years old and meet the lower bound of the forest threshold parameters at the start of the project. Forested wetlands, such as floodplain forests, peatland forests and mangrove forests, are also eligible provided they meet the forest definition requirements mentioned above.
- 4.2.6** Avoiding deforestation and/or degradation can affect GHG emissions and removals in a number of ways. The main effect is on carbon emissions that are reduced by preventing the conversion of forest lands with high carbon stocks to non-forest lands with lower carbon stocks. Where the forest is young or degraded, stopping its further degradation and deforestation also allows for additional sequestration of carbon on the land as the forest re-grows (with or without assisted regeneration). Avoiding conversion of forests to cropland or pasture can reduce emissions of N<sub>2</sub>O and CH<sub>4</sub> that are associated with biomass burning used to clear the land, fertilizer use and other agricultural practices that would have occurred if the forests had been converted.
- 4.2.7** Activities covered under the REDD project category are those that are designed to stop planned (designated and sanctioned) deforestation or unplanned (unsanctioned) deforestation and/or degradation. Avoided planned degradation is classified as IFM.
- 4.2.8** Activities that stop unsanctioned deforestation and/or illegal degradation (such as removal of fuelwood or timber extracted by non-concessionaires) on lands that are legally sanctioned for timber production are eligible as REDD activities. However, activities that reduce or stop logging only, followed by protection, on forest lands legally designated or sanctioned for forestry activities are included within IFM. Projects that include both avoided unplanned deforestation and/or degradation as well as stopping sanctioned logging activities, shall follow the REDD guidelines for the unplanned deforestation and/or degradation and the IFM guidelines for the sanctioned logging activities, and shall follow the requirements set out in Section 3.1.8.

**4.2.9** Eligible REDD activities include:

- 1) Avoiding Planned Deforestation and/or Degradation (APDD): This category includes activities that reduce net GHG emissions by stopping or reducing deforestation or degradation on forest lands that are legally authorized and documented for conversion, noting the following:
  - a) This practice can occur in degraded to mature forests.
  - b) Planned deforestation can encompass a wide variety of activities where forest land is converted to non-forest land, including inter alia:
    - i) National resettlement programs from non-forested to forested regions.
    - ii) National land plans to reduce the forest estate and convert it to industrial-scale production of commodities such as soybeans, pulpwood and oil palm, where the converted land would not qualify as forest land.
    - iii) Plans to convert community-owned forests to other non-forest uses.
    - iv) Planned forest conversion for urban, rural and infrastructure development.
  - c) Planned degradation includes activities where a forest system would have been cleared and replaced by a different forest system with a lower carbon stock and where the recovery of timber was not the primary objective of the initial forest clearance. For example, national land plans to reduce the forest estate and convert it to industrial-scale production of commodities such as pulpwood and oil palm, where the converted land would still meet the country definition of forest land, are considered planned degradation.
  - d) Avoided planned deforestation and degradation can include decisions by individual land owners, governments, or community groups, whose land is legally zoned for agriculture, not to convert their forest(s) to crop production or biofuel plantations. For example, a community may determine that GHG credits from forest protection are more valuable than the potential revenue from crop or commodity production. Similarly, an owner of land zoned for conversion to agriculture or urban development may choose to protect forested lands by partnering with a conservation organization, either in a joint management agreement or an outright sale.
  - e) Avoiding planned degradation in a managed forest (eg, legally sanctioned timber extraction) is an eligible activity under IFM.

Note - Activities that only reduce or avoid logging, followed by protection, on forest lands legally designated or sanctioned for forest products are eligible as IFM activities.

- 2) Avoiding Unplanned Deforestation and/or Degradation (AUDD): This category includes activities that reduce net GHG emissions by stopping deforestation and/or degradation of degraded to mature forests that would have occurred in any forest configuration, noting the following:
  - a) Unplanned deforestation and/or degradation can occur as a result of socio-economic forces that promote alternative uses of forest land and the inability of institutions to control these activities. Poor law enforcement and lack of property rights can result in

piecemeal conversion of forest land. Unplanned deforestation and/or degradation activities can include, inter alia, subsistence farming or illegal logging occurring on both public lands legally designated for timber production and on public or communal lands that are poorly managed or otherwise degraded.

- b) Methodologies may be designed for frontier and/or mosaic configurations, which are described as follows:
- i) The frontier deforestation and/or degradation pattern can result from the expansion of roads and other infrastructure into forest lands. Roads and other infrastructure can improve forest access and lead to increased encroachment by human populations, such as subsistence farming and fuelwood gathering on previously inaccessible forest lands.
  - ii) The mosaic deforestation and/or degradation pattern can result when human populations and associated agricultural activities and infrastructure are spread out across the forest landscape. In a mosaic configuration most areas of the forest landscape are accessible to human populations.

Mosaic deforestation and/or degradation typically occur: where population pressure and local land use practices produce a patchwork of cleared lands, degraded forests, secondary forests of various ages, and mature forests; where the forests are accessible; and where the agents of deforestation and/or degradation are present within the region containing the area to be protected.

### Avoided Conversion of Grasslands and Shrublands (ACoGS)

- 4.2.10** Eligible ACoGS activities are those that reduce net GHG emissions by reducing the conversion of grassland and shrubland ecosystems to other land uses with lower carbon densities. Eligible avoided conversion activities include avoiding, at a minimum, the removal/replacement of vegetation and may also include avoiding soil disturbance. There is no specific requirement with respect to the post-conversion land use that would have occurred in the baseline scenario.
- 4.2.11** The project area shall be native grasslands (including savanna) and/or shrublands (including chaparral). Non-forested wetlands, including peatlands, are not eligible under ACoGS and are covered under other AFOLU project categories.
- 4.2.12** Avoiding conversion of ecosystems can affect GHG emissions in a number of ways. Avoiding the conversion of grasslands and shrublands to cropland can reduce emissions from both soil and biomass carbon pools, with the bulk of avoided emissions likely coming from the soil carbon pool. Avoiding conversion to cropland can also reduce emissions of N<sub>2</sub>O that are associated with fertilizer use and other agricultural practices that would have occurred following conversion. Avoiding conversion of shrublands or savanna to agriculture or development uses can reduce GHG emissions associated with the activities of clearing aboveground woody biomass.

**4.2.13** Activities covered under the ACoGS project category are those that are designed to stop planned (designated and sanctioned) conversion or unplanned (unsanctioned) conversion on public or private lands. This category type only includes avoided conversion of non-forested lands, noting that other management activities on non-forested land may qualify under ALM or ARR project categories.

**4.2.14** For both avoided planned conversion and avoided unplanned conversion, spatially explicit analysis is required to demonstrate that lands included in the project area are economically and physically suitable for the type of conversion being avoided. For example, where protecting lands from conversion to cropland, areas that are too steep, rocky, infertile for crops, or otherwise not viable for agricultural use shall be considered unsuitable for conversion. The spatial analysis shall take into account local land use practices that may include the conversion of marginally suitable lands due to subsidies or population pressures. Unsuitable lands shall be excluded from baseline conversion scenarios.

**4.2.15** Eligible ACoGS activities include:

- 1) Avoiding Planned Conversion (APC): This category includes activities that reduce net GHG emissions by stopping conversion of grasslands or shrublands that are legally authorized and documented for conversion.

Planned conversion may include decisions by individual land owners or community groups, whose land is legally zoned for agriculture or other development, not to convert their land(s). Similarly, an owner of land zoned for conversion to agriculture or development may choose to protect lands by partnering with an NGO or conservation organization either in a joint management agreement, conservation easement, or outright sale or lease.

- 2) Avoiding Unplanned Conversion (AUC): This category includes activities that reduce net GHG emissions by stopping unplanned conversion of grasslands or shrublands.

Unplanned conversion can occur as a result of socio-economic forces that promote alternative uses of native grasslands or shrublands and the inability of institutions to control these activities. Poor law enforcement and weak or lacking property rights can result in piecemeal land conversion. Unplanned conversion activities may include, inter alia, subsistence agriculture, unsanctioned commercial agriculture and collection of biomass fuel where such collection would result in land conversion.

## Wetlands Restoration and Conservation (WRC)

**4.2.16** Eligible WRC activities are those that increase net GHG removals by restoring wetland ecosystems or that reduce GHG emissions by rewetting or avoiding the degradation of wetlands. The project area shall meet an internationally accepted definition of wetland, such as from the IPCC, Ramsar Convention on Wetlands, those established by law or national policy, or those with broad agreement in the peer-reviewed scientific literature for specific countries or types of wetlands. Common wetland types include peatland, salt marsh, tidal freshwater marsh, mangroves, wet floodplain forests, prairie potholes and seagrass meadows. WRC activities may

be combined with other AFOLU project categories, as further explained in Section 4.2.20.

- 4.2.17** Avoiding the degradation or conversion of a wetland can reduce GHG emissions by preventing the release of carbon stored in wetland soils and vegetation. Many wetlands rely on a natural supply of sediments to support soil formation. Sediment supply may be interrupted by a physical alteration to the landscape, such as a river diversion, canal construction or isolation of wetlands behind man-made structures (eg, road or rail embankments, levees or dams).

Restoring wetland ecosystems reduces and/or removes GHG emissions by creating the necessary physical, biological or chemical conditions that enhance carbon sequestration. Activities that affect the hydrology of the project area are only eligible where changes in hydrology result in the accumulation or maintenance of soil carbon stock.

- 4.2.18** A peatland is an area with a layer of naturally accumulated organic material (peat) at the surface (excluding the plant layer). Peat originates due to water saturation, and peat soils are either saturated with water for long periods or have been artificially drained. Common peatland types include peat swamp forest, mire, bog, fen, moor, muskeg and pocosin. Rewetting of drained peatland and the conservation of undrained or partially drained peatland are sub-categories of restoring wetland ecosystems and conservation of intact wetlands, respectively<sup>3</sup>. These activities reduce GHG emissions by rewetting or avoiding the drainage of peatland. There are specific requirements regarding reductions of GHG emissions from fire (as set out in Sections 4.2.19, 4.4.14, 4.5.24, 4.5.32 and 4.5.33).

- 4.2.19** Activities that generate net reductions of GHG emissions from wetlands are eligible as WRC projects or combined category projects (such as REDD on peatland). Activities that actively lower the water table depth in wetlands are not eligible. Eligible WRC activities include:

- 1) Restoring Wetland Ecosystems (RWE): This category includes activities that reduce GHG emissions or increase carbon sequestration in a degraded wetland through restoration activities. Such activities include enhancing, creating and/or managing hydrological conditions, sediment supply, salinity characteristics, water quality and/or native plant communities. For the purpose of these requirements, restoration activities are those that result in the reestablishment of ecological processes, functions, and biotic and/or abiotic linkages that lead to persistent, resilient systems integrated within the landscape, noting the following:
  - a) Restoration or management of water table depth (eg, the rewetting of peatlands, the reintroduction of river flows to floodplains, or the reintroduction of tidal flows to coastal wetlands) implies long-term and measurable changes in water table depth that sequester carbon and/or reduce emissions. Methodologies shall establish the appropriate change in water table depth (such as raising, lowering or restoring hydrological function) that is

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<sup>3</sup> These categories existed as rewetting drained peatlands (RDP) and conservation of undrained and partially drained peatlands (CUPP) in the *AFOLU Requirements v3.2*.

expected for eligible project activities, considering the following baseline scenario conditions:

- i) Drained wetlands have a water table depth that is lower than the natural average annual water table depth due to accelerated water loss or decreased water supply resulting from human activities and/or construction, either on- and/or off-site. Baseline activities include purposeful draining through pumping, ditching, stream channelization, levee construction, and purposeful decreases in water supply through dams and water diversions. Examples of this include selectively logged peatland swamp forests in Southeast Asia impacted by logging canals or wetlands with water tables lowered for agriculture.

Activities shall raise the average annual water table depth in a drained wetland by partially or entirely reversing the existing drained state. Rewetting does not require the restoration of the average annual water table depth to the level of the soil or peat surface. However, RWE projects shall raise the water table depth close to the surface in order to be eligible to generate GHG credits. A clear relationship between GHG emissions and water table depth in wetlands, including peatlands<sup>4</sup> has been established in scientific literature with most changes in emissions occurring with water table depths close to the surface. This relationship is most dramatic on highly-organic soils (eg, peatland). On such sites, activities that establish a higher water table depth compared to the baseline scenario can be eligible where they measurably decrease the rate of soil subsidence due to oxidation to decrease or cease within the project crediting period, and where the permanence requirements set out in Section 4.5.27 can be satisfied.

- ii) Impounded wetlands have a water table that has been artificially raised, intentionally or unintentionally, as a result of impaired natural drainage behind a constructed feature and can result in CH<sub>4</sub> emissions. Examples of impounded wetlands include flooded areas behind artificial barriers to natural drainage (such as road or rail embankments or levees), flooded areas for the purpose of subsidence reversal, man-made reservoirs and fish and shrimp ponds.

Activities that restore hydrological function to an impounded wetland or lower the water table depth shall restore hydrological flow, considering the dynamics of the system and the hydrological connectivity necessary to maintain carbon stock and GHG fluxes.

- iii) Open water is an area continuously flooded or subject to natural periods of flooding, without in-situ vegetation contributing to soil carbon accumulation. Wetlands convert to open water in response to impaired sediment supply, sea level rise and/or impaired water quality.

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<sup>4</sup> For a literature review see Couwenberg, J, Dommain, R, Joosten, H. 2010. *Greenhouse gas fluxes from tropical peatlands in south-east Asia*. *Global Change Biology* 16: 1715-1732.

Activities that restore hydrological function to an open water wetland shall restore the hydrological flow, considering the dynamics of the system and the hydrological connectivity necessary to maintain carbon stock and GHG fluxes.

- b) RWE projects may generate GHG credits from the reduction of GHG emissions associated with avoiding peat fires on drained or partially drained peatlands. Fire-related activities on peatlands that exclude rewetting as part of the project are not eligible, because fire reduction activities on drained peatland are unlikely to be effective over the long term without rewetting.

Note – Activities that increase net GHG removals through carbon sequestration by restoring soil carbon sequestration conditions (eg, peat-forming conditions) are eligible under RWE. The restoration of conditions that favor soil carbon sequestration requires high water table depths over the long term and the presence of vegetation that produces soil carbon. Carbon sequestration rates resulting from rewetting and restoring drained non-tidal wetlands tend to be low on a unit-per-land area basis compared to GHG emissions reduced by avoiding soil carbon oxidation. Soil carbon sequestration restoration is therefore considered to have a relatively small contribution to GHG mitigation from non-tidal RWE projects. Soil carbon sequestration in tidal wetlands can be relatively rapid compared to non-tidal wetlands and will typically be expected to contribute significantly to the GHG mitigation effectiveness of RWE projects. Methodologies for forecasting soil carbon sequestration in tidal wetlands may be proposed, noting that they shall separate the sequestration of carbon as a result of project activities from the deposit of carbon rich soil into the project area as a result of sedimentation, (as set out in Section 4.5.28).

- 2) Conservation of Intact Wetlands (CIW): This category includes activities that reduce GHG emissions by avoiding degradation and/or the conversion of wetlands that are intact or partially altered while still maintaining their natural functions, including hydrological conditions, sediment supply, salinity characteristics, water quality and/or native plant communities.

Wetland degradation or conversion can be planned (designated and sanctioned) or unplanned (unsanctioned). Planned and unplanned degradation or conversion of wetlands can therefore encompass a wide variety of activities such as those listed under REDD while adding a wetland component. Activities covered under the CIW project category are those that are designed to stop or reduce planned or unplanned degradation or conversion in the project area to other land uses. The following CIW activities are eligible:

- a) Avoiding Planned Wetland Degradation (APWD): This activity reduces GHG emissions by avoiding degradation of wetlands, or further degradation in partially drained wetlands that are legally authorized and documented for conversion.
- b) Avoiding Unplanned Wetland Degradation (AUWD): This activity reduces GHG emissions by avoiding unplanned degradation of wetlands, or by avoiding further degradation in partially degraded wetlands. Unplanned wetland degradation can occur as a result of socio-economic forces that promote alternative uses of wetlands and the inability of institutions to control these activities. Poor law enforcement and weak or lack of property

rights can result in piecemeal wetland conversion. Unplanned conversion activities may include, inter alia, subsistence farming, illegal logging, unsanctioned commercial agriculture and collection of biomass fuel where such collection would result in land conversion subsistence agriculture.

Note – Activities where drainage is continued or maintained are not eligible. This includes, for example, projects that require the maintenance of drainage channels to maintain the pre-project drainage level on a partially drained peatland (eg, where periodic deepening may be needed to counteract peat subsidence). Projects that allow selective harvesting that results in a lowering of the water table depth (eg, by extracting timber using drainage canals) or affects the ability of vegetation to act as a major hydrological regulation device (eg, extracting trees which support the peat body) are also not eligible. Project activities may include selective harvesting where harvesting does not lower the water table, for example by extracting timber using wooden rails instead of drainage canals.

Note – WRC activities that are unable to establish and demonstrate a significant difference in the net GHG benefit between the baseline and project scenarios for at least 100 years are not eligible, as set out in Section 4.5.29.

**4.2.20** Activities that generate net GHG emission reductions by combining other AFOLU project activities with wetlands restoration or conservation activities are eligible as WRC combined projects. RWE may be implemented without further conversion of land use or it may be combined with ARR, ALM, IFM, REDD or ACoGS activities, referred to as ARR+RWE, ALM+RWE, IFM+RWE, REDD+RWE or ACoGS+RWE, respectively. CIW may be implemented on non-forest land or combined with IFM, REDD or ACoGS activities, referred to as IFM+CIW, REDD+CIW or ACoGS+CIW, respectively.

Table 1 illustrates the types of WRC activities that may be combined with other AFOLU project categories. The table identifies the applicable AFOLU requirements that shall be followed for combined category projects, based on the condition of the wetland in the baseline scenario, the land use in the baseline scenario and the project activity.

**Table 1: Eligible WRC Combined Category Projects**

Baseline Scenario		Project Activity	Applicable Guidance
Condition	Land Use		
Degraded wetland (including, drained, impounded, and with interrupted sediment	Non-forest (including aquacultures, grasslands and shrublands )	Restoration of wetlands*	RWE
		Restoration of wetlands* and revegetation or conversion to forest	ARR+RWE
		Restoration of wetlands* and conversion to wetland agriculture (including paludiculture)	ALM+RWE
		Restoration of wetlands* and avoided conversion of grasslands or shrublands	ACoGS+RWE

supply)	Forest	Restoration of wetlands*	RWE
	Forest with deforestation/ degradation	Restoration of wetlands* and avoided deforestation/degradation	REDD+RWE
	Forest managed for wood products	Restoration of wetlands* and improved forest management	IFM+RWE
Non-wetland or open water	Non-forest	Creation of wetland conditions and afforestation, reforestation or revegetation	ARR+RWE
	Open water or impounded wetland	Creation or restoration of conditions for vegetation development and afforestation, reforestation or revegetation	ARR+RWE
Intact wetland	Non-forest (including grasslands and shrublands)	Avoided drainage and/or interrupted sediment supply	CIW
		Avoided conversion to open water or impounded wetland (including excavation to create fish ponds)	CIW
		Avoided drainage and/or interrupted sediment supply and avoided conversion of grasslands and shrublands	ACoGS+CIW
	Forest	Avoided drainage and/or interrupted sediment supply	CIW
		Avoided conversion to open water or impounded wetland	CIW
	Forest with deforestation/ degradation	Avoided drainage and/or interrupted sediment supply and avoided deforestation/degradation	REDD+CIW
		Avoided conversion to open water or impounded wetland and avoided deforestation/degradation	REDD+CIW
	Forest managed for wood products	Avoided drainage and/or interrupted sediment supply and improved forest management	IFM+CIW

\* *Restoration of wetlands* includes all the activities set out in Section 4.2.19(1).

The eligible WRC combined categories are further elaborated below:

- 1) ARR on Wetland (ARR+RWE): RWE may be implemented in combination with ARR, for example by planting a native or adapted tree or shrub species on peatland or in mangroves. While existing oxidation in drained conditions is accounted for in the baseline, ARR activities on peatland shall not enhance peat oxidation, therefore this activity requires at least some degree of rewetting. ARR+RWE on already drained peatland without full rewetting is

permitted in cases where the biomass carbon stock increases more than the peat carbon stock decreases by oxidation over a period of centuries.<sup>5</sup>

Note – ARR activities that involve nitrogen fertilization, active peatland drainage or lowering of the water table depth, such as draining in order to harvest, are not eligible project activities, as they are likely to enhance net GHG emissions. Activities involving selective logging, combined with artificial drainage and/or construction of channels to extract the timber are not eligible as these may result in decomposition and subsidence of the peat which could be accompanied by an increase in CO<sub>2</sub> emissions or additional GHG fluxes.

- 2) ALM on Wetland (ALM+RWE): This is an eligible activity if the water table depth of an agricultural wetland is raised to a level that can still support agriculture. The following ALM+RWE practices qualify as eligible activities:
- a) Rewetting a wetland combined with adapted wet agriculture that includes the cultivation of biomass on undrained or rewetted wetland. The wetland shall be sufficiently wet so as to avoid long-term net soil organic carbon losses as set out in Section 4.5.27.
  - b) Improved grassland management activities that reduce overgrazing, high-intensity use and gully erosion for reducing peat erosion on sloping peatlands. In many steppe and mountain regions with dry climates, and also in cold or humid regions (“blanket bogs”), peatlands are the most productive and attractive, or the only available, lands for grazing. Overgrazing on sloping peatlands, frequently leads to vegetation damage and peat soil degradation.
  - c) Improved cropland and grassland management activities that reduce wind erosion on peatlands that are devegetated or sparsely vegetated due to overgrazing, soil degradation or crop production.

Note – ALM activities that involve regular tillage and/or nitrogen fertilization on wetland soil or that actively lower the water table depth in wetlands are not eligible project activities.

- 3) IFM, REDD and ACoGS on Wetland (IFM+RWE, IFM+CIW, REDD+RWE, REDD+CIW, ACoGS+RWE and ACoGS+CIW): RWE and CIW may be implemented in combination with IFM, REDD and ACoGS project activities. Such activities reduce GHG emissions by increasing, or avoiding the loss of, forest, shrubland or grassland carbon stocks, and avoiding the drainage required to undertake such baseline activities, noting the following:
- a) IFM, REDD and ACoGS project activities on wetlands shall not increase drainage. With respect to the forest biomass component, the requirements provided for IFM, REDD or ACoGS apply.

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<sup>5</sup> For more information on the relationship between biomass carbon stock increases and peat carbon stock decreases, see Laine, J. & Minkinen, K. 1996. *Forest drainage and the greenhouse effect*. In: Vasander, H. (Ed.) Peatlands in Finland. Finnish Peatland Society, Helsinki, pp 159-164.

- b) For IFM+CIW projects on peatland that include harvesting activities in the project scenario, selective harvesting shall not significantly affect the hydrology of the peat layer and cause peat decomposition. Where the peat layer in the baseline scenario is partially drained, the effect of harvesting on top soil hydrology is likely to be much less significant. CIW projects that have clear-cut or patch-cut harvesting activities are not eligible.
- c) For IFM+RWE projects, activities that avoid fire of a peat layer are eligible for crediting. IFM activities focusing solely on the reduction of forest fires are not eligible under AFOLU, as set out in Section 4.2.4.

**4.2.21** Many seagrass meadows sit upon significant stocks of soil carbon. Degradation of seagrass meadows likely increases the vulnerability of carbon stocks to disturbance and recirculation. Increases in CO<sub>2</sub> in the water column from decomposition of seagrass bed carbon stocks will lead to an increased CO<sub>2</sub> flux to the atmosphere, although the flux to the atmosphere could be reduced by dissolution of the carbonate soils underlying some seagrass meadows or by the export of CO<sub>2</sub>-enriched waters to deeper waters below the mixing depth. Methodologies shall include credible methods for quantifying and forecasting GHG emissions to the atmosphere associated with seagrass degradation.

**4.2.22** Peat may be used as fuel, soil improver or horticultural substrate. Due to the existence of extensive local, regional and global markets, projects that avoid peat mining are likely to suffer significant (and potentially 100 percent) leakage emissions and therefore are not eligible. Project activities that serve the demand side and avoid peat mining by providing alternatives for peat as fuel or substrate, are outside the scope of AFOLU but may qualify under another sectoral scope.

## 4.3 PROJECT BOUNDARY

### General

**4.3.1** The relevant carbon pools for AFOLU project categories are aboveground tree biomass (or aboveground woody biomass, including shrubs, in ARR, ALM and ACoGS projects), aboveground non-tree biomass (aboveground non-woody biomass in ARR and ALM projects), belowground biomass, litter, dead wood, soil (including peat) and wood products. Methodologies shall include the relevant carbon pools set out in Table 2 below.

**Table 2:** Carbon Pools to be Considered in Methodologies

		Above-ground tree* biomass	Above-ground non-tree* biomass	Below-ground biomass	Litter	Dead wood	Soil	Wood products
ARR		Y	S	S	S	S	S	O
ALM		S	N	O	N	N	Y	O
IFM	Reduced Impact Logging (RIL) with no or minimal (<25%) effect on total timber extracted	Y	N	O	N	Y	N	N
	Reduced Impact Logging (RIL) with at least 25% reduction in timber extracted	Y	N	O	N	Y	N	Y
	Logged to Protected Forest (LtPF)	Y	N	O	N	Y	N	Y
	Extended Rotation Age (ERA)	Y	N	O	N	O	N	O
	Low-productive to High-productive Forests (LtHP)	Y	N	O	N	O	O	O
REDD	Planned or unplanned deforestation/degradation (APD or AUDD) with annual crop as the land cover in the baseline scenario	Y	O	O	N	O	O	S
	Planned or unplanned deforestation/degradation (APD or AUDD) with pasture grass as the land cover in the baseline scenario	Y	O	O	N	O	N	S
	Planned or unplanned deforestation/degradation (APD or AUDD) with perennial tree crop <sup>6</sup> as the land cover in the baseline scenario	Y	Y	O	N	O	N	S
ACoGS	Planned or unplanned conversion	O	O	O	O	O	O	N
WRC		Y	O	O	N	O	Y	O

<sup>6</sup> Common perennial crops include oil palm, bananas, other fruit trees, spice trees, tea shrubs, and the like, which may or may not meet the definition of a tree used within a host country.

- Y: Carbon pool shall be included in the project boundary.
- S: Carbon pool shall be included where project activities may significantly reduce the pool, and may be included where baseline activities may significantly reduce the pool, as set out in Sections 4.3.7 to 4.3.25. The methodology shall justify the exclusion or inclusion of the pool in the project boundary.
- N: Carbon pool does not have to be included, because it is not subject to significant changes or potential changes are transient in nature. The pool may be included in the project boundary because of positive impacts to reducing or removing emissions. Where the carbon pool is included in the project boundary, methodologies shall establish criteria and procedures to set out when a project proponent may include the pool.
- O: Carbon pool is optional and may be excluded from the project boundary. Where the pool is included in the methodology, the methodology shall establish criteria and procedures to set out when a project proponent shall or may include the pool.
- \* For ARR, ALM and ACoGS projects, in place of “Aboveground tree” and “Aboveground non-tree”, these two carbon pool categories should be read as “Aboveground woody” and “Aboveground non-woody” respectively.

**4.3.2** Additional guidance and further requirements with respect to specific carbon pools and GHG sources are set out below in Sections 4.3.7 to 4.3.25.

**4.3.3** Specific carbon pools and GHG sources, including carbon pools and GHG sources that cause project and leakage emissions, may be deemed *de minimis* and do not have to be accounted for if together the omitted decrease in carbon stocks (in carbon pools) or increase in GHG emissions (from GHG sources) amounts to less than five percent of the total GHG benefit generated by the project. The methodology shall establish the criteria and procedures by which a pool or GHG source may be determined to be *de minimis*. For example, peer reviewed literature or the CDM A/R methodological tool *Tool for testing significance of GHG emissions in A/R CDM project activities* may be used to determine whether decreases in carbon pools and increases in GHG emissions are *de minimis*.

Further, the following GHG sources may be deemed *de minimis* and need not be accounted for:

- 1) ARR, IFM and REDD: N<sub>2</sub>O emissions from project activities that apply nitrogen containing soil amendments and N<sub>2</sub>O emissions caused by microbial decomposition of plant materials that fix nitrogen. ALM projects that apply nitrogen fertilizer and/or manure or plant nitrogen fixing species shall account for N<sub>2</sub>O emissions.
- 2) ARR, IFM, REDD, ACoGS and WRC: GHG emissions from the removal or burning of herbaceous vegetation and collection of non-renewable wood sources for fencing of the project area.
- 3) ARR, IFM, REDD, ACoGS and WRC: Fossil fuel combustion from transport and machinery use in project activities. Where machinery use for selective harvesting activities may be significant in IFM project activities as compared to the baseline or where machinery use for earth moving activities may be significant in WRC project activities as compared to the baseline, emissions shall be accounted for if above *de minimis*, in accordance with this Section 4.3.3. Fossil fuel combustion from transport and machinery use in rewetting of drained peatland and conservation of peatland project activities need not be accounted for.

- 4.3.4** Specific carbon pools and GHG sources do not have to be accounted for if their exclusion leads to conservative estimates of the total GHG emission reductions or removals generated. The methodology shall establish criteria and procedures by which a project proponent may determine a carbon pool or GHG source to be conservatively excluded. Such conservative exclusion may be determined by using tools from an approved GHG program, such as the CDM A/R methodological tool *Procedure to determine when accounting of the soil organic carbon pool may be conservatively neglected in CDM A/R project activities*, or by using peer-reviewed literature.
- 4.3.5** Reductions of N<sub>2</sub>O and/or CH<sub>4</sub> emissions are eligible for crediting if in the baseline scenario the project area would have been subject to livestock grazing, rice cultivation, burning and/or nitrogen fertilization.
- 4.3.6** Reductions of CH<sub>4</sub> emissions are eligible for crediting if fire would have been used to clear the land in the baseline scenario.

## ARR

- 4.3.7** Where the methodology is applicable to projects that may reduce the aboveground non-woody biomass, belowground biomass, litter, dead wood or soil pools above *de minimis* (as set out in Section 4.3.3), the relevant carbon pool shall be included in the project boundary.

## ALM

- 4.3.8** Where the methodology is applicable to projects with livestock grazing in the project or baseline scenario, CH<sub>4</sub> emissions from enteric fermentation and CH<sub>4</sub> and N<sub>2</sub>O emissions from manure shall be included in the project boundary.
- 4.3.9** Where land-use conversion requires intensive energy inputs or infrastructure development, such as the establishment of irrigation or drainage systems, the methodology shall include the GHG emissions associated with the conversion process in the project boundary.
- 4.3.10** Where energy-conserving practices reduce emissions of CO<sub>2</sub>, such as adopting no-till practices to reduce fuel use, the methodology may include these GHG emissions reductions in the project boundary.
- 4.3.11** Where activities convert drained, farmed organic soils to perennial non-woody vegetation and reduce or eliminate drainage to reduce CO<sub>2</sub> and N<sub>2</sub>O emissions from organic soils, such activities may increase CH<sub>4</sub> emissions. Methodologies applicable to such activities shall include CH<sub>4</sub> emissions in the project boundary.

## IFM

- 4.3.12** IFM methodologies applicable to activities that reduce harvested timber shall account for the GHG emissions associated with changes in the wood products pool to avoid overestimating project net GHG benefits. The quantity of live biomass going into wood products shall be quantified where above *de minimis* (as set out in Section 4.3.3).
- 4.3.13** For IFM activities, changes in soil carbon are likely to be *de minimis* for forests on mineral upland soils, though they could be considerably above *de minimis* for forests growing in wetland areas such as peatland forests or mangroves. Although it may be conservative to omit the soil carbon pool for such projects, additional GHG credits may be available if the soil carbon pool is included. Therefore, the pool may be included in the project boundary.
- 4.3.14** RIL and LtPF methodologies shall include the dead wood carbon pool in the project and baseline scenario. Both of these activities reduce the amount of timber extracted per unit area, which, in turn, may reduce the dead wood pool in the project scenario.
- 4.3.15** Accounting for the dead wood carbon pool in ERA methodologies is complex because GHG emissions will depend on how post-harvest slash is treated. Slash may either be piled and burned on site, as typically happens in fire prone areas, or left on site to decompose. Extending a harvest rotation or cutting cycle would result in larger trees at harvest, which would increase the amount of dead wood produced at each harvest, but not necessarily the total amount of dead wood produced over time. Because the dead wood pool may increase above the *de minimis* in the baseline or project scenario, this carbon pool is deemed optional.

## REDD

- 4.3.16** Where timber removal is associated with deforestation and/or degradation in the baseline scenario, the wood product pool shall be included in the project boundary because significant quantities of carbon can be stored in wood products instead of entering the atmosphere during deforestation. The quantity of live biomass going into wood products shall be quantified if above *de minimis* (as set out in Section 4.3.3) or may be conservatively excluded (as set out in Section 4.3.4).
- 4.3.17** Where the baseline scenario is the conversion of forest to annual crops, additional GHG credits may be available if the soil carbon pool is included because decreases in soil carbon stocks in the baseline scenario can be significant.

## ACoGS

- 4.3.18** Grasslands and shrublands are highly variable in their above- and belowground biomass, so the relevant carbon pools will vary. Non-forest land commonly generates negligible amounts of wood products, hence the pool is not required for ACoGS. All other pools are optional for ACoGS activities, because none of the carbon pools are expected to decrease with the project activity.

Soil carbon is likely to be the carbon pool that generates the most GHG emission reductions in ACoGS projects. In addition, in non-forested ecosystems, the belowground biomass pool is often several times larger than the aboveground biomass pools<sup>7</sup>. Methodologies shall set out the carbon pools that shall or may be included in the project boundary.

- 4.3.19** Grazing is a common practice in many grassland and some shrubland ecosystems. As such, livestock grazing does not preclude ACoGS project eligibility, and grazing may continue on project areas. Projects that incorporate improved grazing practices shall follow the Improved Grassland Management requirements for such activities in the ALM category. Such activities may provide GHG benefits in addition to those achieved by avoiding conversion under this ACoGS category. Where livestock grazing may be present in the project scenario, methodologies shall set out criteria and procedures to account for CH<sub>4</sub> emissions from enteric fermentation and CH<sub>4</sub> and N<sub>2</sub>O emissions from manure. Where grazing occurs in both the baseline and project scenarios, net changes in CH<sub>4</sub> and N<sub>2</sub>O associated with grazing may be deemed *de minimis* and excluded in accordance with Sections 4.3.3 and 4.3.4.
- 4.3.20** Where the baseline scenario may include conversion to cropland, methodologies may include CH<sub>4</sub> and N<sub>2</sub>O emissions from fertilizer application (manure or synthetic) in the baseline and project scenarios.
- 4.3.21** Where the baseline scenario may include the conversion of vegetation to perennial crops, such as where oil palm or short-rotation woody crops would be planted, the aboveground woody and non-woody biomass pools shall be included.

## WRC

- 4.3.22** Combined category projects shall apply the relevant WRC requirements for the soil carbon pool and the respective non-WRC AFOLU project category requirements for the other pools, unless the former may be deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4)
- 4.3.23** Methodologies shall include CH<sub>4</sub> emissions in the project boundary (for example, transient peaks of CH<sub>4</sub> that may arise after rewetting peatland). The methodology shall establish the criteria and procedures by which the CH<sub>4</sub> source may be deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4)
- 4.3.24** For RWE projects, N<sub>2</sub>O emissions shall be included in the project boundary. The methodology shall establish the criteria and procedures by which the N<sub>2</sub>O source may be deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4).

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<sup>7</sup> Mokany, K., R. J. Raison, and A. S. Prokushkin. 2006. Critical analysis of root: shoot ratios in terrestrial biomes. *Global Change Biology* 12:84-96.

- 4.3.25** For project activities implemented on coastal wetlands, methodologies shall establish criteria and procedures for establishing the geographic boundary that considers projections of expected relative sea level rise. The procedures shall account for the potential effect of sea level rise on the lateral movement of wetlands during the project crediting period and the potential that the wetlands will migrate beyond the project boundary.

## 4.4 BASELINE SCENARIO

### General

- 4.4.1** The determination and establishment of a baseline scenario shall follow an internationally accepted GHG inventory protocol, such as the *IPCC 2006 Guidelines for National GHG Inventories*.

### ARR

- 4.4.2** (No specific requirements)

### ALM

- 4.4.3** The criteria and procedures for establishing the baseline scenario shall require the project proponent to take into account current and previous management activities. The quantification of the baseline scenario may be determined from measured inventory estimates and/or activity-based estimation methods, such as those found in the *IPCC 2006 Guidelines for National GHG Inventories*.

### IFM

- 4.4.4** Methodologies that establish criteria and procedures for establishing the baseline scenario using a project method, rather than a performance method (see *VCS Standard* for further information on project and performance methods), shall require the following:
- 1) Documented evidence of the project proponent's operating history, such as five or more years of management records, to provide evidence of normal historical practices. Management records may include, *inter alia*, data on timber cruise volumes, length of roads and skid trails, inventory levels, and harvest levels within the project area. Where the project proponent or implementing partner is a new owner or management entity and does not have a history of management practices within the project area, procedures shall be established to identify the most plausible baseline scenario based upon the most likely owner or operator, noting the following:
    - a) For RIL and LtPF projects, where the project proponent takes over ownership or management of a property specifically to implement the project, the baseline scenario shall represent the most likely management plan of the most likely owner or operator (ie, be based on the projected management plans of the previous property owners and/or

operators or the management plans of the most likely operator).

- b) In all other cases, the baseline scenario shall reflect the local common practices and legal requirements. However, if the common practice is unsustainable and unsustainable practices are inconsistent with the mission or the historical management practices of the new owner or management entity, then a sustainable baseline is the minimum that can be adopted.
- 2) Adherence to the legal requirements for forest management and land use in the area unless verifiable evidence is provided demonstrating that common practice in the area does not adhere to such requirements.
  - 3) Baseline environmental management practices shall not be set below (ie, be less environmentally robust than) those commonly considered a minimum standard among similar landowners in the area. For example, where common practice exceeds minimum legal practice, the baseline cannot be the minimum legal requirement and the baseline scenario shall, at a minimum, be based on common practice.

## REDD

- 4.4.5** The baseline for REDD projects is comprised of a land-use and land-cover (LU/LC) change component and a carbon stock change component. These components may be addressed separately in a methodology as their scale of analysis may differ.
- 4.4.6** For inclusion of the non-CO<sub>2</sub> gases, evidence shall be provided to demonstrate that the practice for which the project plans to claim credit is not common practice in the area. The guidance in the IPCC 2003 Good Practice Guidelines for LULUCF and the *IPCC 2006 Guidelines for National GHG Inventories* may be used to estimate such GHG emissions.
- 4.4.7** Determination and establishment of the LU/LC change component of the baseline is handled differently for the two eligible REDD activity types, as follows:
- 1) APD: The criteria and procedures for establishing the baseline scenario shall require the project proponent to provide verifiable evidence to demonstrate, based on government plans (for publicly owned and managed land), community plans (for publicly owned and community-managed land), concessionary plans (for publicly owned and concession-holder managed) or landowner plans (for privately owned land), that the project area was intended to be cleared. The baseline scenario shall take into account the following:
    - a) Where it is common practice in the area for timber to be removed before clearing, wood products shall be included in the baseline scenario.
    - b) Where the agent of deforestation is not the landowner (eg, in situations where the project proponent successfully outcompeted other agents to acquire a government concession or privately-owned lands) and the project can identify the most-likely agent of deforestation, the baseline scenario shall be determined based on the activities of the most-likely agent who would have acquired control of and cleared the project area.

- c) Where the agent of deforestation is not the landowner and cannot be specifically identified, the criteria and procedures for establishing the baseline scenario may be determined based on the most-likely-class of deforestation agents and the intent to deforest. This may be demonstrated through a historical analysis of similar deforestation within the region by the identified most-likely class of deforestation agents. The most-likely-class of deforestation agents are the entities (eg, individuals, companies or associations) classified based on common characteristics and rates of deforestation that would have been likely to undertake deforestation activities and post-deforestation land-use practices in the project area. The annual rate of forest conversion shall be based on the recent historical practice of the most-likely class (ie, how much forest is typically cleared each year by similar baseline activities) and projection of the rate of their deforestation activities in the area.
- 2) AUDD: The criteria and procedures for establishing the baseline scenario shall require the project proponent to take into account deforestation/degradation that would have occurred in the project area during the project crediting period. The baseline scenario shall take into account the following:
- a) Methodologies shall set out criteria and procedures to identify where deforestation would likely occur using spatial analysis and projections (except for certain mosaic configurations as set out in Section 4.4.7(2)(c)). Such analysis shall be based on historical factors over at least the previous 10 years that explain past patterns and can be used to make future projections of deforestation.
  - b) In the frontier configuration, most of the forest area to be protected will have low rates of historical deforestation and/or degradation because most of the project area was not accessible in the past to the agents of deforestation/degradation expected to encroach during the project crediting period. Where the expansion of the deforestation frontier into the project area is linked to the development of infrastructure (eg, roads) that does not yet exist, clear evidence shall be provided to demonstrate that such infrastructure would have been developed in the baseline scenario. Evidence may include permits, maps showing construction plans, construction contracts or open tenders, an approved budget and/or evidence that construction has started.
  - c) The criteria and procedures for establishing the baseline scenario in the frontier and mosaic configurations shall take into account such factors as historical deforestation and/or degradation rates and require the project proponent to develop a baseline by determining and analyzing a reference area (which need not be contiguous to the project area), that shall be similar to the project area in terms of drivers and agents of deforestation and/or degradation, landscape configuration, and socio-economic and cultural conditions, noting the following.
    - i) Where, in the mosaic configuration, no patch of forest in project areas exceeds 1000 ha and the forest patches are surrounded by anthropogenically cleared land, or where it can be demonstrated that 25 percent or more of the perimeter of the project area is within 120 meters of land that has been anthropogenically deforested within

the 10 years prior to the project start date, spatial projections to determine where in the project area deforestation is likely to occur are not required. Though not required, such spatial projections may be applied, in accordance with the methodology. Analysis of historical deforestation rates that explain past deforestation in the reference area is required and shall be applied conservatively to the project area.

## ACoGS

- 4.4.8** The baseline for ACoGS projects is comprised of a land-use and land-cover (LU/LC) change component, a carbon stock change component, and a non-CO<sub>2</sub> GHG component where applicable. These components may be addressed with separate analyses because the appropriate scale of analysis may differ for each component.
- 4.4.9** Determination and establishment of the LU/LC change component of the baseline is handled differently for the two eligible ACoGS activity types, as follows:
- 1) APC: The project proponent is required to provide verifiable evidence to demonstrate, based on government plans (for publicly owned and managed land), community plans (for publicly owned and community-managed land), concessionaire plans (for publicly owned and concession holder managed) or landowner plans (for privately owned land), that the project area was intended to be converted. Documentation of the ability to increase net present value of land through conversion is required, including government subsidies or funding that promotes conversion. Further documentation of landowner plans for conversion may include government approval of conversion or a purchase offer from an entity dedicated to conversion. The baseline scenario shall account for spatial heterogeneity in the project area. Where certain areas are unlikely to be converted, these areas shall be excluded from the baseline scenario. The baseline scenario shall take into account the following:
    - a) Where the agent of conversion is not the landowner (eg, in situations where the project proponent successfully outcompeted other agents to acquire a government concession or privately-owned lands) and the project can identify the most-likely agent of conversion, the baseline scenario shall be determined based on historical and current conversion activities of the most-likely agent who would have acquired control of and converted the project area.
    - b) Where the agent of conversion is not the landowner and cannot be specifically identified, the criteria and procedures for establishing the baseline scenario shall be determined based on the most-likely-class of conversion agents and their intent to convert, which shall be demonstrated through a history of similar conversion within the region by the identified most-likely class. The most-likely-class of conversion agents are the entities (eg, individuals, companies or associations) classified based on common characteristics and rates of conversion that would have been likely to undertake conversion activities and post-conversion land-use practices in the project area. The annual rate of land conversion shall be based on the recent historical practice of the most-likely class (ie, how much land is typically converted each year by similar baseline activities) and

projection of the rate of their conversion activities in the area. The timeframe used to quantify recent historical practice shall be justified by the project proponent as being of long enough duration to average over typical market fluctuations, commonly between 5-15 years. This rate of conversion shall only be extrapolated to lands that were identified as susceptible to conversion in the baseline scenario.

- 2) **AUC:** The criteria and procedures for establishing the baseline scenario shall require the project proponent to take into account conversion that would have occurred in the project area during the project crediting period. The baseline scenario shall account for spatial heterogeneity within the project area. Where certain areas are unlikely to be converted, these areas shall be excluded from the baseline scenario. This analysis shall take into account the patch size at which land conversion typically occurs (eg, areas unsuitable for crops may still be plowed if they are a small part of a larger suitable parcel. Alternatively, even suitable areas may be unlikely to be plowed if they are a small part of a larger unsuitable area). The baseline scenario shall take into account the following:
  - a) Methodologies shall set out criteria and procedures to identify where land conversion would likely occur using spatial analysis and projections. Such analysis shall be based on historical factors over at least the previous 10 years that explain past patterns and can be used to make future projections of land conversion.
  - b) In cases where future land conversion rates are predicted to exceed historical rates in the project area, evidence documenting the factors contributing to increased conversion must be presented. Where the expansion of the conversion frontier into the project area is linked to the development of infrastructure (eg, roads) that does not yet exist, clear evidence shall be provided to demonstrate that such infrastructure would have been developed in the baseline scenario. Evidence may include permits, an approved budget or executed construction contracts.
  - c) The criteria and procedures for establishing the baseline scenario shall take into account such factors as historical conversion rates and require the project proponent to develop a baseline by determining and analyzing a reference area (which need not be contiguous to the project area), that shall be similar to the project area in terms of drivers and agents of land conversion, landscape configuration, and socio-economic and cultural conditions.

## WRC

**4.4.10** The criteria and procedures for establishing the RWE baseline scenario shall take into account the following:

- 1) The current and historic hydrological characteristics of the watershed or coastal plain, and the drainage system in which the project occurs.
- 2) The long-term average climate variables influencing water table depths and the timing and quantity of water flow. The long-term average climate variables shall be determined using data from climate stations that are representative of the project area and shall include at least 20 years of data.

- 3) Planned water management activities (such as dam construction).

**4.4.11** The criteria and procedures for establishing the RWE baseline scenario shall also consider the relevant non-human induced rewetting brought about by any of the following:

- 1) Collapsing dikes or ditches that would have naturally failed over time without their continued maintenance.
- 2) Progressive subsidence of deltas or peatlands leading to a rise in relative water table depths, thus reducing CO<sub>2</sub> emissions but possibly increasing CH<sub>4</sub> emissions in freshwater systems.
- 3) Non-human induced elevation of non-vegetated wetlands to build vegetated wetlands. Deltaic systems with high sediment load from rivers often do this naturally, and this should be counted as part of the baseline.

**4.4.12** The criteria and procedures for establishing the CIW baseline scenario are handled differently for each of the eligible CIW activities, as follows:

- 1) AUWD: The criteria and procedures for establishing the baseline scenario shall require the project proponent to reference a period of at least 10 years for modeling a spatial trend in conversion, taking into account the long-term average climate variables, and the observed conversion practices (eg, drainage including canal width, depth, length and maintenance). The long-term average climate variable shall be determined using data from climate stations that are representative of the project area and shall include at least 20 years of data.
- 2) APWD: The criteria and procedures for establishing the baseline scenario shall require the project proponent to provide verifiable evidence to demonstrate that, based on government plans (for publicly owned and managed wetland), community plans (for publicly owned and community-managed wetland), concessionary plans (for publicly owned and concession holder managed) or landowner plans (for privately owned wetland), the project area was intended to be drained or otherwise converted. The annual rate and depth of drainage or rate of other conversion shall be based on the common practice in the area—that is, how much wetland is typically drained or converted each year by similar baseline activities.

**4.4.13** The criteria and procedures for identifying fire in the baseline scenario shall demonstrate with fire maps and historical databases on fires that the project area is now and in future would be under risk of anthropogenic fires. The procedure for identifying fire in the baseline scenario shall also consider any relevant current and planned land use conditions that may affect the occurrence of fire in order to establish the most plausible scenario for fire in the baseline.

**4.4.14** Many land use activities on wetlands (eg, aquaculture and agriculture) involve the exposure of wetland soils to aerobic decomposition through piling, dredging (expansion of existing channels) or channelization (cutting through wetland plains). Where relevant, WRC baseline scenarios shall account for such processes as they expose disturbed carbon stocks to aerobic decomposition thus increasing the rate of organic matter decomposition and GHG emissions that may continue for years from the stockpiles. Methodologies shall include credible methods for quantifying and forecasting GHG emissions from such degradation.

- 4.4.15** Where relevant, WRC baseline scenarios shall take account of hydrological processes that lead to increased carbon burial and GHG reductions within the project area. Such processes include changes in the landscape form (ie, construction of levees to constrain flow and flooding patterns or dams to hold water) and changes in land surface (ie, forest clearing, and ditching or paving leading to intensified run-off).
- 4.4.16** Where relevant, WRC baseline scenarios shall take account of processes within the project area that reduce sediment supply associated with changes in the landscape (eg, construction of upstream dams or stabilization of eroding *feeder* cliffs along the coast). The supply of sediment varies over time and the time-averaged delivery of sediment shall be considered.
- 4.4.17** Where relevant, methodologies shall establish criteria and procedures for identifying wetland erosion and/or migration resulting from sea level rise in the baseline scenario on the basis of wetland maps, historical trend data, future projection of sea level rise and how changes in management would impact carbon stocks.
- 4.4.18** Where relevant, the criteria and procedures for establishing the baseline scenario shall require the project proponent to take into account current and historic management activities outside the project area that have significantly impacted or may significantly impact the project area, including the following:
- 1) Disruption to or improvement of natural sediment delivery, as this will alter the rate and magnitude of coastal wetlands response to sea level rise.
  - 2) Upstream dam construction, as this will alter water and sediment delivery, as well as salinity in coastal lowlands.
  - 3) Construction of infrastructure inland of coastal wetlands, as this will impair wetland capacity to migrate landwards with sea level rise.
  - 4) Construction of coastal infrastructure, as this can impair sediment movement along shorelines causing wetland loss and increasing risk of carbon emissions with sea level rise.
- 4.4.19** Combined category projects shall use the relevant WRC requirements and the respective non-WRC AFOLU project category requirements for the determination and establishment of the baseline scenario.

## 4.5 BASELINE AND PROJECT EMISSIONS/REMOVALS

### General

- 4.5.1** Methodologies shall establish procedures to quantify the GHG emissions or removals for the project and baseline scenario. *The IPCC 2006 Guidelines for National GHG Inventories* or the *IPCC 2003 Good Practice Guidance for Land Use, Land-Use Change and Forestry* shall be used as guidance for quantifying increases or decreases in carbon stocks and GHG emissions. The IPCC Guidelines shall also be followed in terms of quality assurance/quality control (QA/QC) and

uncertainty analysis.

- 4.5.2** The *IPCC 2006 Guidelines for National GHG Inventories* may be referenced to establish procedures for quantifying GHG emissions/removals associated with the following carbon pools including:
- 1) Litter;
  - 2) Dead wood;
  - 3) Soil (methodologies may follow the IPCC guidelines for the inclusion of soil carbon, including the guidelines that are in sections not related to forest lands); and
  - 4) Belowground biomass (estimated using species-dependent root-to-shoot ratios, the Mokany et al.<sup>8</sup> ratios and equations, or the Cairns equations).
- 4.5.3** Where carbon would have been lost in the baseline scenario due to land use conversion or disturbance, GHG emissions from soil carbon, belowground biomass, wood products and dead wood carbon pools generally occur over a period of time following the event. It shall not be assumed that all GHG emissions from these carbon pools in the project categories specified below occur instantaneously or within a short period of time.

Methodologies shall set out criteria and procedures to reliably establish the pattern of carbon loss over time using empirical evidence, such as studies that use primary data or locally calibrated models, or methodologies shall apply an appropriate decay model (such as a linear or exponential decay function) that is scientifically sound, based on empirical evidence and not likely to overestimate early carbon losses.

Where appropriate, belowground biomass, soil carbon and dead wood decay models shall be calibrated. Where models are calibrated using measurement plots or data from research plots, sound and reliable measurement methods shall be applied as set out in Section 4.8.3.

Where the following carbon pools are included in the project boundary, methodologies may opt to comply with the requirement to establish a pattern of carbon loss over time by incorporating the respective procedures below:

- 1) Belowground biomass pool for IFM LtPF and REDD. The pattern of carbon loss shall be modeled based upon a 10-year linear decay function.
- 2) Dead wood pool in IFM and REDD. The pattern of carbon loss shall be modeled using a 10-year linear decay function.
- 3) Soil carbon pool in all AFOLU project categories. The pattern of carbon loss shall be modeled based upon a 20-year linear decay function, taking into account the depth of affected soil layers and the total portion of the pool that would have been lost.

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<sup>8</sup> Mokany, K., Raison, R. J., and Prokushkin, A. S. 2006. *Critical analysis of root:shoot ratios in terrestrial biomes*. *Global Change Biology* 12: 84-96

- 4) Wood products pool in IFM and REDD. The pattern of carbon loss shall be modeled as follows:
  - a) For short-term wood products and wood waste that would decay within 3 years, all carbon shall be assumed to be lost immediately.
  - b) For medium-term wood products that are retired between 3 and 100 years, a 20-year linear decay function shall be applied.
  - c) For long-term wood products that are considered permanent (ie, carbon is stored for 100 years or more), it may be assumed no carbon is released.

Note – Where applying the wood products procedure set out above, it is not required to separately account for the portion of wood products in landfills and the decay rate for such products, due to the current lack of established, reliable data and methods. Such products shall apply the rates for short-, medium-, or long-term wood products, as appropriate.

- 4.5.4** Where activity-based methods are used for determining baseline soil carbon stocks, estimates shall be conservatively determined relative to the computed maximum carbon stocks that occurred in the designated project area within the previous 10 years. For example, if carbon stocks in the project area were 100 tonnes C/ha in 2002 and declined to 90 tonnes/ha by 2007 after intensive tillage, the minimum baseline carbon stock for a project established in 2008 would be 100 tonnes/ha.

## ARR

- 4.5.5** Where ARR or IFM projects include harvesting, the loss of carbon due to harvesting shall be included in the quantification of project emissions. The maximum number of GHG credits available to projects shall not exceed the long-term average GHG benefit. The GHG benefit of a project is the difference between the project scenario and the baseline scenario of carbon stocks stored in the selected carbon pools and adjusted for any project emissions of N<sub>2</sub>O, CH<sub>4</sub> and fossil-derived CO<sub>2</sub>, and leakage emissions. The long-term average GHG benefit shall be calculated using the following procedure:
- 1) Establish the period over which the long-term average GHG benefit shall be calculated, noting the following.
    - a) For ARR or IFM projects undertaking even-aged management, the time period over which the long-term GHG benefit is calculated shall include at minimum one full harvest/cutting cycle, including the last harvest/cut in the cycle. For example, where a project crediting period is 40 years and has a harvest cycle of 12 years, the long-term average GHG benefit will be determined for a period of 48 years.
    - b) For ARR projects under conservation easements with no intention to harvest after the project crediting period, or for selectively-cut IFM projects, the time period over which the long-term average is calculated shall be the length of the project crediting period.
  - 2) Determine the expected total GHG benefit of the project for each year of the established time period. For each year, the total GHG benefit is the to-date GHG emission reductions or

removals from the project scenario minus baseline scenario.

- 3) Sum the total GHG benefit of each year over the established time period.
- 4) Calculate the average GHG benefit of the project over the established time period.
- 5) Use the following equation to calculate the long-term average GHG benefit:

$$LA = \frac{\sum_{t=0}^n PE_t - BE_t}{n}$$

Where:

- LA = The long-term average GHG benefit
- PE = The GHG emission reductions and removals generated in the project scenario (tCO<sub>2</sub>e). Project scenario emission reductions and removals shall also consider project emissions of CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub> and leakage.
- BE = The GHG emission reductions and removals projected for the baseline scenario (tCO<sub>2</sub>e)
- t = Year
- n = Total number of years in the established time period

- 6) A project may claim GHG credits during each verification event until the long-term average GHG benefit is reached. Once the total number of GHG credits issued has reached this average, the project can no longer issue further GHG credits, unless the long-term average is increased. For an example of determining the long-term average GHG benefit, see the VCS website.
- 7) Buffer credits are withheld only when GHG credits are issued. As set out in Section 4.7.2, the number of buffer credits to withhold is based on the change in carbon stocks only (not the net GHG benefit), as such the buffer credits will be based on the long-term average change in carbon stock. Use the following equation to calculate the long-term average change in carbon stock.

$$LC = \frac{\sum_{t=0}^n PC_t - BC_t}{n}$$

Where:

- LC = The long-term average change in carbon stock
- PC = The carbon stock in the project scenario (tCO<sub>2</sub>e)
- BC = The carbon stock projected for the baseline scenario (tCO<sub>2</sub>e)
- t = Year
- n = Total number of years in the established time period

## ALM

- 4.5.6** Methodologies that target soil carbon stock increases shall quantify, where significant, concomitant increases in N<sub>2</sub>O, CH<sub>4</sub> and fossil-derived CO<sub>2</sub>. Similarly, methodologies targeting N<sub>2</sub>O emission reductions shall establish the criteria and procedures by which the changes in soil

carbon stocks may be deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4).

- 4.5.7** Procedures to quantify GHG emissions/removals from cropland and grassland soil management projects may include activity-based model estimates, direct measurement approaches, or a combination of both.
- 4.5.8** Procedures to measure soil carbon stocks shall be based on established and reliable sampling methods, with sufficient sampling density to determine statistically significant changes at a 95 percent confidence level. Uncertainty related to sampling shall be addressed as set out in the *VCS Standard*.
- 4.5.9** Procedures to estimate soil carbon stock shall use soil carbon stock change factors that are based on measurements of soil carbon stocks to the full depth of affected soil layers (usually 30 cm), accounting for differences in bulk density as well as organic carbon concentrations.
- 4.5.10** Procedures to quantify N<sub>2</sub>O and CH<sub>4</sub> emissions factors shall be based on scientifically defensible measurements of sufficient frequency and duration to determine emissions for a full annual cycle. Minimum baseline estimates for N<sub>2</sub>O and CH<sub>4</sub> emissions shall be based on documented management records averaged over the five year period prior to the project start date. Documented management records may include fertilizer purchase records, manure production estimates and/or livestock data. For new management entities or where such records are unavailable, minimum baseline estimates may be based on a conservative estimate of common practice in the region.

## IFM

- 4.5.11** Procedures for quantifying GHG emissions/removals in selected carbon pools may reference the *IPCC 2006 Guidelines for National GHG Inventories* section on *forests remaining as forests*.
- 4.5.12** Procedures for quantifying GHG emissions/removals in wood products may reference Skog et al. 2004<sup>9</sup> or other sources published in scientific peer-reviewed literature.
- 4.5.13** Where biomass is burned as part of the slash removal after harvesting, or nitrogen fertilizer is used, methodologies may reference *IPCC 2006 Guidelines for National GHG Inventories* for the quantification of such GHG emissions.
- 4.5.14** Where IFM projects include harvesting, the loss of carbon due to harvesting shall be included in the quantification of project emissions. The maximum number of GHG credits available to projects shall not exceed the long-term average GHG benefit, as set out in Section 4.5.5.

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<sup>9</sup> Skog, K.E., K. Pingoud, J. E. Smith 2004, *A method countries can use to estimate changes in carbon stored in harvested wood products and the uncertainty of such estimates*. *Environmental Management* 33 (suppl 1): S65-S73

## REDD

- 4.5.15** Procedures for quantifying GHG emissions/removals in all selected carbon pools may reference *IPCC 2006 Guidelines for National GHG Inventories* sections on *conversion of forest to non-forest* (for deforestation) and *forests remaining as forest* (for degradation).
- 4.5.16** Procedures for quantifying GHG emissions/removals in long-lived wood products (eg, wood products lasting longer than five years) may reference published scientific peer-reviewed literature (such as Skog et al. 2004).
- 4.5.17** Where harvesting is allowed in the project scenario (eg, the project activity reduces deforestation but selective harvesting is allowed), the methodology shall include criteria and procedures to quantify GHG emissions/removals from such harvesting. The methodology shall also include criteria and procedures by which the change in carbon stocks from such harvesting may be deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4).

## ACoGS

- 4.5.18** Procedures for quantifying N<sub>2</sub>O emissions from the use of synthetic fertilizers may reference the CDM A/R methodological tool for the *Estimation of direct and indirect (eg, leaching and runoff) nitrous oxide emission from nitrogen fertilization*.
- 4.5.19** Procedures for quantifying GHG emissions/removals in all selected carbon pools may reference *IPCC 2006 Guidelines for National GHG Inventories*. Baseline scenarios may include annual estimates of changes in each carbon pool over the entire project period. Differences in shorter and longer term effects may be accounted for by distinguishing phases of effects. For example, effects of conversion on biomass may occur entirely in year one, whereas effects on soil carbon shall take into account the timing of such effects that may occur over many years, as set out in Section 4.5.3.
- 4.5.20** Under the default assumption that management does not change in the project scenario and carbon pools are at steady state, the project scenario shall ensure the maintenance (or increase) of existing carbon pools. Where methodologies include criteria and procedures to account for increases in carbon pools on lands where conversion is avoided, evidence shall be provided that such increases may occur. Where changes in management are the basis for increases in carbon pools, ALM accounting rules shall be followed. Where revegetation or restoration is the basis for increases in carbon pools under the project scenario, projects shall follow ARR or ALM requirements for quantifying GHG emissions/removals, depending on whether the project activities involve woody biomass.
- 4.5.21** GHG emissions associated with conversion and post-conversion land management practices that are avoided shall be estimated based on expected land management practices. Baseline estimates for N<sub>2</sub>O and CH<sub>4</sub> emissions shall be based on documented management practices

used on lands similar to the project area, or that represent average local or regional land management practices. Preference shall be given to data that are more specific to the project area (eg, site specific data, where available, are preferable to state or province level data). Documentation of land management practices may include, for example, fertilizer purchase or application records, manure production estimates and/or livestock data.

- 4.5.22** Quantifying GHG emissions and/or removals from avoided conversion requires estimates of changes in carbon pools that would have occurred if the land protected by the project had been converted. Although the direct measurement of carbon pools on protected lands can provide an estimate of initial carbon stocks for the baseline scenario, subsequent years under the baseline scenario require estimates of the effects of conversion that are extrapolated from lands similar to the project area but which have already undergone conversion. Estimates of expected changes in carbon stocks following conversion may be based on activity-based model estimates, direct measurement (including direct measurements reported in the scientific literature), or a combination of both.
- 4.5.23** Direct measurements needed for estimating the baseline shall be taken on lands similar to the project area that have already undergone conversion to the same land use as the one(s) being avoided in the project area, rather than direct measurements on the project area itself. Similar lands refers to lands with similar vegetation, climate, topography and soils, and therefore with similar expected responses to conversion. Such extrapolation from similar lands necessarily introduces uncertainty, which shall be accounted for by using methods that allow for calculating a confidence interval as set out in the *VCS Standard*. Uncertainty from baseline modeling shall be combined with other sources of uncertainty using valid statistical approaches (eg, as set out in Chapter 5.2 of the *IPCC Good Practice Guidance for LULUCF*).
- 4.5.24** Estimation of carbon stock change and/or soil emission factors shall be based on data from replicated field experiments whose management treatments have a duration of at least five years (preferably longer), for climate and soil conditions and management activities representative of the project conditions, using established, reliable measurement methods. Stock change factors for soil carbon or woody biomass carbon that are based on experiments shall not be projected over a longer period than the length of the study. Complex, dynamic models that have been validated for conditions representative of the project area are also acceptable. Models shall be parameterized to reflect the range of soil, climate, land use and management conditions in the project area.

## WRC

- 4.5.25** The following applies with respect to the criteria and procedures for quantifying GHG emissions/removals in the baseline scenario:
- 1) For WRC activities on peatland the peat depletion time (PDT) shall be included in the quantification of GHG emissions and removals in the baseline scenario, and for non-peat wetlands, the soil organic carbon depletion time (SDT) shall be included in the quantification

of GHG emissions and removals in the baseline scenario, noting the following:

- a) PDT is the time it would have taken for the peat to be completely lost due to oxidation or other losses, or for the peat depth to reach a level where no further oxidation or other losses occur. No GHG emission reductions may be claimed for a given area of peatland for longer than the PDT. The procedure for determining the PDT shall conservatively consider peat depth and oxidation rate within the project boundary and may be estimated based on the relationship between water table depth, subsidence (eg, using peat loss and water table depth relationships established in scientific literature), and peat depth in the project area. The PDT is considered part of the baseline and thus shall be reassessed with the baseline in accordance with Section 3.1.10.
  - b) SDT is the time it would have taken for the soil organic carbon to be lost due to oxidation or to reach a steady stock where no further losses occur. No GHG emissions reductions may be claimed for a given area of wetland for longer than the SDT. The procedure for determining the SDT shall conservatively consider soil organic carbon content and oxidation rate within the project boundary and may be estimated based on the relationship between water table depth and soil organic carbon content in the project area. Where wetland soils are subject to sedimentation or erosion, the procedure for determining the SDT shall conservatively account for the associated gain or loss of soil organic carbon. This assessment is not mandatory in cases where soil organic carbon content on average may be deemed *de minimis* as set out in Section 4.3.3.
- 2) Any applicable and justifiable proxies, as established in scientific literature, for GHG emissions projected throughout the project crediting period shall be estimated.
  - 3) Net baseline GHG emissions during the project crediting period, including emissions associated with the estimated water table depths, salinity or another justifiable proxy for GHG emissions, plus emissions from other activities such as biomass loss or fires, as well as carbon sequestration, where applicable, shall be estimated.

**4.5.26** Baseline emissions shall be estimated conservatively and consider that the water table depth in the project area may rise during the project crediting period due to any or all of the causes identified in alternative baseline scenarios as set out in Section 4.4.11.

**4.5.27** The procedure for quantifying CO<sub>2</sub> emissions for the baseline and project emissions may be estimated through hydrological modeling or the modeling of proxies for GHG emissions in place of direct on-site gas flux measurements. The procedure may include estimation through well-documented relationships between CO<sub>2</sub> emissions and other variables such as vegetation types, water table depth, salinity or subsidence, or remote sensing techniques that adequately assess and monitor soil moisture. Because of the dominant relationship between water table depth and CO<sub>2</sub> emissions, drainage depth can be used as a proxy for CO<sub>2</sub> emissions in the absence of emissions data.<sup>10</sup> Where relevant, the micro-topography of the project area (eg, the proportion of

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<sup>10</sup> Couwenberg, J, Dommain, R, Joosten, H. 2010. *Greenhouse gas fluxes from tropical peatlands in south-east Asia*.

hummocks and hollows and vegetation patterns in peatlands) shall be considered. Net GHG emissions reductions shall be calculated using the same methods that are used for the baseline estimates, but using monitored data.

- 4.5.28** Where relevant, the fate of transported organic matter as a result of sedimentation, erosion and oxidation shall be assessed conservatively based on peer-reviewed literature and considering the following:
- 1) It is conservative to not account for the loss of sediment from the project area in the baseline scenario.
  - 2) It is conservative to not account for further sedimentation in the project area in the project scenario. Where soil carbon is included in the project boundary, sedimentation shall be accounted for so that carbon sequestration resulting from the growth of vegetation can be estimated separately from carbon accumulated in sedimentation. In the absence of the project activity, such high carbon silt would be washed out to sea and would not have been oxidized and emitted in the baseline, and in such cases carbon accumulated in sedimentation is not eligible for crediting.
- 4.5.29** With respect to the soil carbon pool, the maximum quantity of GHG emission reductions that may be claimed by the project shall not exceed the net GHG benefit generated by the project 100 years after its start date. This limit is established because in wetlands remaining partially drained or not fully rewetted, or where drainage continues, the soil carbon will continue to erode and/or oxidize leading to GHG emissions and eventually depletion of the soil carbon. To determine this long-term net GHG benefit, methodologies shall establish criteria and procedures to estimate the remaining soil carbon stock adjusted for any project emissions and leakage emissions in both the baseline and project scenarios for 100 years, taking into account uncertainties in modeling and using verifiable assumptions. Projects unable to establish and demonstrate a significant difference in the net GHG benefit between the baseline and project for at least 100 years are not eligible.
- 4.5.30** Emissions of CH<sub>4</sub> from drained or saline wetlands may be excluded in the baseline scenario where it may be deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4)
- 4.5.31** As WRC activities are likely to influence CH<sub>4</sub> emissions, methodologies shall establish procedures to estimate such emissions, and shall establish the criteria and procedures by which the source may be deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4). Where relevant, the micro-topography of the project area (ie, the proportion of hummocks and hollows and vegetation patterns) shall be considered.
- 4.5.32** Combined category projects shall use the relevant WRC requirements and the respective AFOLU project category requirements for quantifying GHG emissions/removals, unless the former may

be deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4).

- 4.5.33** RWE projects on peatland that include an activity designed specifically to reduce incidence and severity of fires shall deduct the amount of peat assumed to burn when estimating peat depletion times. Where peat depletion times are estimated based only on oxidation rates due to drainage, the outcome would be a longer period than when first subtracting the amount of peat that is considered to burn in the baseline.
- 4.5.34** Methodologies for RWE projects on peatland explicitly addressing anthropogenic peatland fires occurring in drained peatlands shall establish procedures for determining or conservatively estimating the baseline emissions from peatland fire occurring in the project area using defensible data (such as fire maps, historical databases on fires, and where appropriate, combined with temperature and precipitation data). Methods for estimating GHG emissions from fire may be based on the *IPCC 2006 Guidelines for National GHG Inventories*, or other methods based on scientific, peer-reviewed literature.
- 4.5.35** Where relevant, methodologies shall establish procedures to account for any changes in carbon sequestration or GHG emission reductions resulting from lateral movement of wetlands due to sea level rise, or *coastal squeeze* associated with any structures that prevent wetland landward migration and cause soil erosion.

## 4.6 LEAKAGE

### General

- 4.6.1** Methodologies shall establish procedures to quantify all significant sources of leakage. Leakage is defined as any increase in GHG emissions that occurs outside the project boundary (but within the same country), and is measurable and attributable to the project activities. All leakage shall be accounted for, in accordance with this Section 4.6. The three types of leakage are:
- 1) Market leakage occurs when projects significantly reduce the production of a commodity causing a change in the supply and market demand equilibrium that results in a shift of production elsewhere to make up for the lost supply.
  - 2) Activity-shifting leakage occurs when the actual agent of deforestation and/or forest or wetland degradation moves to an area outside of the project boundary and continues its deforestation or degradation activities elsewhere.
  - 3) Ecological leakage occurs in WRC projects where a project activity causes changes in GHG emissions or fluxes of GHG emissions from ecosystems that are hydrologically connected to the project area.
- 4.6.2** Leakage that is determined, in accordance with Section 4.3.3, to be below *de minimis* (ie, insignificant) does not need to be included in the GHG emissions accounting. The significance of leakage may also be determined using the CDM A/R methodological tool *Tool for testing*

*significance of GHG Emissions in A/R CDM Project Activities.*

- 4.6.3** GHG emissions from leakage may be determined either directly from monitoring, or indirectly when leakage is difficult to monitor directly but where scientific knowledge provides credible estimates of likely impacts. The GHG credit calculation table provided below in Section 4.7 includes an example of indirect leakage accounting.
- 4.6.4** Projects shall account for market leakage where the production of a commodity (eg, timber, aquacultural products or agricultural products) is significantly affected by the project. The significance of timber production is determined as set out in Section 4.3.3 above or as set out in Section 4.6.14 below.
- 4.6.5** Leakage occurring outside the host country (international leakage) does not need to be quantified.
- 4.6.6** Where leakage mitigation measures include tree planting, aquacultural intensification, agricultural intensification, fertilization, fodder production, other measures to enhance cropland and/or grazing land areas, leakage management zones or a combination of these, then any significant increase in GHG emissions associated with these activities shall be accounted for, unless deemed *de minimis* (as set out in Section 4.3.3) or can be conservatively excluded (as set out in Section 4.3.4).
- 4.6.7** Projects shall not account for positive leakage (ie, where GHG emissions decrease or removals increase outside the project area due to project activities).

## ARR

- 4.6.8** Activity-shifting leakage in ARR projects can result from, inter alia, the shifting of grazing animals, shifting of households or communities, shifting of aquacultural or agricultural activities or shifting of fuelwood collection (from non-tree sources). Leakage emissions may also result from transportation and machinery use. The requirements for assessing and managing leakage in ARR projects are similar to those for CDM afforestation/reforestation project activities, and such projects may apply CDM tools for estimating leakage, such as the *Tool for calculation of GHG emissions due to leakage from increased use of non-renewable woody biomass attributable to an A/R CDM project activity*.
- 4.6.9** Where deforestation increases outside the project area due to leakage from project activities, the effects of this deforestation on all carbon pools shall be assessed and quantified, unless determined to be *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4).

## ALM

- 4.6.10** ALM projects setting aside land for conservation shall quantify activity-shifting leakage emissions associated with the displacement of pre-project activities, unless deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4). Guidance on accounting for leakage associated with shifting of pre-project activities due to land conversions from agriculture to grassland is functionally similar to conversion of land to forest vegetation under ARR (see Section 4.3.3 and 4.3.4).
- 4.6.11** Market leakage in ALM projects involving cropland or grassland management activities is likely to be negligible because the land in the project scenario remains maintained for commodity production, and therefore does not need to be included in the GHG emissions accounting, unless determined to be above *de minimis* in accordance with Section 4.3.3.
- 4.6.12** Where livestock are displaced to outside the project area, such activity-shifting leakage shall be quantified to capture potential reductions in carbon stocks and potential increases in livestock-derived CH<sub>4</sub> and N<sub>2</sub>O emissions from outside the project area.

## IFM

- 4.6.13** Leakage in IFM projects can result from activities shifting within the project proponent's operations. It shall be demonstrated that there is no leakage to areas that are outside the project area but within the project proponent's operations, such as areas where the project proponent has ownership of, management of, or legally sanctioned rights to use forest land within the country. It shall be demonstrated that the management plans and/or land-use designations of all other lands operated by the project proponent (which shall be identified by location) have not materially changed as a result of the project activity (eg, harvest rates have not been increased or land has not been cleared that would otherwise have been set aside). Where the project proponent is an entity with a conservation mission, it may be demonstrated that there have been no material changes to other lands managed or owned by the project proponent by providing documented evidence that it is against the policy of the organization to change the land use of other owned and/or managed lands including evidence that such policy has historically been followed.
- 4.6.14** Leakage in IFM projects is predominantly attributable to market leakage (market effects), which shall be quantified by either of the following:
- 1) Applying the appropriate market leakage discount factor identified in Table 3 to the net change in carbon stock associated with the activity that reduces timber harvest.
  - 2) Directly accounting for market leakage associated with the project activity. Where directly accounting for leakage, market leakage shall be accounted for at the country-scale applied to the same general forest type as the project (ie, forests containing the same or substitutable

commercial species as the forest in the project area) and shall be based on methods for quantifying leakage from scientific peer-reviewed journal sources.<sup>11</sup>

**Table 3: Market Leakage Discount Factors**

Project Action	Leakage Risk	Market Leakage Discount Factor
IFM activity with no effect or minimal effect on total timber harvest volumes (eg, RIL with less than 25% reduction)	None	0%
IFM activity that leads to a shift in harvests across time periods but minimal change in total timber harvest over time (eg, ERA with rotation extension of 5-10 years)	Low	10%
IFM activity that substantially reduces harvest levels permanently (eg, RIL activity that reduces timber harvest across the project area, or project that halts logging by at least 25%)	Moderate to High	Conditional upon where timber harvest is likely to be shifted, as follows: <ul style="list-style-type: none"> <li>• Where the ratio of merchantable biomass to total biomass is higher within the area to which harvesting is displaced compared to the project area, 20%</li> <li>• Where the ratio of merchantable biomass to total biomass is similar within the area to which harvesting is displaced compared to the project area, 40%</li> <li>• Where the ratio of merchantable biomass to total biomass is lower within the area to which harvesting is displaced compared to the project area, 70%</li> <li>• Where the leakage is out of country, 0%</li> </ul>

<sup>11</sup> The following three papers may be helpful in assessing market leakage:

- Murray, B.C., B.A. McCarl, and H. Lee. 2004. *Estimating Leakage from Forest Carbon Sequestration Programs*. Land Economics 80(1):109-124. (<http://ideas.repec.org/p/uwo/uwowop/20043.html>)
- Murray, B.C., B.L. Sohngen, et al. 2005. EPA-R-05-006. *Greenhouse Gas Mitigation Potential in U.S. Forestry and Agriculture*. Washington, D.C: U.S. Environmental Protection Agency, Office of Atmospheric Programs. ([www.epa.gov/sequestration/pdf/greenhousegas2005.pdf](http://www.epa.gov/sequestration/pdf/greenhousegas2005.pdf))
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## REDD

**4.6.15** Leakage shall be assessed and managed for the two eligible REDD project types as follows:

- 1) **APD:** Leakage shall be quantified by directly monitoring the activities of the deforestation agent identified in the baseline scenario. The deforestation agent can be an entity that has ownership of, management of, or legally sanctioned rights to use, multiple parcels of forest land within the country or can be the most-likely-class of deforestation agent. Such forest land could be used to make up for the generation of goods and/or services lost through implementation of the REDD project, therefore leading to reductions in carbon stocks or increases in GHG emissions outside the project boundary. Leakage shall be accounted for as follows:
  - a) Where the specific deforestation agent can be identified, leakage need not be considered where it can be demonstrated that the management plans and/or land-use designations of the deforestation agent's other lands (which shall be identified by location) have not materially changed as a result of the project (eg, the deforestation agent has not designated new lands as timber concessions, increased harvest rates in lands already managed for timber, cleared intact forests for agricultural production or increased fertilizer use to enhance agricultural yields). Where management plans and/or land-use designations of the deforestation agent's other lands have materially changed, leakage shall be quantified by directly monitoring the activities of the deforestation agent.
  - b) Where the specific deforestation agent cannot be identified, leakage shall be quantified based upon the difference between historic and with-project rates of deforestation by the identified most-likely-class of deforestation agent within the region. Alternatively, where such agents are driven by the demand for market commodities, the project may directly account for market leakage associated with the specific project activity. Where directly accounting for leakage, market leakage shall be accounted for at the country-scale, taking into account the supply and demand elasticities for the commodity affected, and shall be based on methods for quantifying leakage from scientific peer-reviewed journal sources, as described above in Section 4.6.14.
- 2) **AUDD:** The potential for leakage shall be identified and the project shall address (and describe in the project description) the socio-economic factors that drive deforestation and/or degradation. Leakage shall be calculated by monitoring forested areas surrounding the project and other forested areas within the country susceptible to leakage from project activities.

**4.6.16** Where the project baseline includes illegal logging activities that supply regional, national and/or global timber markets, domestic market leakage shall be quantified using the market leakage discount factors for IFM projects set out in Sections 4.6.13 and 4.6.14. The market leakage effects associated with stopping illegal logging need not be considered where GHG emissions are not included in the baseline and GHG credits from stopping such activities are not claimed.

## ACoGS

**4.6.17** Leakage in ACoGS projects can result from activities shifting within the project proponent's operations. It shall be demonstrated that there is no leakage to areas that are outside the project area but within the project proponent's operations, such as areas where the project proponent has ownership of, management of, or legally sanctioned rights to use land within the country. It shall be demonstrated that the management plans and/or land-use designations of all other lands operated by the project proponent (which shall be identified by location) have not materially changed as a result of the project activity (eg, land has not been cleared that would otherwise have been set aside).

Where the project proponent is an entity with a conservation mission, it may be demonstrated that there have been no material changes to other lands managed or owned by the project proponent by providing documented evidence that it is against the policy of the organization to change the land use of other owned and/or managed lands including evidence that such policy has historically been followed.

**4.6.18** Leakage shall be assessed and managed for the two eligible ACoGS project types as follows:

- 1) APC: Leakage shall be quantified by directly monitoring the activities of the conversion agent identified in the baseline scenario. The conversion agent can be an entity that has ownership of, management of, or legally sanctioned rights to use, multiple parcels of land within the country or can be the most-likely-class of conversion agent. Such land could be used to make up for the generation of goods and/or services lost through implementation of the ACoGS project, therefore leading to reductions in carbon stocks or increases in GHG emissions outside the project boundary. Leakage shall be accounted for as follows:
  - a) Where the specific conversion agent can be identified, leakage need not be considered where it can be demonstrated that the management plans and/or land-use designations of the conversion agent's other lands (which shall be identified by location) have not materially changed as a result of the project (eg, land has not been cleared that would otherwise have been set aside). Where management plans and/or land-use designations of the conversion agent's other lands have materially changed, leakage shall be quantified by directly monitoring the activities of the conversion agent.
  - b) Where the specific conversion agent cannot be identified, leakage shall be quantified based upon the difference between historic and with-project rates of conversion by the identified most-likely-class of conversion agent within the region. Alternatively, where such agents are driven by the demand for market commodities, the project may directly account for market leakage associated with the specific project activity. Where directly accounting for leakage, market leakage shall be accounted for at the country-scale, taking into account the supply and demand elasticities for the commodity affected, and shall be based on methods for quantifying leakage from scientific peer-reviewed journal sources, as described above in Section 4.6.14.

- 2) AUC: The potential for leakage shall be identified and the project shall address (and describe in the project description) the socio-economic factors that drive conversion. Leakage shall be calculated by monitoring areas surrounding the project and areas within the country susceptible to leakage from project activities.

## WRC

- 4.6.19** RWE projects involving rewetting of forested wetlands are likely to reduce the productivity of the forest or make harvesting more difficult, which could lead to fewer forest products and thus result in leakage (ie, GHG emissions from logging and drainage elsewhere). Where the project results in activity shifting of forest products, the applicable requirements for leakage in IFM or REDD project activities shall be followed, accounting for both activity-shifting and/or market leakage. Where the project results in the shifting of drainage activities or other activities that would lower the water table, the expected GHG emissions from a lower water table shall also be accounted for. RWE projects on peatland shall assume that the PDT of leakage activities occurs over the length of the project crediting period if the PDT is longer than the project crediting period.
- 4.6.20** Rewetting in the project area may lead to higher water table depths in some areas beyond the project boundary, and consequently leading to lower water table depths in downstream areas further beyond the project boundary (eg, in the case of project activities that reverse subsidence), or cause transportation of organic matter to areas beyond the project boundary. In such cases, the project proponent shall be required to demonstrate that such changes in water table depths or export caused by the project do not lead to increases in GHG emissions outside the project area, or the affected areas shall be identified and the resulting leakage shall be quantified and accounted for.
- 4.6.21** For CIW, REDD+CIW and IFM+CIW the following requirements apply, noting that for combined category projects, the IFM or REDD leakage requirements also apply:
- 1) APWD: Activity-shifting leakage shall be quantified by directly monitoring the activities of the land conversion agent (eg, deforestation agent or agent causing other forms of wetland degradation) identified in the baseline scenario. The land conversion agent can be an entity that has ownership of, management of, or legally sanctioned rights to use, multiple parcels of wetland within the country, or can be the most-likely-class of land conversion agent. These other wetlands could be used to make up for the generation of goods and/or services lost through implementation of the WRC project, therefore leading to reductions in carbon stocks or increases in GHG emissions outside the project boundary. Leakage shall be accounted for as follows:
    - a) Where the specific land conversion agent can be identified, leakage need not be considered where it can be demonstrated that the management plans and/or land-use designations of the land conversion agent's other lands (which shall be identified by location) have not materially changed as a result of the project (eg, a deforestation agent has not designated new lands as timber concessions, increased harvest rates in lands already managed for timber, cleared intact forests for agricultural production or increased

fertilizer use to enhance agricultural yields). Where management plans and/or land-use designations of the land conversion agent's other lands have materially changed, leakage shall be quantified by directly monitoring the activities of the land conversion agent.

- b) Where the specific land conversion agent cannot be identified, leakage shall be quantified based upon the difference between historic and with-project rates of wetland degradation by the identified most-likely-class of land conversion agent within the region.
- 2) **AUWD**: The potential for leakage shall be identified and the project shall address the socio-economic factors that drive wetland degradation. Leakage shall be calculated by monitoring wetland areas surrounding the project and other wetland areas within the country susceptible to leakage from project activities.

**4.6.22** Wetland restoration projects including fire reduction activities, shall follow the requirements for accounting for fire under REDD, where land use changes are identified as the cause (or one of the causes) of anthropogenic fires in the project region.

## 4.7 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

**4.7.1** Methodologies shall establish procedures for quantifying net GHG emission reductions and removals (the net GHG benefit), which shall be quantified as the difference between the GHG emissions and/or removals, and/or as the difference between carbon stocks, from GHG sources, sinks and carbon pools in the baseline scenario and the project scenario. The GHG emissions and/or removals in the project scenario shall be adjusted for emissions resulting from project activities and leakage. Methodologies shall also establish procedures for quantifying the net change in carbon stocks, so that the number of buffer credits withheld in the AFOLU pooled buffer account and market leakage emissions may be quantified for the project.

**4.7.2** The number of GHG credits issued to projects is determined by subtracting out the buffer credits from the net GHG emission reductions or removals (including leakage) associated with the project. The buffer credits are calculated by multiplying the non-permanence risk rating (as determined by the *AFOLU Non-Permanence Risk Tool*) times the change in carbon stocks only. The full rules and procedures with respect to assignment of buffer credits are set out in VCS document *Registration and Issuance Process*. This calculation process is illustrated in the example below.

**4.7.3** At the first verification event, the example project in Table 4 below has generated a change in carbon stocks in the project scenario compared to the baseline scenario of 1000 tonnes. It also reduced GHG emissions by 60 tonnes by avoiding machinery use as compared to the baseline, resulting in a total change in GHG emissions from baseline to project scenario of 1060 tonnes. The project displaced some pre-project activities and resulted in leakage totalling 280 tonnes, including a reduction in carbon stocks outside the project boundary and associated emissions (note that carbon stock losses caused by leakage are considered permanent). Such leakage is subtracted from the change in GHG emissions of the project, resulting in 780 GHG emission reductions or removals (net GHG benefit). The project is assessed to have a 20 percent non-

permanence risk rating, which is multiplied by the change in carbon stocks only (not the net GHG benefit). This results in a buffer withholding of 200 credits, with 580 GHG credits issued as VCUs.

**Table 4:** Example GHG credit calculation

	tCO <sub>2</sub> e	Comment
<b>Project Compared to Baseline</b>		
Change in carbon stocks	1000	Reversal risk
Change in non-stock related GHG emissions (eg, from decrease in machinery use)	60	No reversal risk
Total change in GHG emissions for project vs. baseline	1060	= 1000 + 60
<b>Leakage</b>		
Change in carbon stocks outside the project area (eg, 20% market leakage, as determined in Table 2)	-200	= 1000 × 0.2 (considered permanent)
Change in GHG emissions	-80	No reversal risk
Total leakage	-280	= -200 - 80
<b>Total GHG Credits Generated</b>		
GHG emission reductions and removals generated (net GHG benefit)	780	= 1060 - 280
Buffer credits (determined as a percentage of net change carbon stocks)	200	= 1000 × 20%
GHG credits issued (VCUs)	580	= 780 - 200

## 4.8 MONITORING

- 4.8.1** The methodology shall establish criteria and procedures for monitoring, and specify the data and parameters to be monitored, as set out in the *VCS Standard*.
- 4.8.2** Leakage shall be monitored as set out in Section 4.6.
- 4.8.3** Where measurement plots or data from research plots are used to calibrate belowground biomass, soil carbon and dead wood decay models (as described above in Section 4.5.3), sound and reliable methods for monitoring changes in carbon stocks, including representative location of samplings sites and sufficient frequency and duration of sampling shall be applied. In addition, plots used to calibrate soil carbon models shall be measured considering appropriate sampling depths, bulk density and the estimated impact of any significant erosion (or plots with significant erosion shall be avoided). Data used to calibrate belowground biomass and dead wood models shall consider an estimation of oven-dry wood density and the state of decomposition.

# 5 | Validation and Verification Requirements

## 5.1 NON-PERMANENCE RISK ANALYSIS AND MARKET LEAKAGE EVALUATIONS

- 5.1.1** Non-Permanence risk analysis and market leakage evaluations shall be assessed by validation/verification bodies that are eligible to perform either validation or verification under the VCS Program for sectoral scope 14 (AFOLU). The project proponent shall contract the validation/verification body (ie, the VCSA is not involved in the process).
- 5.1.2** The validation/verification body shall assess the risk analysis carried out by the project proponent in accordance with VCS document *AFOLU Non-Permanence Risk Tool*. The project proponent shall respond to all and any of the validation/verification body's findings. As a result of any such findings, the project proponent shall amend the documentation as necessary and update the risk rating accordingly.
- 5.1.3** The validation/verification body shall produce an assessment report in accordance with all applicable VCS Program requirements and best practice. In addition to adhering to such requirements and best practice, the assessment report shall also contain the following:
- 1) A description of all and any of the validation/verification body's findings and the project proponent's response to them.
  - 2) An assessment statement, which is issued in accordance with the requirements for validation conclusions set out in the *VCS Standard*, mutatis mutandis. Such statement shall also state the version number of the non-permanence risk report or market leakage evaluation documentation upon which the statement is based.
  - 3) The non-permanence risk rating, leakage emissions and number of GHG emission reductions or removals eligible to be issued as VCUs.

The assessment may be included in the validation report or verification report, as applicable, or may be provided as a separate stand-alone document.

## APPENDIX 1: DOCUMENT HISTORY

Version	Date	Comment
v3.0	8 Mar 2011	Initial version released under <i>VCS Version 3</i>
v3.1	18 Oct 2011	<p>Main updates (all effective on issue date):</p> <ol style="list-style-type: none"> <li>1) Expanded eligible AFOLU project categories to include Avoided Conversion of Grasslands and Shrublands (ACoGS).</li> <li>2) Clarified how harvesting is treated in REDD methodologies and projects.</li> <li>3) Clarified procedure where a portion of the project area is not yet under control of the project proponent at validation.</li> <li>4) Clarified the requirements with respect to resetting the baseline after a catastrophic reversal.</li> <li>5) Minor clarifications in text on eligible IFM activities.</li> </ol>
v3.2	1 Feb 2012	<p>Main updates (all effective on issue date):</p> <ol style="list-style-type: none"> <li>1) Expanded requirements and procedures for AFOLU projects registering and issuing credits under the VCS Program and an approved GHG program (Section 3.5).</li> <li>2) Clarified requirements to explicitly require the timing of emissions, following land use conversion or disturbance, is taken into account for the soil carbon, belowground biomass, wood product and dead wood carbon pools (Section 4.5.3).</li> <li>3) Replaced the term <i>proof of title</i> with <i>evidence of right of use</i> (Section 3.4.2).</li> <li>4) Added additional requirement that projects shall apply the latest approved version of a methodology at the time of baseline reassessment (Section 3.1.10).</li> </ol>
v3.3	4 Oct 2012	<p>Main updates (all effective on issue date):</p> <ol style="list-style-type: none"> <li>1) Expanded the Peatland Rewetting and Conservation (PRC) category to include wetlands, resulting in the AFOLU project category for Wetlands Restoration and Conservation (WRC).</li> <li>2) Minor edits to requirements for default factors and standards to make consistent with <i>VCS Standard</i> (Sections 3.1.1 and 4.1.2).</li> <li>3) Included reference to <i>Jurisdictional and Nested REDD+ Requirements</i> (Section 3.1.2).</li> <li>4) Clarified that VCUs can only be tagged with additional certifications as noted on the VCS website (Section 3.1.5).</li> <li>5) Replaced term <i>geographic</i> with <i>geodetic</i> (Section 3.4.1).</li> <li>6) Structural edits to procedures for handling a loss event and/or a reversal to make consistent with the <i>Registration and Issuance Process</i> (Sections 3.7.7, 3.7.8 and 3.7.9).</li> <li>7) Expanded the eligible REDD project activities to include avoided planned degradation (Section 4.2.9).</li> <li>8) Replaced term <i>existing</i> with <i>other</i> (Section 4.2.11).</li> <li>9) Clarified the requirements for setting the baseline scenario in an IFM project when the project proponent is an entity with a conservation mission (Section 4.4.5).</li> <li>10) Moved the requirement on using activity-based methods to determine baseline soil</li> </ol>

		<p>carbon stocks from Section 4.4 to Section 4.5 (Section 4.5.4).</p> <p>11) Clarified leakage requirements for ALM, REDD and ACoGS projects (Sections 4.6.10, 4.6.15 and 4.6.18, respectively).</p> <p>12) Clarified that the difference in carbon stock between the baseline and project scenarios may be used to quantify the emission reductions from pools (Section 4.7.1).</p>
v3.4	8 Oct 2013	<p>Main updates (all effective on issue date):</p> <ol style="list-style-type: none"> <li>1) Clarified that readers <i>shall</i> use the most current version of this document (Section 1).</li> <li>2) Added a clarification note that WRC activities that cannot demonstrate a significant GHG benefit in the soil carbon pool are not eligible (Section 4.2.19).</li> <li>3) Clarified that carbon accumulation from sedimentation need only be quantified where it occurs (Section 4.5.28).</li> <li>4) Clarified that where a project area is not fully rewetted, the emissions from the soil carbon pool shall be appropriately estimated (Section 4.5.29).</li> <li>5) Clarified leakage requirements for ACoGS methodologies where the agent of land-use conversion cannot be identified, leakage from agents that are driven by market demand can be estimated using market leakage (Section 4.6.18).</li> <li>6) Clarified that activity shifting leakage from agents of land use change must be accounted for in REDD, ACoGS and CIW activities (Sections 4.6.15, 4.6.18 and 4.6.21).</li> <li>7) Clarified that certain requirements in Section 4.4 are relevant to the most plausible baseline scenario and not for all alternative baseline scenarios (Section 4.4).</li> <li>8) Expanded the document to be applicable to JNR, and made other minor edits and clarifications to text and grammar (throughout).</li> </ol>

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