# Building Forest Carbon Projects

## *AR Guidance*

FOREST TRENDS

the katoomba Incubator

EcoDecisión
inversión en el medio ambiente

2011

This work was made possible by:





Cover photo credit: Álvaro Vallejo

# Building Forest Carbon Projects

# AR Guidance

## *Technical Project Design*

Johannes Ebeling
Álvaro Vallejo Carbon Decisions International

July 2011



Preferred Citation: Ebeling, Johannes, and Álvaro Vallejo. *AR Guidance: Technical Project Design.* In Building Forest Carbon Projects, Johannes Ebeling and Jacob Olander (eds.). Washington, DC: Forest Trends, 2011.

Forest Trends' mission is to maintain, restore, and enhance forests and connected natural ecosystems, life-sustaining processes, by promoting incentives stemming from a broad range of ecosystem services and products. Specifically, Forest Trends seeks to catalyze the development of integrated carbon, water, and biodiversity incentives that deliver real conservation outcomes and benefits to local communities and other stewards of our natural resources.

Forest Trends analyzes strategic market and policy issues, catalyzes connections between producers, communities and investors, and develops new financial tools to help markets work for conservation and people.

www.forest-trends.org

The **Katoomba Incubator** provides comprehensive support to bring promising ecosystem services projects to the point where they can access markets or other sustainable finance. The Incubator focuses primarily on communities and small to medium landowners, a sector that plays a critical role in providing ecosystem services but faces particular barriers and challenges to finance, providing an integrated suite of support that can include technical, business and legal resources.

www.katoombagroup.org/incubator

**EcoDecision** is a social enterprise dedicated to developing new ways to finance conservation. EcoDecision is a pioneer in the emerging ecosystem services markets of climate change mitigation, water source protection and biodiversity conservation.

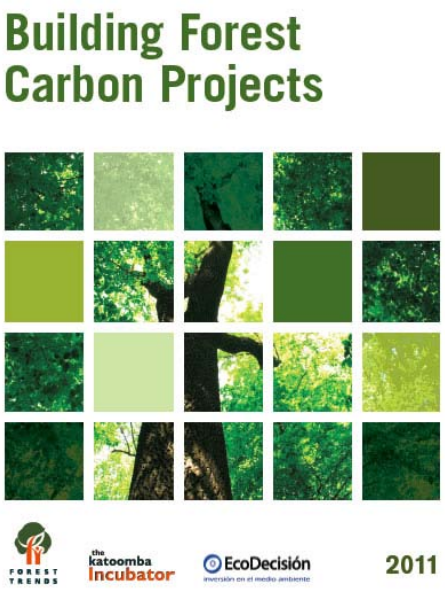
Established in 1995 by Jacob Olander and Marta Echavarria, EcoDecision is based in Quito, Ecuador, and works throughout Latin America with a broad array of clients and partners, including international and national non-governmental organizations, businesses, and government institutions.

www.ecodecision.com.ec

## Acknowledgements

This chapter has benefitted from the review and helpful suggestions of Phoebe Sullivan (New Forest Company), Christian Dannecker (South Pole Carbon Asset Management), Alexa Morrison (Plan Vivo), Zenia Salinas (BioCarbon Fund), Robert Seaton (Brinkman & Associates Reforestation), Pieter van Miedwood and Moriz Vohrer (CarbonFix Standard). These contributions are gratefully acknowledged, though all remaining errors of fact or judgment are the sole responsibility of the principal authors.

We also would like to thank Michael Jenkins, Founder and President of Forest Trends, as well as Gena Gammie and Anne Thiel, and the entire Forest Trends staff for their support.




**This guidance document is part of a Forest Trends series *Building Forest Carbon Projects***
Available at http://www.forest-trends.org/publications/building_forest_carbon_projects.

Other documents in this series, referred to throughout this document, include:

**Step-by-Step Overview and Guide**
*Jacob Olander and Johannes Ebeling*

**REDD Guidance: Technical Project Design**
*Joerg Seifert-Granzin*

**Carbon Stock Assessment Guidance: Inventory and Monitoring Procedures**
*David Diaz and Matt Delaney*

**Community Engagement Guidance: Good Practice for Forest Carbon Projects**
*Tom Blomley and Michael Richards*

**Legal Guidance: Legal and Contractual Aspects of Forest Carbon Projects**
*Slayde Hawkins*

**Business Guidance: Forest Carbon Marketing and Finance**
*Phil Covell*

**Social Impacts Guidance: Key Assessment Issues for Forest Carbon Projects**
*Michael Richards*

**Biodiversity Impacts Guidance: Key Assessment Issues for Forest Carbon Projects**
*John Pilgrim, Jonathan Ekstrom, and Johannes Ebeling*

# Acronyms

| | |
|---|---|
| ACR | American Climate Registry |
| AFOLU | Agriculture, Forestry and Other Land Use |
| ALM | Agricultural Land Management |
| AR | Afforestation and reforestation |
| CAR | Climate Action Reserve |
| CCB | Climate, Community & Biodiversity [Alliance or Standards] |
| CDM | Clean Development Mechanism |
| CER | Certified Emission Reduction |
| GHG | Greenhouse gas |
| IPCC | Intergovernmental Panel on Climate Change |
| IFM | Improved Forest Management |
| lCER | Long-term Certified Emission Reduction |
| NGO | Non-governmental organization |
| NTFP | Non-timber forest product |
| PoA | Programme of Activities [CDM] |
| PDD | Project Design Document |
| REDD | Reducing Emissions from Deforestation and Forest Degradation |
| REDD+ | Reducing Emissions from Deforestation and Forest Degradation, conservation of forest carbon stocks, sustainable management of forests, and enhancement of forest carbon stocks |
| tCER | Temporary Certified Emission Reduction |
| UNFCCC | United Nations Framework Convention on Climate Change |
| VCS | Verified Carbon Standard |
| VCU | Verified Carbon Unit |

# TABLE OF CONTENTS

# 1. Introduction

Afforestation and reforestation (AR) carbon projects have, in many ways, shaped the concept of carbon offsets and largely continue to represent "offsetting" in the eyes of the public. The history of forestry under the Clean Development Mechanism (CDM) has been embroiled in complex political and technical debates; however, the many years of hard work under this standard have produced a clear learning pathway and have provided a solid basis for developing forest carbon accounting approaches. Recent dynamic developments in the voluntary forest carbon markets would not have been possible without the methodological clarity established by AR efforts under the CDM.

In the CDM market itself, AR has fallen far behind original expectations and has not prospered as an asset class. Reasons for this include delays in the definition of procedures and modalities, exclusion of credits from key markets due to the modalities chosen to address the non-permanence risk of carbon sequestration benefits, and the high transaction costs resulting from highly complex rules for AR projects (Chenost, et al. 2010). Although the number of registered projects has grown in recent years, two critical factors continue to block the way for AR projects even today: the temporary nature of AR CDM credits, or Certified Emissions Reductions (CERs)--meaning they have to be replaced after a certain period, which makes them much less attractive to buyers--and, partly as result of the former, the exclusion of AR CERs from the European Union Emission Trading System --meaning that they are barred from, by far, the largest existing carbon market now and for the foreseeable future.

*Plan Vivo and CarbonFix may be strategic alternatives for standardization, particularly for smaller projects.*

Emerging carbon markets and standards have benefited from the complex experiences of AR projects under CDM. The Verified Carbon Standard (VCS), in particular, has drawn lessons from market realities and, consequently, has designed a different way of dealing with non-permanence, while incorporating the wealth of methodological approaches developed under the CDM. Other barriers, including high transaction costs for small projects, have been tackled by other standards so that clear alternatives now exist for different project situations. Thus, while there are good reasons for growing enthusiasm, notes of caution regarding the continuing lack of strong market demand for forest carbon credits (given the limited size of voluntary markets), such as those made by the Business Guidance of this series, need to be heeded.

This chapter focuses on the dominant forest carbon standard (in terms of market share), the VCS, which is discussed alongside the CDM. Methodological guidance for each is very similar, given that CDM methodologies are automatically accepted by, and used by projects developed under the VCS. Key technical aspects of these standards are briefly compared to the Plan Vivo and CarbonFix standards because these may be strategic alternatives particularly for (initially) smaller projects which may struggle under the higher transaction costs of the VCS or CDM.[1] A detailed discussion of every alternative standard, however, is beyond the scope of this guidance document.[2]

These four main standards for AR projects are briefly reviewed in terms of scope of activities, land eligibility, baseline scenario development, demonstrating additionality, definition of project boundary, project start date and crediting periods, permanence assurance, type of credits, emissions, and leakage. Finally, some guidance is given for choosing between available methodologies and standards. Regarding terminology, except in very specific instances, "AR" is

[1] The Plan Vivo Standard in particular is tailored to projects that may start out very small but grow organically as more farmers join, sometimes reaching substantial overall scale. Neither Plan Vivo nor CarbonFix is limited to small-scale activities.

[2] In particular, the focus of this series is on standards that can be widely used throughout developing countries. As such, the Climate Action Reserve (CAR) standard – the CAR Forest Project Protocol – is not discussed here because it is currently restricts eligibility to North America. Readers may see the Step-by-Step Overview for a brief description.

used throughout to generically describe the project types described in this chapter; note, however, that the VCS term is "ARR" (including revegetation activities) and that the CDM uses "A/R."

This chapter focuses on technical and methodological issues; however, it should be stressed that some of the most significant challenges facing AR projects may be of a financial nature due to front-loaded costs (due to forest establishment) and back-loaded carbon benefits (conferred as trees grow and sequester carbon). As outlined in the Business Guidance, in most cases AR projects will therefore require significant revenue derived from timber and other non-carbon revenues, or external subsidies, to become viable. Other key issues for AR project developers are discussed in the Carbon Stock Assessment, Social Impacts, and Biodiversity Impacts guidance documents of this series. In addition, the REDD Guidance contains useful advice for strategic technical and organizational project development that will be useful to AR project proponents and developers.[3]

## 1.1 Choosing between Standards for AR Projects

Existing AR carbon standards vary in their rules and procedures: they can generate temporary credits (CDM) or permanent credits (VCS, CarbonFix, Plan Vivo), which can be ex-post (VCS, CDM), or ex-ante and ex-post (Plan Vivo, CarbonFix), and related regulatory documentation may be highly complex (CDM, VCS), or moderately so (CarbonFix, Plan Vivo). Box 1 offers a succinct introduction to the major AR carbon standards. In addition, the website maintained by the Carbon Offset Research and Education (CORE) Initiative provides up-to-date analysis and synthesis of the most influential offset programs and activities (Stockholm Environment Institute and Greenhouse Gas Management Institute 2011).[4]

### Box 1. Afforestation and Reforestation Standards

**Verified Carbon Standard (VCS)**
http://www.v-c-s.org/
Carbon offset standard that is focused almost exclusively on GHG reductions and that does not require projects to have additional environmental or social benefits. VCS is broadly supported by the carbon offset industry (project developers, large offset buyers, verifiers, projects consultants) and has become the most important standard in the voluntary carbon market. It is compatible with CDM AR methodologies and tools – i.e., all CDM-approved methodologies and tools can be directly used for VCS projects - and has gained much experience from CDM, while also allowing for the development of own methodologies. It issues Verified Carbon Units (VCUs).

**Clean Development Mechanism (CDM)**
http://cdm.unfccc.int/
Carbon offset standard, generating certified temporary (tCER) or long term (lCER) emission reductions coming from AR projects, acceptable for compliance by governments under the Kyoto Protocol.

[3] In this series, the term "project proponents" is used to refer to those individuals or organizations generally responsible for the overall organization, management, and legal representation of the forest carbon project. "Project developers," on the other hand, is used to refer specifically to entities tasked with the technical design aspects of the project as required by the carbon and/or co-benefit standard(s).

[4] Available at: http://www.co2offsetresearch.org/.

**CarbonFix Standard**
http://www.carbonfix.info/
Forest carbon offset standard which enables projects to generate certificates *ex-post* as well as *ex-ante* form and which can be used as a standalone standard or in combination with other certification schemes (e.g., existing Forest Stewardship Council and CCB certification will automatically fulfill some CarbonFix requirements). Modalities and procedures are very simple in comparison to those of the VCS and CDM. AR projects that are not viable under the VCS or CDM standards because of their high transaction costs may be viable under this standard. (However, market acceptance of CarbonFix CO2 certificates is lower than for VCS credits.)

**Plan Vivo**
http://www.planvivo.org/
A system for designing and operating payments for ecosystem service projects and schemes, targeted at small-scale farmers and forest-dependent communities. Under Plan Vivo, farmers and communities create sustainable land management, or "living plans" (*plan vivos*), that combine existing land uses with additional activities to create carbon benefits. The Plan Vivo Standard is relatively simple, and projects use their own "Technical Specifications," which are designed using elements of other methodologies, such as those of the CDM, or original approaches. It mainly issues *ex-ante* carbon credits, although *ex-post* credits can also be generated. Small projects that are not viable under VCS or CDM standards (because of high transaction costs) may be viable under this standard, although projects may grow over time to reach a substantial scale. (However, market acceptance of Plan Vivo Certificates is lower than for VCS credits.)

**The Climate, Community & Biodiversity (CCB) Standards**
http://www.climate-standards.org
This standard is different from the above standards in that it does not lead to the issuance of carbon credits. Rather, it is used to evaluate land-based climate change mitigation projects by identifying high-quality projects that adopt best practices to generate significant benefits for local communities and biodiversity while delivering credible and robust carbon offsets. It is usually combined with carbon standards such as VCS, CDM, or CarbonFix to demonstrate added value from communities and biodiversity benefits.

**American Carbon Registry Standard**
http://www.americancarbonregistry.org/
The American Carbon Registry (ACR), an enterprise of Winrock International, publishes different standards and protocols for carbon project accounting. The ACR's Forest Carbon Project Standard is available for AR, IFM, and REDD projects globally, although the standard's focus has traditionally been North America. Because of its great overlap with the CDM and VCS approach and tools, it will not be systematically discussed in the remainder of the chapter. This standard may introduce some interesting innovations, however, such as the insurance approach as an additional alternative to the non-permanence risk buffer.

**Climate Action Reserve (CAR)**
http://www.climateactionreserve.org/
The CAR program emerged from the California Climate Action Registry, a California-based non-profit organization overseeing emissions reporting and offsets in that state. CAR's Forest Protocol covers AR, IFM and REDD. It is currently only applicable to projects in the U.S., though efforts are underway to adopt protocols for all of North America, including Mexico. Projects are issued Climate Reserve Tonnes (CRTs).

When choosing between standards, project developers should not focus exclusively on their technical complexity. It is also important to be aware, from the outset, that the choice of standard directly impacts a project's ability to access particular markets and buyers. Likewise, realizable carbon credit prices, transaction costs (e.g., for Project Design Document development, validation, and ongoing verification), and other factors may also vary considerably

*The choice of standard directly impacts a project's ability to access particular markets and buyers.*

depending on the standard chosen. Readers should consult the Business Guidance for additional resources on current markets for forest carbon credits and the relative acceptance of different standards in those markets.

Many project proponents will be faced with the potentially difficult choice of developing their project according to VCS or CDM requirements (assuming the project is large enough to be viable under either). Apart from market considerations, these proponents will be interested in examining the technical implications for project design under each standard. They might also be interested to know whether this decision may be postponed or reconsidered at a later date.

Fortunately, there are few differences in formal project design between CDM and VCS, largely because VCS accepts the use of CDM methodologies and has not approved its own AR methodologies yet.[5] Also, in principle, most of the data items and procedures that project proponents need to keep in mind for validation or verification are comparable. However, some differences do exist, most of which create more flexibility under the VCS (see Table 1).

**Table 1. Technical Implications of Developing a Project under VCS or CDM**

| | VCS | CDM |
|---|---|---|
| **Market** | Credits for the voluntary and pre-compliance markets | Credits primarily for the Kyoto compliance market |
| **Credit Type** | Permanent credits (VCUs) | Temporary credits (tCERs, lCERs), i.e. non-fungible with other CDM credits |
| **Risk Assessment** | Requires a permanence risk assessment | No formal risk assessment required |
| **Public Funding** | Accepts Official Development Assistance for projects | Only accepts Official Development Assistance for projects if the donor country does not claim carbon credits generated from the project. |
| **Historic Deforestation** | Areas deforested until ten years before start date are eligible, and others if no relation with intention to create carbon credits exists | Only areas deforested before 1990 are eligible |
| **Non-Forest Areas** | Native non-forest habitats (e.g., wetlands, grasslands) are not eligible | Some natural non-forest areas may be eligible |
| **Forest Definition** | Flexibility regarding forest definition (potentially affecting land eligibility and choice of species); in addition "Re-vegetation" activities eligible | Must apply host-country UNFCCC forest definition |
| **Appeals** | Appeals and arbitration procedure in place; registration is a mere formality after successful validation | No appeal of project rejections possible; CDM Executive Board has final say on registration |
| **Validation / Verification Principles** | Validation/verification principles based on International Organization for Standardization (ISO) principles | Own principles for validation/verification |
| **Government Involvement** | Does not need to specify or involve government Parties | Needs to specify Parties to the Kyoto Protocol participating in the project (host and buyer country) |

[5] The VCS has, however, approved one revision of an existing CDM methodology.

If unsure which way to go, project proponents can keep options open while drafting the Project Design Document (PDD)--called Project Description under the VCS--since many sections will be the same or very similar.[6] During the PDD drafting process itself, the main differences will likely concern the calculation of *ex-ante* carbon credits (temporary vs. permanent credits) and the formal non-permanence risk assessment (only under VCS). Although not required under CDM, conducting a non-permanence risk assessment will be very useful for improving project design even if the project eventually seeks CDM validation. Additionally, project proponents may consider the level of rigidity that auditors may assume during validation and verification. The interpretation of complex methodologies as well as deviation requests have tended, in practice, to be handled more swiftly and easily under the VCS.

# 2. Key Methodological Concepts under Different AR Standards

This section compares key technical aspects of AR projects from the point of view of the different selected standards, including requirements regarding scope of activities, land eligibility, baseline scenario development, demonstrating additionality, definition of project boundary, project start date and crediting periods, permanence assurance, type of credits, emissions, and leakage. While market considerations will, to some extent, determine the choice of a carbon standard for a particular project, proponents should consider these different technical requirements in the project assessment and design phases (see Step-by-Step Overview) before making a final decision. In the end, carbon credits will only be generated if all the requirements under a respective standard (and the chosen methodology) can be met.

In the context of forest carbon projects, a methodology is a tool for determining GHG benefits by using accounting methods appropriate to a certain type of project. Methodologies have been generally developed in a bottom-up fashion for approval under the respective standard, often designed to fit an individual project. The CDM has led the methodology development producing three types of methodologies: regular (large-scale), small-scale, and consolidated. These cover several kinds of AR activities, including active restoration of degraded lands, planting of trees for conservation, industrial production and silvopastoral systems, and assisted natural regeneration. Small-scale methodologies are simplified and applicable only to projects generating less than 16,000 CERs per year.

The CDM has also designed some methodological tools to deal with specific issues, such as demonstrating land eligibility or the insignificance of certain emissions, which can be drawn upon by the various methodologies. To date, 18 AR CDM methodologies (11 large- and 7 small-scale) and 15 methodological tools have been approved. In addition, project proponents must consider a number of CDM Executive Board decisions and directives, making project design extremely complex. See Box 3 for where to find the various methodologies, tools, and decisions.

The VCS has endorsed all CDM-approved AR methodologies and tools, making the present guidance transferrable in full. However, under the VCS, additional information is required to assess risk, and land eligibility criteria differ from CDM rules. More specifically, the VCS has resolved that where the rules and requirements under an approved carbon standard (such as the CDM) conflict with the rules and requirements of the VCS, the rules and requirements of the VCS shall take precedence.[7] This is the case, for example, for land eligibility requirements and forest definitions (see

[6] In the future, this same procedure could require an extra effort if using a VCS-specific methodology since it will not be automatically accepted under the CDM. Even then, however, many parts will be similar.

[7] See VCS, *AFOLU Guidance: Additional Guidance* (2011), available at: http://v-c-s.org/sites/v-c-s.org/files/VCS%20Guidance%2C%20CDM%20AR%20Methodology%20for%20VCS%20Reveg%20Project.pdf.

Section 2.2). In addition, VCS-specific methodologies may be developed, requiring a double-approval process by two accredited external validators. To date, no AR VCS methodologies have been approved, but existing CDM methodologies should suffice for most project types.

In contrast, the Plan Vivo Standard has developed some general directives that must be followed by each project in developing its own, relatively simple "Technical Specifications." That is, there are no approved, generally applicable methodologies for Plan Vivo projects (although a tool is in forthcoming to aid community REDD projects in developing appropriate methodological approaches). Each Plan Vivo technical specification must pass an independent review process coordinated by the Plan Vivo Technical Advisory Committee.

Under the CarbonFix Standard, the standard itself takes on the role of a "methodology," providing technical guidance and options that can be drawn upon similar to a toolbox by projects, depending on their context. This greatly simplifies this standard's regulatory framework.

Table 2 provides an overview over the main characteristics of the four forest carbon standards discussed in this chapter. Each of these aspects is taken up in greater depth in the subsequent sections.

**Table 2. Main Features of Selected AR Standards**

| Feature | Standard | | | |
|---|---|---|---|---|
| | **VCS** | **CDM** | **CarbonFix** | **Plan Vivo** |
| **Eligible Activities** | - Afforestation, Reforestation and Revegetation--i.e., any project increasing woody biomass<br>- Agricultural Land Management (ALM)<br>- IFM<br>- REDD | - Afforestation and reforestation (including silvo-pastoral and agroforestry systems that comply with forest definition)<br>- Natural Regeneration (if caused due to human intervention) | - Afforestation and reforestation<br>- Natural Regeneration (if caused due to human intervention) | - Afforestation and reforestation<br>- Agroforestry<br>- Forest restoration (in addition to REDD) |
| **Land Eligibility** | - Has not been forest within 10 years prior to the project start (or proof that land was not cleared to gain credits) | - Was deforested before January 01, 1990<br>- Is not forest at project start<br>- Would not become forest without project activities | - Has not been forest within 10 years prior to project start (or proof that no relationship of project participants with cause of deforestation)<br>- Is not forest at project start | - Tenure: Small-holder owned or leased farmland, or community owned land, or communities have agreed use rights<br>- No formal restrictions regarding land cover history, but evidence of land cover of previous 10 years should be provided |
| **Project Location** | No restriction | Developing (Non-Annex 1) countries | No restriction | Developing countries |

| | | | | |
|---|---|---|---|---|
| **Forest Definition** | Any "internationally accepted" forest definition, incl. UNFCCC parameters or FAO definition | Defined by host government according to CDM parameters | Same as CDM host-country definition. FAO definition if no CDM host-country definition is available | Minimum of 0.5 ha, 10% of canopy cover and potential for trees of more than 2 m of height, not primarily under agricultural or non-forest use |
| **Additionality** | - VCS additionality tool<br>- In future: Performance-based additionality tests; Positive technology list | CDM additionality tool; or as specified by methodology | UNFCCC additionality tool | Defined in a project's Technical Specification; carbon finance must be vital for project implementation |
| **Project Start Date and Crediting Period** | - After January 01, 2002<br>- Crediting period from 20 to 100 years | - After January 01, 2000<br>- Crediting period of 20 (renewable twice) or 30 years | - No start date restriction<br>- Maximum crediting period of 50 years; no minimum period | - Start date after the creation of the Plan Vivo Standard<br>- Crediting period starting after validation (not retroactive) |
| **Permanence Assurance** | Non-permanence risk buffer of 10-60% (or fail), depending on project-specific assessment | Temporary credits (t-CERs and l-CERs) which must be replaced once they expire | 30% buffer (default) | Buffer of 10 - 50%, depending on project-specific assessment |
| **Leakage** | Activity shifting (displacement of e.g., grazing, agriculture, fuelwood collection) | Activity shifting (displacement of e.g., grazing, agriculture, fuelwood collection) | Activity shifting (displacement of e.g., grazing, agriculture, fuelwood collection) | Activity shifting of agricultural activities |
| **Monitoring and Verification** | Monitoring of carbon pools, emission sources, disturbance events and leakage. Third-party verification | Monitoring of tree survival, carbon pools, emissions and leakage. Every five years. Third-party verification | Monitoring of carbon pools, discount factors for emissions. Every 5 years. Third-party verification | Annually. Self-reporting with desk-based assessment and periodic third-party verification |
| **Eligible Methodologies** | - VCS-approved methodologies<br>- CDM-approved methodologies | CDM-approved methodologies | There are no methodologies other than the standard | - Plan Vivo 'project specific methodologies' (Technical Specifications) |
| **Registry** | 3 different commercially operated registries linked to central VCS account, with credits issued by VCS Association | CDM Registry administered by the UNFCCC secretariat | Commercial registry operated by Markit, with credits issued by the CarbonFix Foundation | Commercial registry operated by Markit, with credits issued by the Plan Vivo Foundation |

## 2.1 Eligible Activities

Not all projects that plant trees are necessarily eligible under existing carbon standards. Among other aspects, discussed below, project activities have to fall within the scope of what has been defined under the respective standard.

AR activities consist of converting non-forest areas to forests, using an agreed definition of what represents a "forest," (see Table 1) such that the ecosystem's carbon storage increases. The distinction between *afforestation* (establishing a forest on land that has not been a forest for at least 50 years, or never) and *reforestation* (restocking of forests which have been depleted less than 50 years ago), established by the CDM, carries no practical consequences. VCS follows this distinction and adds another category of *revegetation*, which consists of the establishment of woody biomass (not necessarily trees) and does not lead to establishing an actual forest (as per the forest definition). The planting of trees in existing forest is excluded from crediting under AR under both VCS and CDM, but may be creditable under VCS as part of an Improved Forest Management (IFM) project.

*Revegetation consists of the establishment of woody biomass (not necessarily trees) and does not lead to establishing an actual forest.*

The establishment or restoration of forests can be accomplished through different techniques, such as direct planting (or seeding), with different levels of site preparation, or through natural regeneration. The latter is usually considered "assisted" because the project activity is creating the conditions for such regeneration, which would not happen under the baseline scenario—for example, fires which would have recurred in the baseline scenario and stifled regeneration may be prevented by the project. Mixed techniques, such as assisting natural regeneration and simultaneously planting trees, perhaps to increase the abundance of certain species, may also be used. It is important to note that some AR methodologies under the CDM and VCS are limited to certain techniques (e.g., some methodologies only allow for direct planting).

Under the Plan Vivo Standards, afforestation and reforestation activities are broadly eligible; additionally, agroforestry and avoided deforestation (i.e., REDD) activities are also eligible. In contrast, CarbonFix projects are restricted in scope to afforestation and reforestation. Both standards place restrictions on the species that may be planted: Plan Vivo only allows native or naturalized species, with additional requirements, while CarbonFix only specifically excludes genetically modified species (see Biodiversity Impacts Guidance).

## 2.2 Land Eligibility and Forest Definitions

### 2.2.1 Land Eligibility

In order to preserve the environmental integrity of carbon credits, AR carbon standards are very careful to not provide potential perverse incentives for planting new forests after clearing existing ones. Therefore, project proponents must demonstrate that the project area was not cleared of pre-existing forests with the goal of later claiming carbon credits. This can often be achieved by referencing the baseline analysis to demonstrate, for example, that land was subject to ongoing degradation through grazing or other land-use activities.

*Project proponents must demonstrate that the project area was not cleared of pre-existing forests with the goal of later claiming carbon credits.*

In the case of CDM, areas are only eligible if they did not contain forest on 31 December 1989, were not forested at the beginning of project activities, and would not be expected to become forest without the project. This also means that areas that are only temporarily unstocked (e.g., because of timber harvests or slash-and-burn agriculture where forest regeneration is expected) are not eligible. This is particularly relevant in tropical climates where rapid regeneration (e.g., during a fallow cycle) may cross the thresholds of the national forest definition.

*Under the VCS, the conversion of any native, non-forest habitat—such as wetlands, grasslands, or scrublands—is not allowed.*

For the same purpose of avoiding perverse incentives, the VCS only allows AR projects in areas where it can be demonstrated that no native ecosystems (forest or otherwise) were removed to create carbon credits through an AR project. The validator will assess documentation provided by the project proponent in this regard. Such proof is not required where clearing took place more than 10 years before project start date.[8] This means that, contrary to popular perception, there is no hard "10-year rule" for land eligibility under the VCS and that, provided that the above documentation can be produced, land deforested more recently may be also eligible for reforestation.

Given that hundreds of millions of hectares of forestland have been converted globally for reasons not related to carbon finance, the CDM rules effectively block vast areas of land from being reforested with the help of carbon finance. If a project plants trees in an area that historically has had little forest due to, for example, ecological conditions, then the amount of eligible land could be commensurate under either VCS or CDM. However, if a project is envisioned in an area which is historically known for its rich forest resources and which has more recently been subject to large-scale deforestation, then a large portion of land may well be ineligible under the CDM. In fact, many project proponents have identified a land area for planting, only to later discover that portions of it are ineligible under the CDM. Thus, project mapping (and implementation) may become very complex in order to identify eligible areas that may be fragmented across the project space, thereby requiring multiple sets of boundaries.[9]

Under the VCS, the conversion of any native, non-forest habitat--such as wetlands, grasslands, or scrublands--is also not allowed (VCS, *AFOLU Guidance: Additional Guidance*, 2011, 5), whereas the CDM makes no such requirement. An explicit definition of "native" ecosystems, however, is not provided, and it should be assumed that severely degraded land that has been transformed by human intervention (e.g., agriculture, grazing, anthropogenic fires) would be eligible.

To demonstrate land use and cover during the critical periods, the following may be used, as specified by the relevant standard: remote-sensing imagery (aerial photography or satellite images), usually supplemented with field work; official land use and land cover maps; field inventories; land use permits; management plans; or other official records. If these are not available or sufficient, documented evidence from a Participatory Rural Appraisal may be used under some methodologies.[10] Satellite imagery dating back to 1989 (to adhere to CDM stipulations) may be non-existent or expensive to obtain. Under these conditions, it is best to assess eligibility by interviewing local community members

[8] The VCS's *AFOLU Guidance: Additional Guidance* (2001, 5) states: "Evidence shall be provided in the project description that any (….) project areas were not cleared of native ecosystems to create GHG credits (….). 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."

[9] If a project were to pursue planting across the entire area regardless of CDM land eligibility it could risk having their additionality arguments questioned given that carbon finance will only accrue to a portion of the land.

[10] See, for example, Catley, et al. (2008).

who have lived in the area for a long time and to substantiate this further through interviews with relevant government departments, consulting historical maps, and so forth.

There are multiple types and sources of remotely-sensed images with appropriated resolution to be used for assessing land eligibility. Those resources listed for deforestation detection in the GOFC-GOLD REDD Sourcebook, for example, are similarly applicable to assessing AR land eligibility.[11] The selection of an appropriate source of remotely-sensed data may be partly determined by the forest definition, as well as topography, seasonal changes, etc., which may render some remote sensing approaches insufficiently sensitive to reliably distinguish between forested and non-forested states. This is particularly true in the humid tropics, where cloud cover is prevalent and can lead to difficulties constructing accurate data sets covering the entire project area. Furthermore, satellite imagery information must be ground-truthed through sample plot measures in the different land-use types identified in the remote-sensing analysis; these field measures may include tree height and diameter, tree crown cover, and bush crown cover. Typically, three to four plots may be chosen per land-use type.

Under the Plan Vivo Standard, no formal restrictions exist regarding land-use history in the project area, although evidence of land cover during the previous 10 years should be provided to ensure that there are no perverse incentives. Additionally, project coordinators are required to have a simple system to ensure farmers did not clear land in order to join the project. The 10-year requirement is less stringent because projects are usually made up of multiple (or thousands of) smallholdings, and it is not seen as practical to obtain formal evidence for every new participant as the project rolls out. In addition, in line with the foundation's rural development objectives, lands have to be under tenure of (or with use rights held by) smallholders or communities.

The CarbonFix Standard, similar to the VCS, requires that the project area has not been forested for 10 years prior to project start, with exceptions for project participants who can prove that they have no relationship to the cause of deforestation. Both Plan Vivo and CarbonFix standards have some additional requirements regarding land eligibility aimed at avoiding negative environmental impacts (e.g., on biodiversity or watersheds) which go beyond the requirements of CDM and VCS. However, biodiversity safeguards under both standards are still much less sophisticated and stringent than those of the CCB Standards (see Biodiversity Impacts Guidance.)

## 2.2 Forest Definitions

Deciding on an appropriate forest definition, in turn, is a necessary step for both selecting areas that were not forests before project activities ("eligible lands") and ensuring that the project activity establishes or restores forests. The CDM has created an *ad hoc* forest definition, which includes minimum thresholds for area (from 0.05 to 1 ha), tree height (from 2 to 5 meters of height at maturity), and crown cover (from 10 to 30 percent). These minimum values must be agreed at the national level by host countries within these limits and communicated to the CDM Executive Board (see Box 3). Unfortunately, still not all designated national authorities (DNAs) have decided on a CDM forest definition.

Projects seeking VCS validation can use this same definition of their respective host country, adopt the Food and Agriculture Organization's (FAO) forest definition,[12] or choose any other internationally accepted definition, which gives more flexibility in this respect. Since the CDM does not explicitly define "trees," woody species such as bamboos

[11] See Step 3, Section 2.1.2.4 of GOFC-GOLD (2010).

[12] The FAO defines forests as having a minimum of 10 percent crown cover, 0.5 ha area, and height exceeding 5 m at maturity. The definition excludes stands of trees established primarily for agricultural production, such as fruit tree plantations (FAO 2000).

and palms cannot always be used in AR activities under this standard.[13] This issue can also be handled more flexibly under the VCS, which also accepts revegetation activities. That is, even if a planned project does not result in vegetation cover that meets any acceptable forest definition, under the VCS it can simply be developed under the ARR category as a revegetation activity, while still using CDM A/R methodologies (VCS, *AFOLU Guidance: Additional Guidance,* 2011).

When deciding between different potential forest definitions, it is important to note that trade-offs can exist on both ends of the spectrum – determining which lands are actually eligible for reforestation (see Table 2 below) as well as what will count as forest in the project scenario. For example, choosing a low, 2 m height threshold will allow for more flexibility in using certain species in a plantation that would not otherwise qualify as forest (e.g., many Jatropha plantations); however, this may also mean that areas that already have vegetation above 2 m at project start have to be excluded from the eligible project area.

*When deciding which forest definition to use, it is important to note that trade-offs exist on both ends of the spectrum of land eligibility.*

Forests are defined under Plan Vivo as covering a minimum of 0.5 ha, with 10 percent canopy cover and to potential for trees to reach more than 2 m of height. In addition, the area must not primarily be under agricultural or non-forest use. CarbonFix uses the respective CDM host-country definition, and the FAO definition can be used in cases where the former is not available.

See Table 2 for a succinct comparison of eligible areas under different AR standards.

## 2.3 Establishing the Baseline Scenario

Estimating the baseline is a critical step in quantifying the actual carbon benefits of a project because only the difference between carbon stocks in the baseline and the project scenario can be attributed to the project activities. If, for example, some trees were expected to regenerate even without project intervention, the carbon contained in these trees would have to be deducted from apparent project carbon benefits. Under the CDM, project proponents are required to provide proof of the **most plausible baseline scenario**, to be used for calculating actual additional carbon removals from project activities. Three different approaches to establishing a baseline reference scenario have been established under the CDM, and all approved methodologies are built on one of these (thus, for the time being, VCS projects will also need to follow them):

- Existing or historical changes in carbon stocks;
- Changes in carbon stocks from a land use that represents an economically attractive course of action, taking into account barriers to investment; and
- Changes in carbon stocks from the most likely land use at the time the project starts.

Each approach requires a different analysis.[14] The first approach is the most simple and is taken up by the majority of methodologies. It describes cases where the most likely baseline is the continuation of existing land uses (e.g., degraded and further degrading lands). The fact that the baseline approach is pre-selected in each methodology may

[13] Such species may only be included in AR activities if a DNA explicitly states that this is included in the host country's forest definition (UNFCCC 2010).

[14] The two tools for demonstrating additionality discussed in the subsequent section are also very helpful in establishing an appropriate baseline because of the close relationship between both concepts.

limit the methodology choice for project proponents, considering that this may not be the appropriate scenario for their project even if a given methodology may best fit their needs in other aspects. For many projects, however, two or even all three of these approaches may be functionally identical. For instance, the historical changes in carbon stocks may be occurring under the most likely land use at project commencement, which may represent an economically attractive course of action.

*The development of a baseline scenario is distinct from the assessment of carbon stocks at project start.*

Baseline determination and modeling ranges from simple scenarios such as degraded and further degrading areas[15] to scenarios where some trees are present and their growth must be modeled to estimate future carbon stocks as part of the baseline. In extreme cases, baseline scenarios may be quite complex, as in slash and fallow systems, where carbon stocks follow complex, dynamic growth patterns.[16]

The baseline scenario development is distinct from the assessment of carbon stocks at project start, or "time 0." The latter refers to existing carbon stocks in woody or non-woody vegetation or other carbon pools, e.g. soil carbon, which will then change, in different ways, under the baseline and project scenario. Carbon stocks that are present in the project area before project start generally need to be taken into account when calculating a project's net GHG benefits. If, for example, site preparation for planting leads to the removal of woody biomass, then this usually needs to be accounted for as a project emission (in contrast, herbaceous biomass can be neglected).

The CDM has become somewhat more flexible with regards to removing biomass at project start. For example, in some instances, project proponents can demonstrate that baseline carbon stocks were in regular decline due to slash-and-burn agriculture or natural fires in the absence of the project.[17] In other cases, and under some methodologies, if time-0 tree crown cover is 20 percent below the respective value of the national forest definition it can be neglected (see Table 1). These and other conditions have been recognized in updated methodologies, tools, and guidance, and project developers should regularly review the CDM website for updated rules, which can greatly reduce the amount of field-based research required.

The Plan Vivo Standard requires baselines to be estimated based on "carbon stocks in existing vegetation and expected changes in land use," as defined in each project's Technical Specifications. Alternatively, the CarbonFix Standard defines the baseline as the woody and non-woody biomass on the eligible planting area just before the project start (i.e., what would be time-0 biomass measurements under the CDM), although any long-term increases in woody biomass generated in the absence of the project would need to be accounted for.

## 2.4 Additionality

Probably the most important issue of carbon offset projects is additionality. A project is considered to be additional if actual net greenhouse gas (GHG) removals by sinks resulting from the project activity are greater than those that would have occurred in the baseline scenario, i.e., the land management activity most likely to have taken place

---

[15] In this case, carbon stocks are decreasing over time and are conservatively assumed to be constant under the baseline scenario after project start.

[16] Generally, these shifting systems have relatively high baseline carbon stocks (decreasing the potential gains from project implementation) and may also represent a challenge to demonstrating the eligibility of lands.

[17] Project developers may use the University of Maryland's *Fire Information for Resource Management System* web-based Web Fire Mapper to track the frequency and extent of fires in the project area over a given period of time, avoiding costly field-based work; it is available at http://firefly.geog.umd.edu/firemap/.

without the financial or other incentives provided by the generation of carbon credits. Although the concept is virtually identical in all the standards considered here, the procedure for demonstrating additionality may differ.

The CDM identifies four types of barriers that may impede the implementation of the proposed project activity in the absence of carbon credits: investment barriers (access to finance), technological barriers, barriers due to prevailing practice, and other barriers. Producing proof of one or more of these barriers is required to demonstrate the additionality of the project activity. When relying on the barrier analysis for the proof of additionality, it is recommended to provide a very robust justification of a single barrier, rather than anecdotal or weak evidence of several barriers.

An alternative route (for large-scale projects) is to carry out a financial investment analysis in which evidence must be provided that, without the carbon revenues, the proposed project activity is economically or financially less attractive than activities under at least one of the alternative land-use scenarios identified in the baseline analysis, and that this situation may change with the additional revenue from carbon credits. This investment analysis may be performed as a standalone additionality analysis or in addition to the barrier analysis. These steps are explained in detail in the CDM additionality tool for AR activities, which many approved large-scale methodologies must use.[18] These steps are also broadly followed by another AR CDM tool that addresses both additionality and baseline development,[19] as well as by the approaches specified by small-scale methodologies themselves, albeit in a simplified form.

Auditors expect to see more than anecdotal evidence to demonstrate additionality. Where there is a shortage of scientific literature, national statistics, and market reports, interviews with communities and key stakeholders can support barrier claims in particular.

The VCS has developed its own additionality regulations, which can be verified through a Project Test (based on the execution of an investment barrier analysis, a technological barrier analysis, or an institutional barrier analysis), a Performance Test, or a Technology Test. However, given that current VCS AR projects exclusively use CDM methodologies, the requirements that project proponents need to fulfill are *de facto* the same as under the CDM. [20]

The Plan Vivo Standard provides general guidance on demonstrating additionality and also allows each project's Technical Specification to define a detailed approach. A barrier analysis similar to the CDM and VCS approach can be used to demonstrate additionality, including evidence of a lack of technical expertise, institutional capacity, financing, or political or cultural barriers. Due to inherent project characteristics (e.g., smallholders, no exotic timber species), and the *ex-ante* crediting approach (to aid up-front financing), in general, Plan Vivo projects may be argued to be more clearly additional.

Carbon Fix projects may prove additionality by using the CDM procedures. Furthermore, in order to fulfill additionality requirements, project proponents must provide evidence that the project leads to more sustainable development than the baseline scenario.

It should be noted that a sizeable share of CDM project rejections are due to failures to clearly demonstrate additionality. Regardless of the adopted standard, additionality should be addressed in a very early stage of project design, and further project design and implementation should only be pursued after having sound additionality

---

[18] *Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities*, available at: http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-01-v2.pdf.

[19] This tool, called the *Combined tool to identify the baseline scenario and demonstrate additionality in AR CDM project activities*, is available at: http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v2.2.pdf.

[20] Both CDM and VCS explicitly state that alternative options may be suggested for demonstrating additionality in the future.

arguments and documentation. This could include ensuring that, for example, board minutes include reference to carbon finance expectations, carbon revenues are modeled in the project's business plan, or an early carbon sales agreement is in place. Under the CDM, the project developer must officially inform the Executive Board of the intention to pursue CDM registration within six months of project start. If there is no paper trail in place that the auditor can follow to confirm early consideration of carbon revenues, additionality becomes increasingly difficult to demonstrate.

## 2.5 Defining Project Boundary, Carbon Pools, and Sources of Emissions

The assessment of the baseline as well as of project carbon benefits requires the determination of spatial boundaries, carbon pools, and sources of emissions.

**Spatial boundaries** precisely delineate the area within which the project activity will be undertaken so that carbon stocks and emissions can be accurately assessed and monitored. As explained above, areas for project implementation must be eligible under the chosen standard and thus fulfill specific requirements such as previous and current land use. Also, the practical suitability of the land for the underlying forestry activities needs to be assessed. For VCS and CDM, project boundaries must be clearly defined with GPS coordinates for each discrete area. Project developers need to be consistent when presenting discrete parcels throughout the PDD and any supporting documentation or other project documents, such as forest management plans.

Under the CDM and VCS, project boundaries must be fixed from the outset and laid down in the PDD, a requirement that has proven to be a serious drawback for implementing umbrella-type projects, which may have particularly high environmental and social benefits. In principle, Programmes of Activities (PoAs), under the CDM, offer more flexibility in this regard (allowing for new project activities to be added at later dates), but these have proven extremely challenging to develop, even in non-forestry sectors. Recent updates to the VCS allow for grouped projects that add new "project activity instances" after initial validation. However, the new areas within which new project activity instances may be developed must already be set out in the project description, along with clear eligibility criteria for their inclusion (including baseline determination, land eligibility, and additionality aspects, although exact project location need not be defined).

The CarbonFix and Plan Vivo standards are more flexible on future inclusion of new areas, provided that they fulfill all other eligibility requirements. This means that project boundaries need not be fixed at the time of validation and that scaling up is explicitly encouraged.

All standards considered here also require proving "control" over project areas, with different degrees of flexibility according to the selected standard, as regards land tenure or use rights. The CDM and VCS provide some limited flexibility, allowing project proponents to only demonstrate control over two-thirds and 80 percent of the project area, respectively, at validation, with the remainder to be demonstrated by the time of the first verification.[21] Both standards also require a "proof of title" to GHG benefits at the time of validation (see Legal Guidance for further discussion).

**Carbon pools and sources of project GHG emissions** are treated differently by different standards in terms of which pools and emissions may or must be included in AR project accounting. While these are specified by the applicable methodology under CDM and VCS, as a general rule, carbon pools can only be neglected if it can be demonstrated

[21] The VCS allows a lower percentage if a number of additional requirements are met.

that this is conservative, or, in some cases, if it can be shown that changes in the pool will be so small as to be immaterial ("*de minimis*"). If, for example, soil carbon is reduced in the project relative to the baseline to a degree that is considered significant by the applicable methodology, the project developer must account for it. The CarbonFix Standard predefines eligible carbon pools for the baseline, project scenario, and leakage accounting.

Some sources of emissions have been deemed insignificant in some methodologies after several years of struggling with complex procedures to assess them, most notably fossil fuel combustion from transport and machinery use, $N_2O$ emissions from fertilizer application and N-fixing plant species, use of non-renewable wood for fencing and removal of herbaceous vegetation. CDM and VCS consider *de minimis* all sources accounting for less than 5 percent of the total decreases in carbon pools and increases in emissions. In contrast, CarbonFix accounts for project emissions from use of fossil fuel, fertilizer, and biomass removal by applying simple default discounts (e.g., 0.5 percent of GHG benefits for fossil fuel use, 5 g of $CO_2$ for 1 kg of nitrogen fertilizer applied).

*Discarding carbon pools, as allowed by some methodologies, represents a trade-off between simpler monitoring and fewer potential carbon benefits.*

The optional discarding of carbon pools allowed for by some methodologies represents a trade-off between simpler monitoring and fewer potential carbon benefits. For example, soil organic carbon may be neglected in some methodologies, simplifying the monitoring process; however, measurement costs have continued to decrease, and a cost-benefit analysis should be done before discarding this carbon pool from project accounting.

### Box 2. Key Guidance for AR Project Development

Pearson, Timothy, Sarah Walker, Jessica Chalmers, Erin Swails, and Sandra Brown. *Guidebook for the Formulation of Afforestation/Reforestation and Bioenergy Projects in the Regulatory Carbon Market.* Arlington, VA: Winrock International, 2009. Available at: http://www.itto.int/technical_report/.

> *Focused on technical compliance with CDM guidelines for AR projects. It includes a detailed treatment of additionality screening, and other CDM issues such as leakage management and assessment, and discusses field measurement and inventory design in depth.*

BioCarbon Fund. BioCarbon Fund Experience: *Insights from Afforestation and Reforestation Clean Development Mechanism Projects.* Washington, DC: World Bank Carbon Finance Unit, 2011 (forthcoming).

> *Provides a wealth of practical experience around methodological, regulatory, and technical issues gathered during implementation of projects in the BioCarbon Fund's portfolio.*

Gibbon, Aadam, Jeffrey Hayward, and Julianne Baroody. *Guidance on Coffee Carbon Project Development Using the Simplified Agroforestry Methodology,* Rainforest Alliance, 2009. Available at: http://www.rainforest-alliance.org/climate/documents/coffee_carbon_guidance.pdf.

> *Provides guidance on the technical and practical aspects of AR project development, based on agroforestry activities but relevant for small-scale and community oriented projects more broadly.*

Waage, Sissel, and Katherine Hamilton. *Investing in Forest Carbon: Lessons from the First 20 Years.* Washington, DC: Forest Trends, 2011. Available at: http://www.forest-trends.org/publication_details.php?publicationID=2677.

> *Reviews 20 years of experience with forest carbon finance and provides detailed guidance on feasibility screening, tips for avoiding pitfalls, and an overview over existing standards and registries.*

UNFCCC. *Clean Development Mechanism Methodology Booklet.* Bonn, Germany: United Nations Framework Convention on Climate Change, 2010. Available at: http://cdm.unfccc.int/methodologies/documentation/index.html.

> *Provides a succinct overview over all approved CDM methodologies and tools, together with a summary of key principles.*

UNEP. *Clean Development Mechanism PDD Guidebook: Navigating the Pitfalls.* Roskilde, Denmark: United Nations Environment Program, 2005. Available at: http://cd4cdm.org/Publications/UNEP-DNV_PDD%20Pitfalls%20Guidebook.pdf.

> *Discusses common stumbling blocks in developing PDDs and passing validation for CDM projects, which continues to be relevant also for AR projects.*

Hinostroza, Miriam. *Clean Development Mechanism PDD Guidebook: Navigating the Pitfalls.* Third edition. Roskilde, Denmark: United Nations Environment Program, 2011. Available at: http://www.cd4cdm.org/Publications/PDDguidebook_3rdEdition.pdf.

> *Builds on a wealth of experience of developing PDDs across all CDM sectors, and provides practical guidance on avoiding common stumbling blocks in passing validation and verification.*

## 2.6 Project Start Date and Crediting Period

The **start date** in the context of a carbon offset project refers to either the start of the project activity itself or the crediting period. Standards specify the earliest possible start date mainly to avoid non–additional projects entering the pipeline (or those where proof of additionality or certain baseline assumptions are more difficult to establish because activities have been implemented for a long time).

Under the CDM, the project start date is defined as "the date on which the implementation or construction or real action of a project activity begins" (resulting in actual net GHG removals) and must not be earlier than 2000. The VCS similarly defines the project start date as "the date on which the project began generating GHG emission reductions or removals," and it specifies that the earliest start date for a forest project activity as 2002.

Regardless of when the project developer decides to define the start date, it is of utmost importance to maintain records to back up this date during validation. For example, receipts from nursery establishment, seed purchases, or land leases can be used. Auditors will typically insist on proof of investment as a sufficient indicator of project start, as opposed to more qualitative activities such as press events or drafts of the business plan.

The CarbonFix Standard defines project start as "the date when the planting of the first trees took or will take place" and does not impose a limit date for starting a project activity. Plan Vivo does not define a project start date, although credits cannot be issued retroactively.

The **crediting period** is the period during which a carbon offset project can generate certifiable emissions reductions credits. The crediting period for AR projects under the VCS must be between 20 to 100 years (without renewal option), while under the CDM it may be 20 (renewable twice) or 30 years (without renewal). As credits issued under the VCS are permanent credits, longer crediting periods may lower non-permanence risk, but proponents need to show credible management plans for such a long term period. In the case of CDM, as credits are temporary (see below), non-permanence risk is not an issue in this sense.

The CarbonFix Standard sets a minimum crediting period of 30 years and specifies a maximum of 50 years, while the Plan Vivo Standard sets a lower limit of 10 and an upper limit of 100 years.[22]

See Table 2 for a succinct comparison of starting dates and crediting period across selected AR carbon standards.

## 2.7 Permanence Assurance and Types of Credits

"Permanence" refers to the question of whether carbon emissions are permanently – rather than only temporarily - removed from the atmosphere. AR projects sequester carbon from the atmosphere and store it primarily in biomass carbon pools, but these stocks can also disappear if the forest is harvested or disturbed (e.g., through fires or storm damage) and, thus, project benefits may be lost or reversed over time. To address this challenge, CDM has designed two types of expiring credits: Temporary Certified Emission Reductions (tCERs), and long-term Certified Emission Reductions (lCERs), which have to be replaced once they expire (or, in the case of lCERs, if reversals are observed during verification);[23] however, this limitation has been perhaps the most important stumbling block to the inclusion of CDM forestry credits in carbon markets. While CDM temporary credits can be issued and sold several times for the same tree or same carbon stock (once they have expired), they have to be replaced by the buyer, which has contributed to keeping the appetite and prices for AR CERs very low.

*The VCS risk assessment tool is extremely valuable for recognizing and addressing risks to project success and can thus be incorporated effectively into other areas of project design and management.*

Voluntary carbon offset standards have therefore explored several alternative ways to address the non-permanence risk of forest carbon stocks. The VCS, the Plan Vivo Standard, and the Carbon Fix Standard have each designed a buffer approach, through which a certain portion of issued credits are retained to ensure against the risk of future reversals. Under the VCS, these credits are kept in a globally pooled buffer, but a project-specific non-permanence risk assessment is used to determine the percentage of credits that is withheld from trading. Some buffer credits can be reclaimed if the project demonstrates that risks are well-managed, and this is assessed during each verification audit (see Step-by-Step Overview and REDD Guidance). As a result of the buffer, normally fungible credits can be issued.

The VCS provides a risk assessment tool which serves to determine the appropriate buffer discount by systematically assessing external, internal, and natural risks.[24] This tool is also extremely valuable for recognizing and addressing risks to project success and can thus be incorporated effectively into other areas of project design and management.

The Plan Vivo and CarbonFix standards also use non-permanence credit buffers with discounts between 10 and 50 percent (Plan Vivo), or a flat discount of 30 percent (CarbonFix, without project-specific assessment).[25] In this case, the buffer serves to insure *ex-ante* permanent credits, although different types of *ex-ante* and *ex-post* credits exist

---

[22] The maximum crediting period is due to be reduced to 50 years in the next version of the standard, expected for late 2011.

[23] For a discussion of the concept and relative advantages, please see Chenost, et al. (2010, 109, 137) and Pearson, Walker and Chalmers(2009, 30).

[24] The VCS's *AFOLU Non-Permanence Risk Tool* is available at: http://www.v-c-s.org/sites/v-c-s.org/files/AFOLU%20Non-Permanence%20Risk%20Tool,%20v3.0.pdf.

[25] Plan Vivo has, indeed, pioneered this approach since its inception in 1997.

under both the Plan Vivo and the CarbonFix Standard.[26] In addition, the Plan Vivo Standard demands evidence of clear strategies for managing non-permanence risks and provides support in this regard. To further incentivize against non-permanence risks, payments for Plan Vivo credits are disbursed in tranches after field verification and discount levels are set in reference to apparent risk levels in the project (see Plan Vivo risk assessment tool in Box 3).[27]

*The risk buffer discount can be decreased if there is clear evidence of good risk management strategies.*

The American Carbon Registry (ACR), not otherwise discussed in this guidance because of its similarity to the VCS, is piloting the use of insurance schemes as an additional innovative option, while also allowing the use of non-permanence buffers.

Although *ex-ante* crediting may be a plus for generating early funds for project development, they have not always been well-perceived by environmentalists and potential buyers because they are issued before any carbon sequestration has actually taken place. However, the upfront finance from the sale of *ex-ante* credits can provide a very strong additionality argument. It may also create a relative advantage for slower-growing native species (whereas fast-growing exotics generate earlier carbon revenues under *ex-post* crediting approaches). In any case, the feasibility of ensuring environmental integrity of *ex-ante* credits through a buffer approach (and field-based verification of initial planting efforts) and convincing potential buyers will to a large extent still need to be proven in practice.

See Table 2 for a brief overview of credits type among selected standards.

### 2.7.1 Assessing and Managing Non-Permanence Risks

Assessing non-permanence risks is a formal requirement under the VCS. A good understanding of risks and the development of risk mitigation or management strategies will directly influence project success for any project under any standard (see Step-by-Step Overview). The VCS non-permanence risk assessment tool should therefore be considered a very useful guide during the design and implementation of any forest carbon project.

Under the VCS, buffer size is set according to a project-specific assessment of risks and mitigation strategies. This percentage of credits is deducted from the volume available for trading and can be lowered if there is clear evidence of good risk management strategies. For example, even if there is a clear fire risk in an area, if fire breaks and good surveillance and response systems are in place this risk may not be judged to be very high.

During a risk assessment, an AR project is evaluated against risk factors applicable to all AFOLU project types, as well as to some specific to AR. The project proponent provides its own risk ranking in the PDD, and this evaluation is then checked by the auditor. The assessment remains a somewhat subjective analysis, despite the quantitative evaluation elements provided. Projects should endeavor to present all available evidence of sound risk management, such as

---

[26] CarbonFix Standard projects can receive different types of "CO2-certificates": *ex-post*, *ex-post* forwards or *ex-ante* / future certificates. *Ex-post* certificates are CO2-certificates which have been verified by a certification body. *Ex-post* forward CO2-certificates are CO2-certificates which have been validated by a certification body and will be delivered in a defined year (e.g., 2016). *Ex-ante* / future CO2-certificates are CO2-certificates which have been validated by a certification body and include an expected, non-binding, year of delivery.

[27] In contrast to the VCS, neither of these two standards currently provides clear incentives for projects to lower their risk ratings to reclaim buffer credits during future verifications, although Plan Vivo is in the process of setting up such a system, together with a dedicated account in the Markit Environmental Registry.

systems to manage risks from fire or pest infestation. It therefore makes sense to invest in risk management tools as a way to lower buffer discounts (leading to more credits being available for sale), in addition to their direct contribution to long-term project performance.

Many of the risks assessed under the VCS are at least partly under the control of the project proponent. These risks can be internal to the project (e.g., project management capacity or financial viability) or "natural" risks (e.g., fires and pests). Even some "external risks" can be effectively mitigated (e.g., through land tenure conflict resolution). Recognizing this should simultaneously serve as a roadmap for risk management strategies. Importantly, if some risk category indicators point towards a very high (or fail) risk, this should lead proponents to urgently review the project design and implementation strategy. Some risks are considered so critical by the VCS that a very negative rating in just one category may lead to a validation failure (e.g., a high occurrence of catastrophic natural disturbances in the area), even if all others score much better – indicating vital doubts about overall project viability. See also Step-by-Step Overview.

### 2.7.2 Implications of Harvesting under Different Standards

The issue of temporary (CDM) versus permanent (VCS) credits also becomes pertinent when considering the effect of planned harvesting in AR projects on crediting protocols. Under the CDM, there is a requirement that verification (which leads to credit issuance) cannot be timed to coincide with peak carbon stocks that exist just in advance of a planned harvest. Given that credits expire and need to be replaced, however, this issue is less critical. In contrast, the VCS has developed sophisticated guidance to ensure that carbon credits are not over-issued for projects in which some (or all) carbon stocks will be removed during or after the project's crediting period.

Specifically, the VCS assesses the amount of credits that can be issued to a given project using a net cumulative average approach. This approach sums the net gains and losses of a project, including any harvesting and thinning cycles, and then divides the final sum by the number of years of the project's crediting period. This final amount represents the total amount of credits the project is allowed to sell, and credits are only issued until this long-term average is reached, even if a plantation continues (temporarily) to sequester carbon thereafter. For example, if the average value were reached in year 11, no credits would be generated even if the project continued for another 40 years (VCS, *AFOLU Guidance: Example*, 2011). Importantly, this average amount is typically far smaller than the peak carbon stocks.

When the net cumulative average is considered alongside the VCS buffer discount, the VCS approach may lead to far fewer commercial credits to commercialize than would the CDM approach (even before considering that the latter can be issued repeatedly after they expire). Other considerations, such as credit prices and demand, will also be crucial factors for putting judging the overall commercial attractiveness of both routes.

## 2.8 Assessing and Managing Leakage

Leakage is defined as any increase in GHG emissions (or decrease in carbon stocks) that occurs outside a project's boundary (but within the same country) and that is measurable and attributable to the project activities. Leakage lowers the net climatic benefit of a project and, thus, its resulting emissions must be discounted during project crediting unless they can be proven to be insignificant under CDM and VCS.[28]

[28] The *Tool for testing significance of GHG emissions in AR CDM project activities* helps project developers to assess whether the emissions associated with leakage must be debited from the project's GHG benefits. It is available at: http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-04-v1.pdf.

Under the CDM and VCS, leakage in AR projects is categorized as activity shifting (displacement of grazing, fuelwood collection activities, or agriculture) which may lead to a decrease of carbon stocks at destination. Other types of leakage, such as fossil fuel emissions, have been deemed insignificant by the CDM and have, thus, been excluded from recent versions of AR CDM methodologies, though projects that are already registered must still account for these types of leakage. Market leakage is not considered under current carbon standards for AR projects.[29]

Leakage may be avoided through specifically-designed activities (e.g., increasing the carrying capacity of some existing pastures under the control of project proponents to receive displaced grazing animals, or creating alternative sources of fuelwood) or must be accounted for and monitored. Some types of leakage, such as grazing displacement to unidentified areas, may lead to large discounts, since it is assumed that displacement will occur to forest areas. Recently, the CDM recognized that under certain conditions (notably in areas subject to a high level of degradation or previous cultivation) leakage from grazing and cropping activities may be negligible and, in such cases, need not be accounted for.[30] This is an important shift as it allows project proponents to take into consideration localized, project-specific dynamics and also ensures that projects are not forced to adopt the "worst-case scenario" leakage predictions (activities shifting to standing forests).

*Leakage may be avoided through specifically-designed activities; otherwise, it must be accounted for and monitored.*

If project activities may create a specific, significant source of leakage, the list of eligible methodologies will be limited to those considering that source of leakage and specifying accounting approaches. On the flipside, projects using methodologies that do consider specific sources of leakage may be required to monitor that source of leakage, even if it does not occur. Assessing and accounting for leakage can be require data that may be difficult to generate in a reliable form. Projects should therefore consider data availability when selecting a methodology that requires detailed leakage accounting.

The CarbonFix Standard considers leakage from fuelwood use, agricultural farming, charcoal burning, timber harvesting, and livestock grazing. Emissions resulting from these activities are calculated using a simple equation based on a percentage of displaced activity, carbon stock densities, and affected area. Plan Vivo considers possible leakage from activities displacement or increased use of wood and the way of addressing and calculating it must be defined by project proponents in the Technical Specifications document (i.e., the project-specific "methodology").

## 2.9 Monitoring and Verification

Calculation of actual net GHG benefits achieved by the project activity (required for determining carbon benefits of projects) requires monitoring both removals and emissions. GHG removals occur as increases in the carbon stocks of different considered pools (mainly through the growth of trees but possibly also through other carbon pools, such as soil carbon), while GHG emissions comprise both project emissions (under the CDM and VCS, mainly biomass burning) and leakage (see previous section). Monitoring also requires recording seedling and tree survival, as well as, potentially, replanting dead trees. Technical details on biomass change monitoring are discussed in much more depth in the Carbon Stock Assessment Guidance. See the Step-by-Step Overview for practical recommendations on monitoring and preparing for verification.

---

[29] However, the VCS does consider it for IFM and REDD projects that reduce timber harvests.

[30] Readers may consult the relevant CDM Executive Board documents, Annexes 13 and 14 of the report of the 51st Executive Board meeting (2009).

Not following the monitoring plan contained in the validated PDD or not accurately and transparently collecting and storing data s a frequent hurdle during verification and can jeopardize the issuance of carbon credits. Therefore, at the time of validation, the project developer must have a very clear and detailed understanding of exactly how monitoring will be carried out, and must be very sure that the monitoring plan is completely feasible and that the designated project participant is competent and able to implement it on the ground. Beyond what is required by carbon standards forest carbon projects, just as any other forestry project, should keep track of the performance of their underlying assets. Thus, it is good practice to implement a continuous monitoring system for quickly and effectively responding to risks and unforeseen events, while also having sound statistics and projections for taking managerial decisions.

*At the time of validation, the project developer must be very confident that the monitoring plan is completely feasible and that the designated project participant is competent and able to implement it on the ground.*

Under the VCS and CDM, emissions are monitored continuously or annually, depending on the nature of the emission (e.g., every occurrence of biomass burning must be monitored) and the specifications of the applied methodology. Removals (i.e., increases in carbon stocks) should be monitored at least before each verification event, which occurs every five years under the CDM. VCS does not specify any minimum period for monitoring and verification but provides incentives for regular verification through the potential for reclaiming credits held back in the risk buffer.[31]

Under the VCS, monitoring and verification also includes the non-permanence risk assessment, and the risk rating assigned by the auditor can increase or decrease during each verification event. As part of this monitoring, the VCS further requires projects to record and assess disturbance events linked to non-permanence risks (such as forest fires or storm damage). The resulting carbon losses must be reported in a formal "loss event report" and will result in a corresponding amount of buffer credits being put on hold until the buffer accounting can be reconciled during the next verification (see Carbon Stock Assessment Guidance).

*Project proponents should take the utmost care to secure and store all supporting information for monitoring results, especially for events that are difficult to assess in retrospect.*

Under CarbonFix, project developers must present appropriate monitoring and assessment documentation every five years during certification events. For the verification of *ex-post* certificates, monitoring is executed prior to every certification event; alternatively, for the issuance of *ex-ante*/future certificates, the net future GHG removals must be reassessed by the project proponent and confirmed during the certification process. For the reassessment and adaptation of growth models, regular forest inventories are required, measuring the real rate of carbon sequestration. Moreover, CarbonFix requires project developers to calculate project emissions using a tool on the organization's website, discounting a fixed percentage of the project's GHG benefits (e.g., 0.5 percent for fossil fuel emissions and an additional 10 percent for any emissions from biomass burning to account for non-$CO_2$ emissions).

[31] Also, in order to maximize revenues and reduce transaction costs, the best time for seeking external verification under VCS should be determined based on the expected volume of carbon credits generated until that point—project developers may estimate these volumes using internal monitoring results, even if these are more preliminary than what would be submitted to an auditor.

Plan Vivo projects are monitored through annual reports, which are assessed by the Plan Vivo Foundation. There is also a third-party verification based on desk review and field visits within the first five years of registration. Plan Vivo, as usual, defines sources and methods of calculation of emissions in the Technical Specifications document drafted *ad hoc* for each Plan Vivo project.

It is important to realize that there is currently very limited practical experience on project verification under most AR standards, since no registered CDM project, and only two VCS reforestation projects, has reached this stage.[32] Considerable uncertainty therefore still exists as to what kind of monitoring issues may turn up during external project audits. Nevertheless, the Step-by-Step Overview contains some recommendations based on the experience of project developers who have gone through validation and have prepared for verification. In particular, project proponents should take the utmost care to secure and store all supporting information for monitoring results, especially for events that are difficult to assess in retrospect (such as emissions from biomass burning, tree mortality, or loss events). It is also recommended to simulate a verification event early on, so that needs for adjusting monitoring approaches and any data gaps may be determined.

## Box 3. Official Tools and Procedures for AR Projects under Various Standards

***CDM***

The official portal to all CDM rules, procedures, methodologies, tools etc., including updates, clarifications and guidance is http://cdm.unfccc.int/Reference/index.html.

CDM documentation can be difficult to navigate as it consists of an accumulation of multiple UNFCCC and Executive Board decisions. Even when working on VCS forestry projects, some of this documentation will need to be accessed. A regularly updated, very useful synthesis and explanation of terms, procedures and tools is provided by Baker & McKenzie's CDM Rulebook. It is available at: http://cdmrulebook.org/home.

See Table 3 and 4 for a full overview of CDM small-scale and large-scale AR methodologies. For an updated list of approved AR CDM methodologies, see http://cdm.unfccc.int/methodologies/ARmethodologies/index.html.

Table 5 summarizes the CDM methodological tools that are currently in use. For an updated list of AR CDM methodological tools, please visit http://cdm.unfccc.int/methodologies/ARmethodologies/approved_ar.html.

Parameters for forest definition adopted by some individual countries can be found at: http://cdm.unfccc.int/DNA/allCountriesARInfos.html.

***VCS***

VCS documentation (methodologies, tools and templates), can be accessed at http://www.v-c-s.org. Specific AFOLU documentation is found at http://www.v-c-s.org/develop-project/agriculture-forestry-projects.

The VCS risk tool can provide a very useful framework for identifying key issues for project performance and long-term viability at an early stage: VCS. AFOLU Non-Permanence Risk Tool. VCS Version 3 Procedural Document, Washington, DC: Verified Carbon Standard, 2011. Available at: http://www.v-c-s.org/sites/v-c-s.org/files/AFOLU%20Non-Permanence%20Risk%20Tool%2C%20v3.0.pdf.

VCS. Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities. VT0001, Version 1.0, Washington, DC: Voluntary Carbon Standard, 2010. Available at: http://www.v-c-s.org/methodologies/VT0001.

VCS. AFOLU Guidance: Additional guidance for VCS Afforestation, Reforestation and Revegetation projects using CDM Afforestation/Reforestation Methodologies. VCS Guidance Document, Washington, DC: Verified Carbon Standard, 2011. Available at: http://www.v-c-s.org/docs/Guidance%20for%20AFOLU%20Projects.pdf.

[32] Somewhat more experience exists under Plan Vivo, which has verified three projects.

***IPCC***

IPCC. Guidelines for National Greenhouse Gas Inventories. Eggleston, H.S., Buendia L., Miwa K., Ngara T., and Tanabe K. (eds). Prepared by the National Greenhouse Gas Inventories Programme, Hayama, Japan: Institute for Global Environmental Studies, 2006. Available at: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.htm.

IPCC guidelines are the most authoritative source of technical information, generic methods for accounting of carbon stocks in carbon pools, and are the basis for accounting standards such as the CDM and VCS. The publication also includes an extensive database of default factors which are used in AR methodologies of all standards.

***Plan Vivo***

The Plan Vivo Standard document can be downloaded at http://www.planvivo.org/standard/. An official guidance manual, covering all aspects of project development, as well as a project registration guide and templates are available at: http://www.planvivo.org/tools-and-resources/.The risk management tool developed by BioClimate for Plan Vivo projects. Available at:
http://www.planvivo.org/tools-and-resources/reference-materials/.

***Carbon Fix***

CarbonFix Standard (v.3.1) as well as various templates for validation and reporting are available at: http://www.carbonfix.info/CarbonFix-Standard.html?PHPSESSID=s9jarkfhkvh4gm3ua16nspbk82.

# 3. Choosing between AR CDM Methodologies

As mentioned earlier, there are 18 approved methodologies under CDM for developing small- and regular-scale projects that can also be used for VCS projects, the CarbonFix uses no methodologies beyond the Standard itself, and Plan Vivo approves project-specific Technical Specifications which follow the standard's guidelines. If project developers have already decided to use the CarbonFix or Plan Vivo standard, then the issue of choosing the right methodology is solved. In contrast, for projects developed according to VCS or CDM, selecting an appropriate methodology for a specific project may be a complex process and may have long term implications for the project.

## 3.1 Choosing an Approved Methodology

Given that VCS endorses CDM AR methodologies and that there are no VCS-specific AR methodologies as of yet, the following points apply for selecting among AR methodologies for both CDM and VCS projects. However, proponents developing a VCS project must carefully review VCS policy updates that could modify or affect CDM rules (for example, the VCS has developed its own additionality tool, an adaptation of the CDM tool; see Box 3).

In determining which methodology to use, proponents should first consider project scale. If it is expected the project will deliver less than 16,000 tons $CO_2$ per year (average net GHG reductions over first crediting period), it can use a small-scale methodology. In addition, such projects must be "implemented by low-income communities and individuals as determined by the host Party" (UNFCCC 2008). However, this will mean that future carbon credits will be cut off at the small-scale limit, i.e. there will be no flexibility to gain credits beyond this should the project perform better than expected or increase in size. If a small-scale methodology is chosen, applicability conditions are the main criterion for selecting between them.

If working with regular-scale methodologies, criteria beyond applicability conditions should be taken into account. These include, in particular, planned activities and potential leakage (for example, only some methodologies accommodate displaced fuelwood collection). If, based on applicability conditions, planned activities, and leakage modalities, more than one methodology could be used, project developers should consider which carbon pools are mandatory (as opposed to optional) in each methodology. A cost-benefit analysis of applicable methodologies may reveal significant differences in the monitoring costs or the carbon revenues associated with including different carbon pools.

If no methodology fits project characteristics, then developing a new one could be considered. However, developing a new methodology is expensive and time-consuming (usually taking one to two years), and approval is far from certain. Therefore, it may be beneficial to adapt a project to fulfill the requirements of an existing methodology. It also may be possible to apply for a "methodology deviation," under which minor changes in a single aspect of an existing methodology (particularly the monitoring approach, under the VCS) allow it to be applicable to the project.

Tables 3 and 4 present a brief comparison of approved CDM methodologies (small-scale and regular-scale, respectively) for supporting the selection of the most appropriate one. Another excellent resource for comparing CDM methodologies and tools is the CDM Methodology Booklet (see Box 2). To date, for project developers designing smaller scale initiatives, A/R-AMS0001 *Simplified baseline and monitoring methodologies for small-scale AR CDM project activities implemented on grasslands or croplands with limited displacement of pre-project activities* has been the methodology of choice. For large-scale projects, the following methodologies have been overwhelmingly chosen over other options:

- A/R-AM0001: Reforestation of degraded land;
- A/R-AM0004: Reforestation or afforestation of land currently under agricultural use; and
- A/R-AM005: Afforestation and reforestation project activities implemented for industrial and/or commercial uses.

The popularity of these methodologies is likely due to the ease of complying with the applicability conditions and, to a lesser extent, the relatively modest complexity of the field-based research required. As many projects are pursued on land that can be classified as degraded, A/R-AM0001 and A/R-AMS001 may be particularly worthwhile starting points when considering methodology options. In contrast, any methodology that was approved long ago but is not used by any registered project ought to be handled with care.

*Proponents of VCS projects must carefully review VCS policy updates that could modify or affect CDM rules.*

In all cases, project developers should analyze the requirements for field-based research in detail to ensure that efforts to collect various types of information can be streamlined. For example, satellite imagery analysis should be coordinated with field-based carbon stock assessments for ground-truthing and confirming the vegetation structure of different strata. Similarly, if household surveys are conducted to understand leakage effects, interview questions about historical land-use change, degradation trends, forest loss and challenges to local development can fit both into baseline assessments and documenting barriers for the additionality analysis.

In addition, it may be useful to undertake some initial field research to determine which a methodology is best-suited to the project. For example, AR-AM0005 allows project proponents to discount emissions from removing pre-project trees if baseline crown cover falls below 20 percent of the national definition of forest crown cover, but this can only be assessed using advanced satellite imagery analysis or through sample plot investigations. Additionally, preliminary field research can help to determine which methodology can deliver the highest carbon credit volumes, while yielding other results that can be used as inputs under several methodologies.

**Table 3. Overview of Approved CDM AR Small-Scale Methodologies**[33]

| Approved AR CDM Methodologies | Small-Scale Methodologies | | | | | |
|---|---|---|---|---|---|---|
| | AR-AMS 0001 | AR-AMS 0002 | AR-AMS 0003 | AR-AMS 0004 | AR-AMS 0005 | AR-AMS 0006 |
| ***Applicability*** | | | | | | |
| **Applicability Conditions** | - Project implemented on grasslands or croplands.<br>- Displacement of agricultural areas of less than 50% of total project area; less than 50% of grazing capacity.<br>- Disturbance of soil for preparation <=10% of areas. | - Project implemented on settlements (road strips, lawns, etc.).<br>- Total displacement of grazing lands or agricultural areas must be less than 50% of the project area.<br>- Disturbance of soil for preparation <=10% of areas. | - Project implemented on degraded wetlands.<br>- No changes in hydrology possible.<br>- Less than 10% of area dedicated to agriculture.<br>- No leakage possible.<br>- Disturbance of soil for preparation <=10% or areas. | - Project not implemented on grasslands.<br>- Allows introduction of crops among trees.<br>- Decrease of existing crops of less than 20%.<br>- Tree crown cover in baseline less than 20% of lower limit of DNA forest definition. | - Project implemented on lands with low potential to support living biomass (sands, dunes, saline, spoiled soils, etc.). | - Silvopastoral project implemented on degraded croplands and grassland subject to grazing.<br>- Tree crown cover in baseline less than 20% of lower limit of DNA forest definition. |
| ***Considered carbon pools*** | | | | | | |
| *See the Carbon Stocks Assessment Guidance.* | | | | | | |
| ***Leakage*** | | | | | | |
| **Grazing Displacement** | 0% or 15% default discount | - | - | - | - | - |
| **Agriculture Displacement ( Con-version to Cropland)** | 0% or 15% default discount | 15% default discount | 20% default discount | - | - | - |
| **People Displacement** | X* | X* | X* | X* | - | X* |

X* Not considered if project demonstrate that there is no displacement.

[33] Methodology versions as of April 2011. For an updated list of approved AR CDM methodologies, see http://cdm.unfccc.int/methodologies/ARmethodologies/index.html.

**Table 4. Overview of Approved CDM AR Large-Scale Methodologies**[34]

| Approved AR CDM Methodologies | Regular Methodologies | | | | | | | | Consolidated | |
|---|---|---|---|---|---|---|---|---|---|---|
| | AR-AM 0002 | AR-AM 0004 | AR-AM 0005 | AR-AM 0006 | AR-AM 0007 | AR-AM 0009 | AR-AM 0010 | AR-AM 0011 | AR-ACM 0001 | AR-ACM 0002 |
| ***Applicability*** | | | | | | | | | | |
| **Applicability Conditions** | - Project implemented on degraded lands.<br>- Activity shifting not allowed. | - Project implemented on degraded lands.<br>- Activity shifting allowed.<br>- No disturbance of soils by site preparation. No flood irrigation, no soil drainage.<br>- No other planned AR activities. | - Project implemented on degraded grasslands.<br>- No drainage of organic soils.<br>- No disturbance of more than 10% of organic soils in the area.<br>- Other planned AR activities in baseline could exist. | - Project implemented on severely degraded lands.<br>- No grazing allowed (in baseline and project). | - Project implemented on agricultural or pastoral lands.<br>- Activity shifting not allowed.<br>- Flood irrigation not allowed.<br>- Tree crown cover in baseline less than 20% of lower limit of DNA forest definition. | - Project implemented on degraded lands.<br>- Shifting activities allowed.<br>- No disturbance by site preparation. No flood irrigation, no soil drainage.<br>- No biomass burning.<br>- No manure collection.<br>- Site preparation affects less than 10% of area. | - Project implemented on unmanaged grassland in reserves or protected areas with no potential to become forests without human intervention. | - Project implemented on areas that contain polycultures, possibly including perennial tree crops and/or fallow periods with woody regrowth.<br>- Not implemented on grassland or crops. No flood irrigation. | - Project implemented on agricultural or pastoral lands.<br>- Flood irrigation not allowed.<br>- No drainage of organic soils.<br>- No disturbance of more than 10% of organic soils in the area. | - Project implemented on degraded lands.<br>- Shifting activities not allowed.<br>- No flood irrigation. |
| ***Considered Carbon Pools*** | | | | | | | | | | |
| *See Carbon Stocks Assessment Guidance.* | | | | | | | | | | |
| ***Emissions by Project Activities*** | | | | | | | | | | |
| Biomass burning | X | X | X | - | - | - | X | X | X | X |
| Site preparation | X | X | X | X | X | X | X | X | X | X |
| ***Leakage*** | | | | | | | | | | |
| Grazing displacement | - | X | X | - | - | - | - | - | X | - |
| Agriculture displacement (conversion to cropland) | - | X | - | - | - | - | - | X | - | |

[34] Methodology versions as of April 2011. For an updated list of approved AR CDM methodologies, see http://cdm.unfccc.int/methodologies/ARmethodologies/index.html.

## 3.2 AR Methodological Tools

The bottom-up nature of methodology development under the CDM carries the risk of ever-increasing complexity and, potentially, inconsistency in CDM carbon accounting. The CDM has aimed to build consistency across approved methodologies by introducing "methodological tools" for dealing with specific methodological issues. To date, 15 methodological tools have been approved. Besides methodologies and methodological tools, project developers must also consider CDM Executive Board decisions and directives. Apart from being published on the UNFCCC website following their adoption during Executive Board Meetings, these decisions are captured by the online CDM Rulebook (see Box 3), which should be regularly consulted.[35] See Table 5 for a summary of methodological tools currently in use, and the overview presented in the CDM Methodologies Booklet (see Box 2).

The VCS has also developed methodological tools in addition to accepting the CDM tools. VCS methodological tools currently in use are the *Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination and the Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities* (see Box 3). The VCS Association similarly issues occasional policy updates, and project proponents should regularly consult the organization's website for new developments.

[35] The UNFCCC publishes such decisions at http://cdm.unfccc.int/EB/; the CDM rulebook may be accessed at http://www.cdmrulebook.org/.

**Table 5. Summary of CDM AR Methodological Tools Currently in Use**[36]

| Tool | Short Description | Applies to | Comments |
|---|---|---|---|
| **Tool 01 - Demonstration and Assessment of Additionality in AR CDM Project Activities V.2** | Step-wise approach to demonstrate additionality in AR CDM projects. | AR-AM0002 V.3, AR-AM0004 V.4, AR-AM0005 V.4, AR-AM0006 V.3, AR-AM0010 V.4 | Most plausible baseline scenario must be defined before using this tool. Not applicable to small - scale projects. |
| | | *http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-01-v2.pdf* | |
| **Tool 02 - Combined tool to identify the baseline scenario and demonstrate additionality in AR CDM project activities. V.1** | General framework and a step-wise approach to identify the baseline scenario and simultaneously demonstrate additionality in AR CDM project activities. | AR-AM0002 V.3, AR-AM0005 V.4, AR-AM0006 V.3, AR-AM0007 V.5, AR-AM0009 V.4, AR-AM0011 V.1, AR-ACM0001 V.4, AR-ACM0002 V.1 | Not applicable to small - scale projects. |
| | | *http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-02-v1.pdf* | |
| **Tool 03 - Calculation of the number of sample plots for carbon stock measurements within AR CDM project activities. V.2** | Estimates the number of permanent sample plots needed for monitoring changes in carbon pools at a desired precision level. | AR-AM0005 V.4, AR-AM0007 V.5, AR-AM0009 V.4, AR-AM0010 V.4, AR-AM0011 V.1, AR-ACM0001 V.4, AR-ACM0002 V.1 | Requires a preliminary idea of carbon stock variability and average in order to apply this tool. |
| | | *http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-03-v2.pdf* | |
| **Tool 04 - Significance of GHG emissions in AR CDM project activities. V.1** | Some decreases in carbon pools and increases in GHG emissions by sources and leakage emissions may be considered insignificant and may be neglected. | AR-AM0005 V.4, AR-AM0007 V.5, AR-AM0009 V.4, AR-ACM0001 V.4, AR-ACM0002 V.1 | A limit of 5% of total emissions may be neglected. Several sources of emissions and leakage have been considered insignificant per se and removed from AR CDM. |
| | | *http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-04-v1.pdf* | |
| **Tool 06 - Conservative neglection of Soil Organic Carbon in CDM AR project activities. V.1** | Changes in the carbon stocks of the mineral soil component of the soil organic carbon pool may be conservatively neglected under certain conditions. | AR-AM0007 V.5, AR-AM0010 V.4, AR-ACM0002 V.1 | Being able to neglect soil carbon emissions is an applicability condition for several methodologies (allowing for conservative non-accounting). |
| | | *http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-06-v1.pdf* | |

[36] For an updated list of AR CDM methodological tools, please visit http://cdm.unfccc.int/methodologies/ARmethodologies/approved_ar.html.

| Tool | Short Description | Applies to | Comments |
|---|---|---|---|
| **Tool 08 - Estimation of GHG emissions due to clearing, burning and decay of existing vegetation attributable to a CDM AR project activity. V.3** | Estimation of the increase in emissions of greenhouse gases due to live woody vegetation existing within the proposed AR project boundary being cleared, burned, and/or left to decay. | AR-AM0011 V.1, AR-ACM0001 V.4, AR-ACM0002 V.1 | These emissions have to be deducted from a projects carbon benefits. |
| | | *http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-08-v3.pdf* | |
| | | *http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-09-v2.pdf* | |
| **Tool 10 - Demonstration of eligibility of lands for AR CDM project activities. V.1** | Guidelines on the application of CDM rules for determining which lands can be included as part of AR CDM projects. | AR-ACM0002 V.1 | Proponents must demonstrate that that the lands to be included in a project do not contain forest and that the activity to be implemented is either reforestation or afforestation. |
| | | *http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-10-v1.pdf* | |
| **Tool 13 - Identification of degraded or degrading lands for consideration in implementing CDM AR project activities. V.1** | Procedure for the identification of what constitutes degraded or degrading lands in the context of AR CDM projects. | AR-AM0002 V.3, AR-AM0005 V.4, AR-AM0009 V.4, AR-AM0011 V.1, AR-ACM0001 V.4, AR-ACM0002 V.1 | A number of methodologies are restricted to project activities on lands that can be considered "degraded or degrading" |
| | | *http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-13-v1.pdf* | |
| **Tool 15 - Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in AR CDM project activity. V.1** | Estimation of leakage due to displacement of pre-project agricultural activities. | AR-AM0011 V.1 | |
| | | *http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool15-v1.pdf* | |

# References


BioCarbon Fund. *BioCarbon Fund Experience: Insights from Afforestation and Reforestation Clean Development Mechanism Projects.* Washington, DC: World Bank Carbon Finance Unit, 2011 (forthcoming).

Catley, Andrew, John Burns, Davit Abebe, and Omeno Suji. *Participatory Impact Assessment: A Guide for Practitioners.* Feinstein International Center Report, Medford, MA: Tufts University, 2008.

CDM Executive Board. *Guidelines on conditions under which increase in GHG emissions attributable to displacement of pre-project crop cultivation activities in A/R CDM project activity is insignificant.* EB 51, Annex 14, UNFCCC/CCNUCC, 2009.

CDM Executive Board. *Guidelines on conditions under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant.* EB51, Annex 13, Version 1, UNFCCC/CCNUCC, 2009.

Chenost, Clément, Yves-Marie Gardette, Julien Demenois, Nicolas Grondard, Martin Perrier, and Matthieu Wemaere. *Bringing Forest Carbon Projects to the Market.* ONF International, 2010.

FAO. *Global Forest Resources Assessment 2000 Main Report.* FAO Forestry Paper 140, Rome: Food and Agriculture Organization of the United Nations, 2000.

GOFC-GOLD. *A sourcebook of methods and procedures for monitoring and reporting anthropogenic greenhouse gas emissions and removals caused by deforestation, gains and losses of carbon stocks in forests remaining forests, and forestation.* GOFC-GOLD Report version COP16-1., Alberta, Canada: Natural Resources Canada, 2010.

Hinostroza, Miriam. *Clean Development Mechanism PDD Guidebook: Navigating the Pitfalls.* Third edition. Roskilde, Denmark: United Nations Environment Program, 2011.

IPCC. *Guidelines for National Greenhouse Gas Inventories.* Prepared by the National Greenhouse Gas Inventories Programme, Hayama, Japan: Institute for Global Environmental Studies, 2006.

Pearson, Timothy, Sarah Walker, and Sandra Brown. *Sourcebook for Land Use, Land Use Change, and Forestry Projects.* Washington, DC: World Bank BioCarbon Fund, Winrock International, 2005.

Pearson, Timothy, Sarah Walker, Jessica Chalmers, Erin Swails, and Sandra Brown. *Guidebook for the Formulation of Afforestation/Reforestation and Bioenergy Projects in the Regulatory Carbon Market.* Arlington, VA: Winrock International, 2009.

Shrestha, Ram M., Sudhir Sharma, Govinda R. Timilsina, and S. Kumar. *Baseline Methodologies for Clean Development Mechanism Projects: A Guidebook.* Denmark: UNEP project CD4CDM, 2005.

Stockholm Environment Institute and Greenhouse Gas Management Institute. *CORE: Carbon Offset Research & Education.* 2011. http://www.co2offsetresearch.org/.

UNFCCC. *Clean Development Mechanism Methodology Booklet.* Bonn, Germany: United Nations Framework Convention on Climate Change, 2010.

UNFCCC. *Decision 9/CMP.3: Implications of possible changes to the limit for small-scale afforestation and reforestation clean development mechanism project activities.* Bali, Indonesia: United Nations Framework Convention on Climate Change, 2008.

UNFCCC. *Report of the 27th meeting of the afforestation and reforestation working group.* Version 01.1, Bonn, Germany: United Nations Framework Convention on Climate Change, 2010.

VCS. *AFOLU Guidance: Additional guidance for VCS Afforestation, Reforestation and Revegetation projects using CDM Afforestation/Reforestation Methodologies.* VCS Guidance Document, Washington, DC: Verified Carbon Standard, 2011.

VCS. *AFOLU Guidance: Example for Calculating the Long-Term Average Carbon Stock for ARR Projects with Harvesting.* VCS Version 3 Guidance Document, Washington, DC: Verified Carbon Standard, 2011.

VCS. *AFOLU Non-Permanence Risk Tool.* VCS Version 3 Procedural Document, Washington, DC: Verified Carbon Standard, 2011.

# Glossary

For CDM projects, readers may wish to refer to the official definitions provided in the CDM Glossary of Terms, available at: http://cdm.unfccc.int/Reference/Guidclarif/glos_CDM.pdf.

VCS also provides standard Program Definitions, which are available at: http://www.v-c-s.org/sites/v-c-s.org/files/Program%20Definitions%2C%20v3.0.pdf.

**Additionality** – The principle of carbon additionality is that a carbon project should only be able to earn credits if the GHG benefits would not have occurred without the revenue (or expected revenue) of carbon credits. The same principle of additionality can be applied to social and biodiversity benefits.

**Attribution** – The isolation and accurate estimation of the particular contribution of an intervention to an outcome, demonstrating that causality runs from the intervention to the outcome. That is, attribution demonstrates that benefits claimed by the project (usually *co-benefits*) have been caused by the project and not another phenomenon.

**Baseline** – See *reference scenario*.

**Biodiversity target** – Biodiversity features which the project will target in its efforts to achieve net positive impacts on biodiversity. These will usually comprise High Conservation Values.

**Causal model** – See *theory of change*.

**Co-benefits** – Benefits generated by a forest carbon project beyond GHG benefits, especially those relating to social, economic, and biodiversity impacts.

**Control** – In the context of impact assessment for forest carbon projects, an area that does not experience project interventions but is otherwise similar to the project area. Controls are used to monitor the reference scenario and to demonstrate the attribution of outcomes and impacts to the project.

**Counterfactual** – The outcome that would have happened had there been no intervention or project – i.e., the final outcome of the reference scenario.

**Evaluation** –The systematic and objective assessment of an on-going or completed project, program or policy, and its design, implementation, and results.

**GHG benefits** – Any emissions reductions from reducing carbon losses or emission removals from enhanced carbon sequestration due to the forest carbon project activities.

**Impact** – The positive and negative, primary and secondary, short- and long-term effects of a forest carbon project. Impacts may be direct or indirect, intended or unintended. Impacts result from a chain of inputs, outputs, and outcomes.

**Indicator** – A measurable variable that reflects, to some degree, a specific monitoring information need, such as the status of a target, change in a threat, or progress toward an objective.

**Inputs** – The financial, human, and material resources used for a forest carbon project. Most relevant in discussion of outputs, outcomes, and impacts.

**Leakage** – The geographical displacement of GHG emissions – or social, economic, or biodiversity impacts – that occurs as a result of a forest carbon project outside of the forest carbon area. Leakage assessments must consider adjacent areas as well as areas outside of the project zone.

**Measurement, Reporting, and Verification System** – A national, subnational, or project-level set of processes and institutions that ensure reliable assessment of GHG benefits associated with real and measurable emission reductions and enhancement of carbon stocks.

**Methodology** – An approved set of procedures for describing project activities and estimating and monitoring GHG emissions.

**Monitoring** – A continuing process that uses systematic collection of data on specified indicators to provide indications of the extent to which objectives are being achieved.

**Multiple-benefit projects** – Projects that generate sufficient environmental and social co-benefits, in addition to GHG benefits.

**Outcomes** – The likely or achieved short-term and medium-term effects of an intervention's *outputs*.

**Outputs** – The products, capital goods, and services that result from a forest carbon project.

**Project area** – The land within the carbon project boundary and under the control of the project proponent. (The CCB Standards use distinct language for *project area* and *project zone*.)

**Project developer –** The individual or organization responsible for the technical development of the project, including the development of the PDD, the assessment of social and biodiversity impacts, monitoring and evaluation, etc. Although the term does not necessarily describe a commercial entity, it often refers to an external company that is contracted to do work on the ground.

**Project Design Document** – A precise project description that serves as the basis of project evaluation by a carbon standard, commonly abbreviated to PDD. (Alternatively, VCS calls this the "project description," or PD)

**Project participant** – Under the CDM, a Party (national government) or an entity (public and/or private) authorized by a Party to participate in the CDM, with exclusive rights to determine the distribution of CERs – equivalent to *project proponent* under the VCS. In the voluntary market, project participant is used more loosely to describe any individual or organization directly involved in project implementation.

**Project proponent** – A legal entity under the VCS defined as the "individual or organization that has overall control and responsibility for the project." There may be more than one project proponent for a given project. Carbon aggregators and buyers cannot be project proponents unless they have the right to all credits to be generated from a project.

**Project zone** – The project area plus adjacent land, within the boundaries of adjacent communities, which may be affected by the project. (The CCB Standards use distinct language for *project area* and *project zone*.)

**REDD** – A system that creates incentives and allocates emissions reductions from reducing emissions from deforestation and forest degradation.

**REDD+** – A system that creates incentives and allocates emissions reductions from the following activities: (a) reducing emissions from deforestation; (b) reducing emissions from forest degradation; (c) conservation of forest carbon stocks; (d) sustainable management of forests; and (e) enhancement of forest carbon stocks.

**Reference scenario** – An estimated prediction of what will happen in a given area without the project. Reference scenarios may cover land use patterns, forest conditions, social conditions, and/or biodiversity characteristics. Also called the "business-as-usual scenario" and the "baseline."

**Starting conditions** – The conditions at the beginning of a project intervention. Also called "original conditions" in the CCB Standards and sometimes referred to as the "baseline" in the field of impact assessment. This can, however, lead to confusion, considering that CCB Standards and carbon standards use the same term to describe the "reference scenario" of a forest carbon project.

**Theory of change** – The hypothesis, as developed by the project design team, of how the project aims to achieve its intended goals and objectives, including social and biodiversity objectives. This is sometimes referred to as the *causal model.*

FOREST TRENDS

## The Family of Forest Trends Initiatives


*Using innovative financing to promote the conservation of coastal and marine ecosystem services*

Ecosystem Marketplace

*A global platform for transparent information on ecosystem service payments and markets*

Forest Trade & Finance

*Bringing sustainability to trade and financial investments in the global market for forest products*

the katoomba group

*Building capacity for local communities and governments to engage in emerging environmental markets*

BBOP

*Business and Biodiversity Offsets Program, developing, testing and supporting best practice in biodiversity offsets*

CHESAPEAKE FUND

*Building a market-based program to address water-quality (nitrogen) problems in the Chesapeake Bay and beyond*

the katoomba Incubator

*Linking local producers and communities to ecosystem service markets*

Learn more about our programs at
**www.forest-trends.org**