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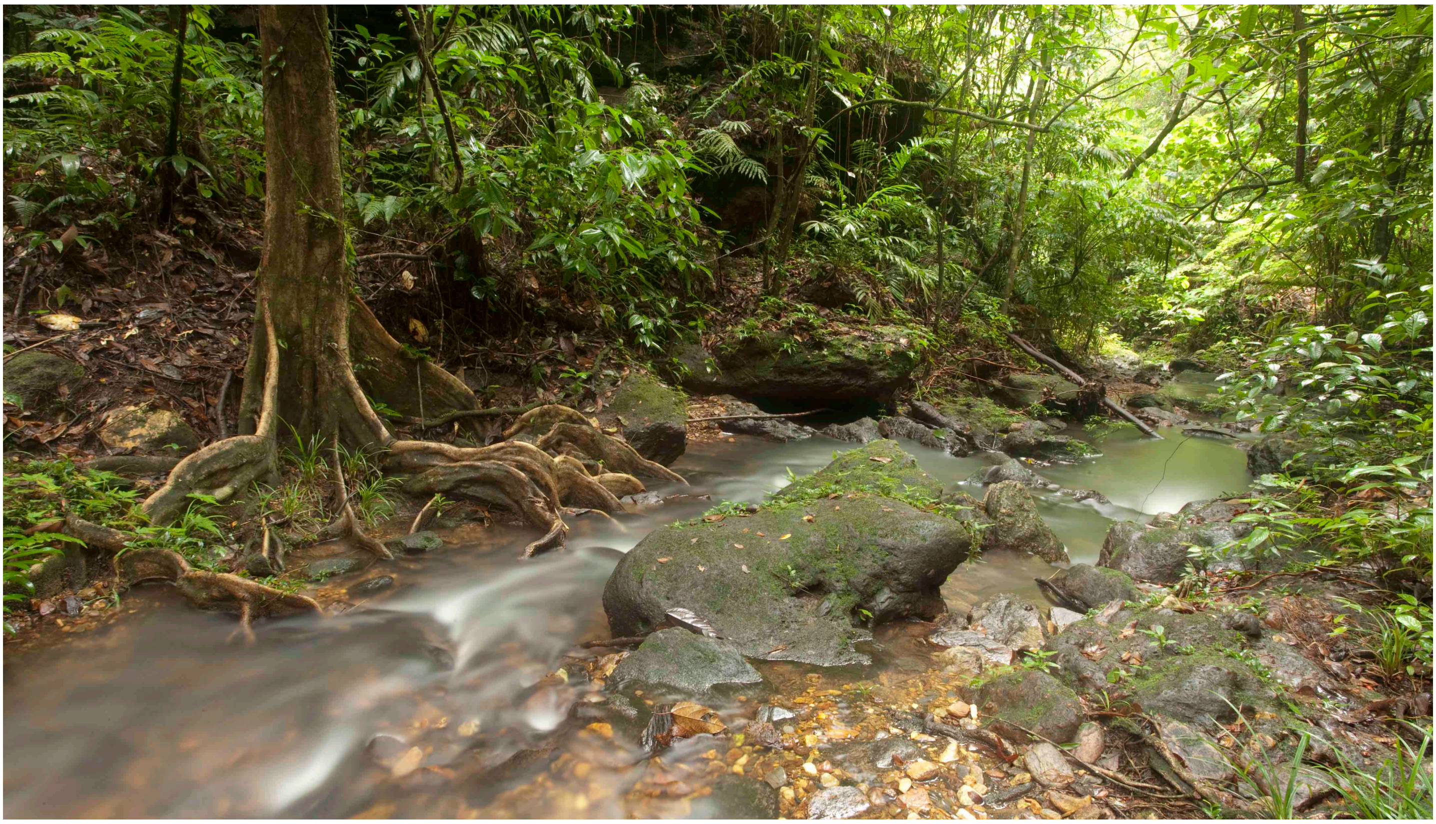

BIODIVERSITY OFFSETS: LEARNING FROM REDD+

MEASUREMENTS, ACCOUNTABILITY AND AGGREGATION

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1 EXECUTIVE SUMMARY

With mineral resource exploitation and major infrastructure development planned in many developing countries - often coinciding with areas of high biodiversity importance – biodiversity offsets are recognised as having potential to address the residual impacts of project development as the last step in the mitigation hierarchy. Over recent years, the uptake of biodiversity offsets as a mechanism for addressing these residual impacts has increased rapidly, with offset policy and frameworks emerging and/or planned in many developing countries around the world. However, it is widely recognised that offset implementation faces a host of technical, social and governance challenges.

It is therefore important that learning generated through existing biodiversity offset schemes that have been in operation for many years is brought to bear on the development and application of emerging offset policy elsewhere. However, the longest-running offset schemes are primarily situated in the developed economies of the United States and Australia. The development and application of offset policy in diverse country contexts require particular consideration. Applying learning from the implementation of other conservation strategies can help to inform emerging offset policy and its potential to achieve intended biodiversity outcomes.

This report considers lessons from carbon offsets generated through Reducing Emissions from Deforestation and forest Degradation (REDD+) mechanisms that have relevance to current challenges in the field of biodiversity offsets. Both forms of offsets have commonalities, the most fundamental being that they are both mechanisms designed to quantify and offset ecosystem values (i.e. carbon emissions and biodiversity impacts). The complex nature of both offset mechanisms and ecosystems leads to many inevitable challenges in the design and implementation of all types of ecosystem-based offsets. With a global market for REDD+ offsets established and growing, consideration of the challenges encountered during the emergence of REDD+ as an ecosystem-based offset mechanism provides 'tried and tested' insight for some current challenges in biodiversity offset frameworks.

Drawing on the experience of Fauna & Flora International (FFI) in REDD+ and biodiversity offsetting, this report discusses some key constraints that need to be overcome in the practical delivery of voluntary offsetting frameworks with a focus on the challenges associated with quantifying and accounting for inherently complex ecosystem values. The report groups these challenges into four main categories:

- Developing standardisation in offset measurement principles (section 3);
- Developing scientifically robust but cost-effective measurement methods (section 4);
- Ensuring accountability in offset implementation through enforceable frameworks and the monitoring and reporting of offset outcomes (section 5);
- Accounting for impact at scale (section 6).

The report discusses each of these important issues, presents case studies on how these challenges were approached in REDD+ offsetting frameworks, and discusses the potential relevance of lessons from REDD+ for biodiversity offsetting. Note that this report does not attempt to address other complexities associated with offset implementation, particularly the socio-economic and political factors that strongly influence the enabling environment and the approach to implementation in a given context. These are discussed in detail in other reports in the series produced through FFI's assessment of biodiversity offset policy and practice including 'Learning from Community REDD+' and 'A synthesis of lessons learned in offset policy and practice'. The complete report series is available online at: www.fauna-flora.org/initiatives/business-biodiversity-resources.

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2 INTRODUCTION

2.1 This study

This study is designed to consider lessons from carbon offsets generated from Reducing Emissions from Deforestation and forest Degradation (REDD+) mechanisms that have relevance to current challenges in the field of biodiversity offsets.

Both forms of offsets have commonalities, the most fundamental being that they are both mechanisms designed to quantify and offset ecosystem values; REDD+ offsets to compensate for carbon emissions, biodiversity offsets to compensate for negative impacts on biodiversity (see also Table 1). The complex nature of both offset mechanisms and ecosystems leads to many inevitable challenges in the design and implementation of all types of ecosystem-based offsets.

With a global market for REDD+ offsets now successfully established and growing, consideration of past difficulties encountered during the emergence of REDD+ as an ecosystem-based offset mechanism provides 'tried and tested' insight for some current challenges in biodiversity offset frameworks. The overarching objective of this study is to consider the main constraints that need to be overcome in the practical delivery of voluntary offsetting frameworks in a developing country context. In particular, key objectives are to:

1. **Distil lessons** from the development and implementation of REDD+ offsets that are relevant to biodiversity offsets, at different levels of implementation, including implementation challenges on the ground and policy-level challenges; and
2. **Provide practical examples** of how challenges were approached in the field of REDD+ carbon offsetting, ultimately in order to inform progress in the field of biodiversity offsetting, at both local and global levels, towards more positive outcomes for biodiversity.

This study considers these objectives through the lens of FFI's approach to both offsetting processes; i.e. not only achieving real and measurable offsets, but also ensuring that these offsets maximise positive outcomes for biodiversity and communities.

Table 1: A brief overview and comparison of key concepts in biodiversity and REDD+ offsetting

Offsetting principle	Biodiversity Offsets	REDD+ Offsets
Offset mechanism: how the offset mechanism works	Biodiversity offsets are designed to offset ecosystem losses in one geographic location by protecting, restoring and/or enhancing similar biodiversity and ecosystem services values in another geographic location, usually as close as possible to the impacted area. Offsets are intended to compensate for 'residual' impact, i.e. that which remains after all effort has been made to avoid and reduce impacts and restore impacted areas.	Reducing Emissions from Deforestation and forest Degradation (REDD) allows carbon offsets to be generated from activities that have measurably reduced deforestation rates and/or enhanced carbon sequestration in threatened forests.
Offset eligibility: when is offsetting eligible?	Biodiversity offset mechanisms are usually applied by private entities when negative impacts on biodiversity as a result of their operations are deemed unavoidable (i.e. when all other steps in the mitigation hierarchy have been exhausted) and when the impacted biodiversity is not considered irreplaceable. Biodiversity offsets must demonstrate **additionality** and **longevity** (for at least as long as the impacts remain, ideally in perpetuity).	REDD+ offsets must demonstrate **additionality** through documented evidence that in the absence of the offset project, deforestation would have occurred; and **permanence** through clarification and proof of land tenure titles and rights.
Key international offset frameworks	The Business and Biodiversity Offsets Programme (BBOP)[1] provides a hierarchy of Principles, Criteria and Indicators, with the objective to provide an auditable framework and best-practice guidelines in biodiversity offsetting. Numerous other offsets frameworks exist that require loss-gain accounting relative to specific species or habitats, all of which are designed to ensure a no net loss or net gain of biodiversity. Conservation and biodiversity banking, including wetlands banking, are frameworks that enable species or habitat offsets.	REDD+ is a mechanism recognised under the United Nations Framework Convention on Climate Change (UNFCCC) and overarching principles of accounting for emissions reductions from Agriculture Forestry and Other Land Uses (AFOLU) are embedded in the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National GHG Accounting. REDD+ methods are also currently recognised in the framework of a number of global third-party standards.
Current offset markets and mechanisms	Regulated offsetting frameworks, embedded in legislation, have been established in some developed countries (e.g. Australia and USA), but only a few exist in developing countries (e.g. Brazil and Columbia) where offsetting is mostly voluntary and unregulated.	Globally, most REDD+ offsets are predominantly still voluntary-based offsetting, with a view to internationally agreed compliance-based emissions reductions targets (and offsetting) under UNFCCC negotiations by 2020. This will apply to all countries that sign up to UNFCCC.

[1] http://bbop.forest-trends.org/pages/guidelines

2.2 Challenges in offset implementation: measurement, quantification, monitoring, accountability and aggregation

This report focuses on the challenges in offset implementation that are associated with quantifying and accounting for inherently complex values, i.e. the difficulties that come with the need to measure and account for ecosystem values. Such challenges arise for both REDD+ and biodiversity offsetting and fall into four categories:

a) **Developing standardisation in offset measurement *principles***: creating broad consensus on offsetting principles and 'norms' is key to ensuring offsetting mechanisms are understood and effectively achieve their objectives by applying comparable approaches.

b) **Developing cost-effective measurement *methods***: ensuring that methods applied for offset measurement are scientifically valid and yet not so complex or time consuming that they are impractical to implement.

c) **Ensuring *accountability* in offset implementation:** even after methods are agreed, enforceable frameworks are needed that ensure accountability through monitoring and reporting of offset outcomes.

d) ***'Scaling up'* from projects to the wider landscape:** to make sure that offset benefits 'add up' over space and time and are aligned with national or subnational governance frameworks and schemes.

Inconsistencies in application and quality of offset outcomes are not just likely to be seen as a failure for a given offset project, but may also have ramifications for public perception and the utility of offsetting mechanisms as a whole.

This report discusses each of these important issues, presents case studies on how these challenges were approached in REDD+ offsetting frameworks, and discusses the potential relevance of lessons from REDD+ for biodiversity offsetting in the future. Note that this report does not attempt to address other complexities associated with offset implementation, particularly the socio-economic and political factors that strongly influence the enabling environment and the approach to implementation in a given context[2].

3 DEVELOPING STANDARDISATION IN OFFSET MEASUREMENT PRINCIPLES

3.1 REDD+ experience

A key feature of REDD+ offset measurement frameworks is their 'tri-tiered' nature, whereby standardisation has broadly emerged at three distinct levels (see Figure 1).

Global principles originally agreed upon through the UNFCCC[3] forum provide a common basis for carbon accounting principles applicable to REDD+. A number of **international expert technical working groups**

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[2] Socioeconomic and political factors influencing the enabling environment for offsets and the approach to implementation are considered in detail in other reports in the series produced through FFI's assessment of biodiversity offset policy and practice including 'Learning from Community REDD+' and 'A synthesis of lessons learned in offset policy and practice'. The complete report series is available online at: www.fauna-flora.org/initiatives/business-biodiversity-resources.

[3] United Nations Framework Convention on Climate Change

have since arisen with the explicit purpose to further 'translate' global carbon accounting principles, and develop consensus on international 'best practice' guidelines for various technical components of REDD+ offsetting. More recently, third-party offset certification standards have provided a vehicle for road-testing global carbon accounting principles and best-practice guidelines through piloting of **REDD+ carbon accounting 'methodologies'** for REDD+ implementation at site level.

This section provides case studies from each of these three 'layers' in global REDD+ offset measurement frameworks and discusses how each now helps to support an overall global framework for REDD+ offsetting.

Figure 1. The 'tiered' nature of current REDD+ offset measurement frameworks

3.1.1 Case study: Global principles and REDD+ offsetting – the intergovernmental panel on climate change (IPCC) and the emergence of agriculture, forestry and other land uses (AFOLU) guidelines for national greenhouse gas inventories

This case study provides a brief overview of how the 'top tier' of global principles on REDD+ offset accounting frameworks emerged, and how they currently provide an overarching basis for REDD+ accounting frameworks globally.

A brief history

The Intergovernmental Panel on Climate Change (IPCC) was formed under the United Nations Framework Convention on Climate Change (UNFCCC) in 1988, to provide assessment of the body of scientific literature on climate change and the risks it presents[4]. One of the early tasks of the IPCC was to develop guidelines for national-level monitoring and reporting on greenhouse gas emissions, and so in 1996 the IPCC published official *Guidelines for National Greenhouse Gas Inventories*[5].

The needs of different sectors were recognised during this process. In particular, a special taskforce group was formed at the invitation of the UNFCCC to provide further advice for issues specific to measuring, monitoring

[4] For an overview see: http://en.wikipedia.org/wiki/Intergovernmental_Panel_on_Climate_Change#Assessment_reports
[5] See: http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html (Note: after their release these guidelines were subsequently revised in 2006)

and reporting from 'land use, land use change and forestry' (LULUCF) sector activities under the Kyoto Protocol, and in 2003 the IPCC approved *'Good Practice Guidance for Land Use, Land-use Change and Forestry'*(GPG-LULUCF)[6].

The challenge of high-level principles

The IPCC carbon accounting framework for the LULUCF sector was already established when the concept of REDD+ emerged in 2005. While REDD+ is formally a LULUCF-sector carbon offset mechanism, with its emergence also came complex considerations that had not been explicitly addressed in the IPCC framework principles and guidelines. For example, while the IPCC guidelines provided principles to calculate net carbon stock changes and GHG emissions as a result of deforestation, they did not provide clear guidance on how to determine baseline deforestation rates. This is a necessary component of REDD+ offset measurement frameworks and is also important for the quantification of gains in many biodiversity offsets projects.

3.1.2 Case study: Guidelines for REDD+ offsets and improving convergence on international 'best-practice' measurement methods through expert technical working groups

Early in the conceptualisation of REDD+ as a carbon offset mechanism, a number of different expert working groups on REDD+ began to convene. Most of these groups formed with the aim to provide more specific technical guidance for implementation of carbon accounting measurement principles relevant to REDD+[7], and effectively 'fill the gap' between the 'top tier' IPCC LULUCF and more REDD+ specific offset accounting needs.

This case study presents an example of international working groups that convened to develop guidelines and demonstrate best practice in measuring forest cover changes for REDD+. Similarly, additional expert groups also focused on other aspects of REDD+ offset measurement. For example, the World Bank BioCarbon Fund convened experts to develop common-practice guidelines for forest carbon field data collection protocols, through publication of the '*Sourcebook for Land Use, Land-Use Change and Forestry Projects*'[8].

Remote sensing: a complex field of science

While the IPCC principles provided overarching guidance on the need for land cover classes to be identified and mapped, the variety of sources and methods involved in developing vegetation maps raised questions about how to ensure quality and standardisation of practices across REDD+ projects. The complexity of remote sensing as a field of science also raised questions about transparency of results.

Remote sensing is a specialist field of practice relating to the procurement and analysis of satellite imagery to produce maps of land use and cover. This field also has relevance to biodiversity offsetting, in that remote sensing is often used to quantify impacts on different habitat types, and to scope out potential offset areas.

There are many inherent complexities in developing vegetation maps from satellite images. Firstly, there are many different types and qualities of satellite images. The images in their 'raw' form also need to be processed and 'rectified' to make sure they are aligned. There are also a variety of ways in which images are then 'interpreted' into land cover maps, ranging from on-screen 'visual interpretation' to more sophisticated use of software and algorithms that read spectral signatures and correlate them with land cover types and changes.

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[6] See: http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html
[7] For example, the LULUCF sourcebook was designed for 'providing additional explanation, clarification and enhanced methodologies' to the IPCC Good Practice Guidance on Land Use, Land-Use Change and Forestry (2003) and the GOFC-GOLD sourcebook working group convened to provide consensus on methodological issues related to remote sensing for REDD+ and to *'understand what information, expertise, equipment and infrastructure is required to effectively monitor the world's tropical forests'*.
[8] See: Timothy Pearson, Sarah Walker and Sandra Brown (2005) *Sourcebook for Land Use, Land–Use Change and Forestry Projects*, Winrock International

Example 1. Expert working group on international best-practice remote sensing guidelines for REDD+; *The GOFC-GOLD sourcebook*

As a result of UNFCCC negotiations and the emergence of REDD+ as a proposed offset mechanism, a working group was commissioned by the Government of Norway to provide consensus on methodological issues related to remote sensing for REDD+, more specifically, to *'understand what information, expertise, equipment and infrastructure is required to effectively monitor the world's tropical forests'*[9].

The '*Global Observation of Forest and Land Cover Dynamics' (GOFC-GOLD) Sourcebook*[10] is the product of this working group, and remains as a living document that is updated annually prior to each UNFCCC 'Conference of the Parties' (CoP). It has become a common reference amongst REDD+ practitioners for best-practice procedures for analysing satellite imagery for accurately determining forest cover and changes.

An example of how these guidelines have been applied by FFI for the Hieu Commune REDD+ project development activities in Vietnam is provided in Box 1 below.

Box 1: Applying international 'best-practice' guidelines on remote sensing to FFI REDD+ project development activities in the Hieu Commune REDD+ project, Vietnam[11]

International best-practice and third-party REDD+ standards require accurate and consistent estimates of forest cover and deforestation, and transparent reporting of methods and procedures applied. The following 'best-practice' principles were applied for the analyses of forest cover change and baseline reference emissions levels at the project level in REDD+ offsetting:

- **Pre-processing**: geometric corrections must be applied and cloud shadows masked out and excluded from the calculation of deforestation rates. Cloud cover must not exceed 20%.
- **Land cover classes**: classes must include at minimum the six IPCC classes: Forest Land, Crop Land, Grassland, Wetlands, Settlements, and Other Land.
- **Land cover classification**: forest stratification may be pixel or segment-based, and classes assigned using clearly defined rule-based forest stratification model.
- **Accuracy**: An independent accuracy assessment of the classification must be conducted using at minimum systematically distributed 50 reference locations per land class. The minimum acceptable accuracy is 70%.

Example 2. Raising public awareness and transparency in remote sensing for REDD+; the *Global Forest Change* database[12]

Expert collaborations of a different kind have also been convened that, rather than explicitly providing guidelines for international best practice in remote sensing, instead seek to raise public awareness and transparency on international best practice. The most prominent example of this is the work of a group of scientists from the University of Maryland, who published freely available global maps of forest cover and change from 2000 – 2012[13].

[9] *Sourcebook for reducing greenhouse gas emissions from deforestation and degradation in developing countries*, Global Observation of Forest Cover and Land Dynamics (GOFC-GOLD), see: http://www.gofcgold.wur.nl/redd/
[10] ibid
[11] Based on: *Methodology for Carbon Accounting for Mosaic and Landscape-scale REDD Projects*, v2.1 http://www.v-c-s.org/methodologies/VM0006
[12] See: http://earthenginepartners.appspot.com/science-2013-global-forest
[13] The work was also published in the journal *Science* in November 2014: *High-Resolution Global Maps of 21st-Century Forest Cover Change: http://www.sciencemag.org/content/342/6160/850.short*

Ultimately these types of projects have raised awareness on international best practice through providing comparable, independent reporting on forest cover changes. For example, *Global Forest Watch*[14], a partnership convened by the World Resources Institute, is linking the global forest change database with other forest change data from projects around the world.

3.1.3 Case study: Flexible frameworks for applying offset principles and guidelines at the site level

This case study presents an example of the final 'tier' in global REDD+ measurement frameworks: the application of global principles and best practice at the site level (see also Figure 1).

Whilst there are central statistical principles of data collection and monitoring common to all REDD+ offset projects, there is also a lot of variation in how these can be applied in practice. For example, a REDD+ project in a dry, seasonally deciduous tropical forest in Cambodia will require different monitoring and measurement protocols to an evergreen, wet, tropical, mountainous forest in Vietnam. Even after consensus has been reached on global principles and best-practice guidelines, implementation at the site level inevitably presents further complexities and challenges.

Ultimately, REDD+ monitoring frameworks have developed ways that simultaneously enable principles and best practice to be maintained, while also incorporating elements of flexibility so that interventions can be tailored to site-specific needs. Two examples are discussed here: standard operating procedures (SOPs) and carbon accounting 'methodologies'.

Example 1. REDD+ carbon accounting 'methodologies'

'Methodology'[15] is a term used to broadly describe the detailed documentation of the quantitative analysis and measurement methods applied to REDD+ projects at the site level.

In REDD+ offsetting, methodologies have predominantly emerged through 'entrepreneurial' style frameworks established under third-party standards, whereby independent third-party standards organisations[16] have provided an overarching set of rules and process for developing methodologies. Any number of REDD+ project proponents may use the process to develop REDD+ methodologies (for an example, see Box 2), which ultimately provide an interpretation and detailed prescription of IPCC carbon accounting principles for site-level implementation across a range of REDD+ offset sub-categories (e.g. offsets for avoided oil palm conversion, offsets for reducing deforestation from small-scale agricultural encroachment, etc.).

Under these third-party standard methodology development frameworks, the onus has been placed on REDD+ projects themselves to create and publish methodologies that are appropriate and practical for a given set of ecological conditions and REDD+ project type(s), which are subsequently audited, revised and approved by the relevant standards organisation. This is in contrast to biodiversity offsetting, in which projects either develop their own methodologies without any auditing or standardisation (most voluntary offsets), or methodologies are standardised and approved by government bodies (regulated offsets).

Developing REDD+ methodologies in this way has fostered innovation by allowing practitioners to explore different solutions to challenges in the implementation of REDD+ across a range of environments.

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[14] *'{GFW} is part of a growing global movement seeking transparency, innovation, and action to conserve and sustainably manage the world's remaining forests.' (*http://www.globalforestwatch.org/) It launched an interactive website in 2014, which shows interactive maps of deforestation over time.

[15] This is predominantly terminology from the VCS standard, however other third-party standards use a similar concept, e.g. the Plan Vivo standard requires projects to develop 'Technical Specifications' describing quantitative analyses.

[16] At the time of writing, global carbon standards that incorporate elements of REDD+ offsets and methodologies include: the Verified Carbon Standard, Plan Vivo standard and The Gold Standard.

Note that while REDD+ methodologies originally emerged predominantly via third-party standards, both third-party standard methodologies themselves and other methodology-type approaches are now being integrated into developing subnational and national REDD+ frameworks (see also Section 6).

Box 2 The Verified Carbon Standard (VCS) Methodology Approval Process – an example of a REDD+ methodology 'entrepreneurial framework'

The Verified Carbon Standard (VCS) (see also case study 5.1.1) has created a framework that individual REDD+ projects can use to publicly propose REDD+ 'methodologies', or a set of detailed prescriptions on how REDD+ offsets would be measured and monitored in accordance with global principles and best-practice guidelines.

Specifically, this process under the VCS is governed by the following:

- The *VCS Agriculture, Forestry and Other Land Use (AFOLU) Requirements*[17], which draws on both IPCC principles and international best practice to set out how these must be applied to REDD+ projects and methodologies wishing to be approved under the standard;
- The *VCS Methodology Template*[18] which provides a standardised format and structure that must be used for all methodologies; and
- The *VCS Methodology Approval Process*[19] which outlines the minimum requirements and process by which methodologies may be submitted to the standard for review and approval.

The VCS methodology approval process requires various stages of review and approval, including an initial public consultation phase and publication of progressive drafts of methodologies 'under development' online. The VCS approved its first REDD+ methodologies in 2009, and since then many methodologies applicable to REDD+ projects have been and continue to be developed (see Table 2).

Pros and cons

A key advantage of the VCS methodology development process is that it has fostered 'bottom-up' practical experimentation and innovation in applying global principles and best-practice guidelines to REDD+ offsetting at the site level. A practical outcome of this has been greater clarity on the categorisation of different types of REDD+ projects, and within those categories greater convergence of REDD+ quantification, measurement and monitoring protocols (for example see Table 2).

However, the VCS Methodology Approval Process has also attracted some criticism from REDD+ practitioners, in particular with regard to its rigorous 'double-approval' methodology audit requirement (see

[17] http://www.v-c-s.org/sites/v-c-s.org/files/AFOLU%20Requirements%2C%20v3.4.pdf
[18] www.v-c-s.org/sites/v-c-s.org/files/VCS%20Methodology%20Template%2C%20v3.3_0.doc
[19] http://www.v-c-s.org/sites/v-c-s.org/files/Methodology%20Approval%20Process%2C%20v3.5.pdf

Figure 2). In some cases REDD+ methodologies have taken years and a substantial investment of resources to progress from initial submission to final VCS approval. Ultimately this has resulted in some REDD+ projects remaining ‘on hold’ and unable to generate credits in the interim, thus creating tension among project stakeholders.

This issue is reflective of an ongoing debate on the minimum level of rigour and investment required to ensure REDD+ offsets remain robust (see Section 4).

Figure 2. An overview of the VCS standard REDD+ methodology approval process[20]

1. **Methodology proposal**: REDD+ project developer wishing to create a new methodology submits documentation

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2. **Public consultation**: VCS publishes the proposed methodology and holds a 30-day public consultation through online submission process

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3. **Methodology 'double-approval' process**

   First assessment: a third-party auditor is hired to review the draft methodology, and project developers respond to technical revisions proposed by the auditor

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   Second assessment: a second independent third-party auditor is hired to review the draft methodology (after first assessment)

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4. **VCS review**: the VCS reviews the results of the double-approval audit and assessment reports

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5. **VCS approval**: VCS approves and publishes the methodology. The methodology is now available for the project and other projects to use, subject to copyright terms and conditions.

[20] Based on http://www.v-c-s.org/methodologies/develop-methodology

Table 2. Examples of REDD+ quantification and measurement methodologies under the VCS standard

REDD+ project 'sub-type'[21]	Examples of REDD+ offset quantification and monitoring 'methodologies' published under the VCS 'entrepreneurial' methodology framework[22]
Reducing Emissions from Deforestation and forest Degradation (REDD)	• Methodology for Carbon Accounting for Mosaic and Landscape-scale REDD Projects • Methodology for Avoided Unplanned Deforestation
Improved Forest Management (IFM)	• Methodology for Improved Forest Management through Extension of Rotation Age • Improved Forest Management in Temperate and Boreal Forests methodology • Reduced Impact Logging Practices that Reduce Carbon Emissions methodology
Wetlands Restoration and Conservation (WRC)	• Methodology for Conservation Projects that Avoid Planned Land Use Conversion in Peat Swamp Forests • Methodology for Rewetting Drained Tropical Peatlands

Example 2. REDD+ Standard Operating Procedures (SOPs)

In contrast to methodologies, REDD+ SOPs provide even more detailed protocols on specific aspects of measuring and monitoring. Usually in a REDD+ project, methodologies will require that SOPs be developed and documented as evidence of applied consistency in measurement methods, which are likely to vary from project to project, even in the case that the same methodology is applied.

For example, the plot design (square or circular etc.) and data collection methods for forest inventories; or the type of satellite imagery procured (source of imagery and resolution etc.) and classification hierarchies applied, all commonly vary between projects. Therefore, for example, an SOP for plot data collection would describe the steps project field teams must follow to locate, establish and measure a plot; and an SOP for forest cover monitoring using remote sensing would describe in detail the methodological steps from procuring a satellite image to developing maps and conducting an accuracy assessment.

While methodologies provide assurance about the consistency in offset measurement principles *across* REDD+ project types, SOPs provide assurances regarding the consistency of measurements *within* a given project. SOPS are also useful in that they provide a framework for consistency with offset measurement principles (e.g. statistically sound collation of field samples), alongside flexibility for site-specific adaptations and preferences (e.g. survey methods and plot designs).

An example of how SOP requirements have been developed to reflect these dual needs of standardisation and flexibility in VCS REDD+ methodologies is provided in Table 3 below, and real-world examples from FFI's REDD+ project SOPs are described in Box 3.

[21] These are based on VCS AFOLU requirement definitions: http://www.v-c-s.org/sites/v-c-s.org/files/AFOLU%20Requirements%2C%20v3.4.pdf

[22] These are examples of published VCS methodologies, publicly available for download from the VCS website, see: http://www.v-c-s.org/methodologies/find

Table 3. Example of SOP prescriptions for field & remote sensing monitoring activities for REDD+ projects[23]

Technical component	Standardised SOP requirements – principles that must be adhered to by REDD+ projects	Flexible SOP requirements – aspects that individual projects may determine
Forest carbon field inventories	*Develop Standard Operating Procedures (SOPs) for each step of the field measurements and adhere to these at all times {including the following requirements}:* • *Persons involved in the field measurement work should be fully trained in the field data collection and data analyses* • *Record which teams have measured each sampling plot* • *Record who was responsible for each task* • *Verify that plots have been installed and measured correctly, by having approximately 10% of all plots re-measured by an independent team.*	*The location of sample plots should be selected to be as random as practically feasible. However, in cases where access to the forest land is challenging, biomass plots located along a forest transect may be used instead of a stratified random sampling design.* *The determination of the sample size (number of sampling plots) is dependent on* *(1) the required precision of at least 15% at a confidence level of 95% and* *(2) the anticipated variance in the specific LULC class and forest strata.* *Further explanation on how to select the layout of sampling plots (form, nesting, etc.) can be found in textbooks*
Remote sensing monitoring	*Develop Standard Operating Procedures (SOPs) for each step of the remote sensing analyses and adhere to these at all times {including the following requirements}:* • *Use ground-truthing data to validate the LULC classification and forest stratification* • *Use confusion matrices and accuracy indices to analyse and quantify the accuracy of the classification* • *If outliers are present (e.g., in deforestation quantities), analyse the cause and correct if errors were made* • *Consult experts and literature for further advice on pre-processing techniques. Duly record all pre-processing steps for later reporting.*	*The exact number and type of LULC classes and forest strata used is project-specific and dependent on local conditions.* *The selection of data sources is not prescriptive.* *High to medium resolution (≤ 30 m) remote sensing data are required for at least three time points.* *Recent (< 5 yr) high resolution (< 5 m) remote sensing data is required for at least part of the reference region.*

Box 3 FFI SOPs for biomass field data collection

SOPs are now commonly used by FFI teams across a broad range of activity components in REDD+ offsetting, including remote sensing protocols, field data collection and forest patrolling protocols.

FFI's SOPs are drafted by technical project team members in close consultation with local forestry experts and stakeholders, and are then translated into the relevant local language(s). FFI believes that developing SOPs using a consultative approach provides a good opportunity to raise awareness and build local-level technical capacity. SOPs are drafted for each project location, but often involve sharing amongst project teams so that existing SOPs can be adapted wherever possible, to reduce the need to start from scratch.

FFI's SOPs demonstrate examples of considerations needed for tailoring global principles and best-practice methods to the site level in REDD+ (see Figure 3). As stand-alone technical procedural documents, SOPs are now also playing an increasingly important role in ensuring transparency and accountability in REDD+ reporting (see also Section 5).

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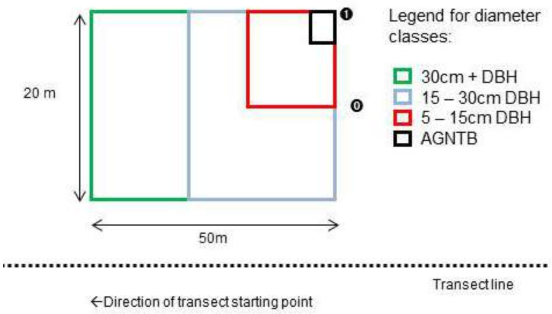
[23]These requirements are summarised from the VCS REDD+ carbon accounting methodology: *Methodology for Carbon Accounting for Mosaic and Landscape-scale REDD Projects*, v2.1. See: http://www.v-c-s.org/methodologies/VM0006

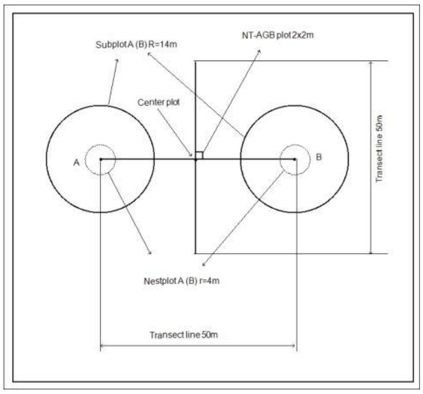
Figure 3. Examples of forest carbon inventory plot designs in FFI REDD+ SOPs in Indonesia and Vietnam

Example 1: Indonesia peat swamp forest carbon inventory plot design



The plot design in an Indonesian peat swamp forest is long and large to maximise sample size in relatively flat terrain. This plot design also reflects aspects of Indonesian national forestry protocols.

Example 2: Vietnam mountainous tropical forest carbon inventory plot design



The plot design in a Vietnamese mountainous tropical forest uses two circular sub-plots, which accommodates for difficulties in establishing plots in highly mountainous terrain.

3.2 Biodiversity offsets practices by comparison

In contrast to REDD+ carbon offsets, biodiversity offsetting is yet to evolve a certification system, although the Biodiversity Offsets Standard (BOS) has been developed by BBOP. Recommended good-practice accounting and implementation principles, criteria and indicators sit within the BBOP BOS. The independent verification of compliance with the BOS is in its infancy and has met with some resistance as practitioners battle to find comparable and consistent methodologies that are practicable and meaningful in the full range of ecosystems to which they need to be applied. This resistance owes less to the objectives of BOS than to the weakness of governance and legal frameworks, and the lack of broad commitment on the part of the private sector and governments to follow up policy and standards with compliance monitoring and implementation.

A suite of methodologies exists for both species or habitat-based and ecosystem approaches to biodiversity offsets. The methodologies are guided by country-level or biodiversity objectives and remain open to interpretation. The use of the International Finance Corporation (IFC)'s Performance Standard 6 (PS6) is a case in point. PS6 calls for no net loss of biodiversity in natural habitat and net gain of biodiversity in critical habitat. Identifying such habitat requires a consistent methodology, but inconsistency in the interpretation of the methodology and definitions results in biodiversity targets or objectives varying in a landscape. Similarly, biodiversity targets for loss-gain accounting in Australia under their Environmental Protection and Biodiversity Conservation Act (EPBC) Act require national-level biodiversity objectives to be met through no net loss of listed species or habitats. The prescribed accounting methodology is useful and transparent, but may be inconsistent with State Level requirements and accounting methodologies for biodiversity.

The proliferation of texts and academic papers addressing accounting principles and approaches for biodiversity offsets complements the suite of reference guidance documents offered by BBOP.

Guidance on limits to 'offsetability', papers on additionality and no net loss, and a new suite of guidance and case studies on the application of the mitigation hierarchy fulfil some of the technical and methodological needs of biodiversity offsets implementation. Developing offsets in complex contexts and in the absence of legal frameworks requires precautionary, and highly adaptable and flexible approaches, particularly where data are inadequate or entirely absent.

The use of some of the REDD+ technical guidance and recommended practices would be valuable in the measurement of habitat quality and alteration when defining the residual impacts that may require biodiversity offsets, and in the development of offsets driven by an ecosystem approach – i.e. taking into account on a landscape or ecosystem scale the ecological patterns and process that underpin healthy, functioning ecosystems. Such assessment may be undertaken in the absence of detailed information at a species level and yet maintain rigour in defining the ecosystem when it comes to loss-gain calculations to determine offsets design.

3.3 Lessons learnt and considerations for biodiversity offsets

REDD+ lesson: expert global working groups, guidelines and awareness raising have helped to achieve consensus and standardisation on international best-practice principles for REDD+ offsetting. In particular, working groups formed logically around particular fields of science associated with offset measurement were most constructive; for example: remote sensing science (land cover mapping and monitoring) and forest science (forest carbon field inventories and biomass measurement).

Considerations for biodiversity offsets:

- What are the core analytical elements and related fields of science relevant to the quantification of losses and gains in biodiversity offsetting?
- Would further convening of international expert technical working groups and publication of expert guidance documents on quantification of losses and gains for biodiversity offsetting help to achieve global consensus on biodiversity offset 'best practice'?
- Do expert working groups already exist and/or are they adequately funded, and their outputs appropriately recognised and publicised in order to raise awareness on global 'best practice' in offsetting?
- Would the outcomes of biodiversity offsetting be improved by a similar process of standardisation of remote sensing methodologies to that achieved for REDD+?

- Would the outcomes of biodiversity offsetting be improved if the approaches applied to baselining and monitoring were standardised and agreed upon, as has been achieved for REDD+?

REDD+ lesson: third-party standards have provided a public platform and 'entrepreneurial-style' framework for individual REDD+ projects to develop quantification and measurement 'methodologies' which both uphold consistency with global offsetting principles and best practice, and also provide flexibility to tailor these to site-specific interventions and characteristics. These frameworks have proved a source of innovative ideas for practical application of global principles and best practice for ground-level implementation.

Considerations for biodiversity offsets:

- Has there been sufficient capturing of the practical interpretation of biodiversity offsetting principles and best practice at the site-level implementation? Are there processes that allow for a regulated balance between maintaining offsetting principles whilst retaining flexibility for these principles to adapt to site-specific needs?
- Is there sufficient consultation, inclusion and rigour in the design and implementation of biodiversity offsets?
    - Third-party verification and certification of BOS through the application and audit or monitoring of accounting and design methodologies ensuring they are appropriate to the context and the biodiversity features affected.
- Incorporate monitoring and evaluation of progress on implementation of biodiversity offsets in the design and verification or certification process to ensure rigour, defensibility and consistency
- Consider adopting some of the methodologies developed for REDD+ ecosystem-scale approaches and GIS/remote sensing to calculating baseline forest condition and deforestation rates
- Can the idea of REDD+ methodologies and/or SOPs be 'translated' into a biodiversity offset context?
    - E.g. are there existing frameworks that could be used as a public platform for the development and approval of methodological approaches to biodiversity offset quantification and measurement protocols?
    - E.g. is there a role and a place for tools such as SOPs to provide both consistency and flexibility in the way offset projects develop data collection methods? (e.g. SOPs for indicator species detection and monitoring, SOPs for mapping habitats)
    - E.g. is there scope for a similarly consultative approach to the development of site-level standard operating procedures for biodiversity offsetting projects?

REDD+ lesson: applying a high level of independent rigour to methodologies and operating procedures can introduce delay in project progression, but is important for ensuring trust and transparency as uptake grows.

Considerations for biodiversity offsets:

- How could the level of independent rigour applied to biodiversity offsets methodologies (quantification etc.) be increased so that it matches that applied to REDD+ methodologies (two independent assessments by experts) and SOPs (e.g. 10% of plots re-measured by an independent team)?

REDD+ lesson: standardisation of protocols and methodologies can encourage a standardised approach to *monitoring* as well as measuring, and thereby enable monitoring to become an integrated component of a project's operating procedures.

Considerations for biodiversity offsets:

- How can standardisation and rigour be applied to biodiversity offsetting methodologies in such a way that monitoring protocols are captured and embedded, and monitoring becomes integral to offsetting projects, rather than an afterthought?

4 DEVELOPING COST-EFFECTIVE METHODS FOR QUANTIFYING OFFSET IMPACTS AND GAINS

4.1 What and how to measure?

The challenge for biodiversity offsets is how to develop methods that are cost-effective, statistically robust and scientifically valid. This remains one of the most difficult and potentially controversial aspects of biodiversity offset accounting and design. As mentioned above, the units of measurement for biodiversity can be species and habitat based, or ecosystem based. What to measure can be defined by the objectives set, the quantity and quality of data available, the spatial and temporal scales applied, the legal or methodological frameworks used, and level of understanding of the ecosystem or landscape within which the biodiversity offset is to be generated. Fundamentally, the lack of a consistent framework and the absence of an agreed methodology or suite of methodologies make measurement of biodiversity for offsetting difficult.

This has proved equally challenging in the context of REDD+, for which baseline scenarios, carbon stocks and emissions reductions must be accurate enough to enable project developers and beneficiaries to confidently demonstrate to what extent the project is effectively avoiding carbon emissions. The need for accuracy must be balanced, however, with the realities of on-the-ground capacities and resources. The up-front investment of a REDD+ project can be extremely high and needs to make financial sense when compared to the resulting carbon benefits and corresponding sales on the voluntary carbon market (this is particularly true of smaller-scale projects, or projects in ecosystems or landscapes that store lower amounts of carbon). If, for example, annual monitoring protocols require continued assistance from expensive international consultants, this will have considerable impact on how much of those carbon benefits can flow back into communities, sustainable forest management and biodiversity protection. This has been and continues to be a key challenge in REDD+ offsetting, and two main aspects of current debate in REDD+ offsetting are explored in this section:

(i) *What* to measure?

Agreement on some aspects of this question was quickly reached in REDD+ offsetting, for example through the delineation of carbon pools and the idea of 'significance' (see Box 4). However, other aspects remain both complex and contested, for example Case study 4.1.1 presents the difficult trade-offs in the decision over whether or not to measure degradation in addition to deforestation as part of REDD+ offsetting.

(ii) *How* to measure?

This question relates to the trade-off between practicality, inclusiveness and cost-effectiveness, and statistical rigour and scientific validity of REDD+ offset quantification approaches. In REDD+ offsetting, this question is being explored by different third-party standards through their respective approaches to methodology development. FFI has been at the forefront of this debate by working with both the Verified Carbon Standard (VCS) and the Plan Vivo third-party standards. Some preliminary lessons drawn from FFI's experiences to date are outlined in Case study 0.

Box 4. What to measure in REDD+ offsets: carbon pools and the idea of 'significance'

Carbon pools have come in to use in REDD+ offsetting to help define what elements need to be included in, or excluded from, offset measurement. Carbon pools are an artificial categorisation of different types of forest biomass, based on forest science; for example, see Table 4. Whether or not a carbon pool is deemed 'compulsory' to include in a given REDD+ offset project largely depends on the 'significance' of that carbon pool's contribution to the overall offset value.

The idea of significance was included in international-level discussion on carbon offset principles under the UNFCCC, where consensus converged on the (arbitrary) principle that if a carbon pool contributes less than 5% of the overall emissions reductions, then it may be deemed 'insignificant'. A specific technical protocol has been developed under the UNFCCC and is now broadly applied to REDD+ projects to determine whether each carbon pool and emissions source is significant or otherwise[24].

For example, a REDD+ project in a typical tropical rainforest usually includes measurement of 'above-ground tree biomass' (trees), as this is where the largest changes would occur in carbon storage and, proportionally, soil carbon does not contribute appreciably to the overall storage of carbon. However, a REDD+ project in a typical tropical peat swamp forest is also required to measure soil carbon, because peat is an extremely significant carbon store, approximately six times that of tree biomass (see

Figure 4 for an example).

In some cases, inclusion of a particular carbon pool is optional (see

Figure 4). Whether the project chooses to include these optional pools usually depends on the balance of cost-effectiveness versus return on increased offset value in each specific case. For example, adding soil carbon where it is not essential to include that pool would increase the carbon value of the offset, but would also add expense and technical complexity, and the balance between the two would determine whether it was worth including.

[24] See: https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-04-v1.pdf

Table 4. Overview of carbon pools as an arbitrary categorisation of 'what to measure' in REDD+ offsets

Carbon pool	Description
Above ground tree biomass	Trees measured through forest inventories
Above ground non-tree biomass	Understorey vegetation and shrubs; in some cases, e.g. bamboo forests, this may be a significant store of carbon.
Below ground tree biomass	Accounts for tree root systems, which may also be a substantial store of carbon. Usually estimated based on a ratio of below ground to above ground tree biomass.
Dead wood	Includes either/both 'lying dead wood' (logs on the forest floor) and/or 'standing dead wood' (dead stumps and trees).
Litter	Leaf litter on the forest floor
Soil organic carbon/peat	Carbon/biomass in the soil substrate, in some cases this is peat in swamp forests

Figure 4. Examples of carbon pools and justifications for inclusion or exclusion in project monitoring and measurement for two different types of REDD+ projects

Example 1: Carbon pools measured in a tropical forest REDD+ project[25]

Carbon Pool	Included?	Justification/ Explanation of Choice
Aboveground tree biomass	Yes	Major carbon pool affected by project activities
Aboveground non-tree biomass	Yes / Optional	Expected to increase from project activities. Must be included when the land cover under the baseline scenario is perennial tree crop. May be excluded when baseline land cover is annual crop or pasture grass.
Belowground biomass	Optional	Major carbon pool affected by project activities. May be conservatively excluded.
Dead wood	Optional	Major carbon pool affected by project activities. May be conservatively excluded. If included either or both of standing or lying deadwood may be included.
Litter	No	Excluded as per VCS *AFOLU Requirements*.
Soil organic carbon	Optional	Conservative to exclude since this pool is expected to decrease under the baseline scenario. However, may be only included per VCS *AFOLU*

Example 2: Carbon pools measured in a peat swamp forest REDD+ project[26]

Carbon pool	Included?	Justification/Explanation
Aboveground tree biomass	Yes	Required for inclusion by VCS rules.
Aboveground non-tree biomass	No	It is conservative to exclude this carbon pool.
Belowground biomass	No	It is conservative to exclude this carbon pool.
Litter	No	It is conservative to exclude this carbon pool.
Deadwood	No	It is conservative to exclude this carbon pool.
Soil	Yes	Main pool addressed by project activities.
Wood Products	No	It is conservative to exclude this carbon pool.

4.1.1 Case study: The trade-off between increasing complexity and cost-effective practicality in offset quantification – monitoring deforestation and degradation in Vietnam

This case study presents a practical example of how FFI weighed up trade-offs between increasing complexity versus cost-effective practicalities in the measurement of forest cover change for a REDD+ offset project in Vietnam.

Forest cover versus forest condition

[25] Source: *Methodology for Carbon Accounting for Mosaic and Landscape-scale REDD Projects*, v2.1 (VM0006). See: http://www.v-c-s.org/methodologies/VM0006

[26] Source: Methodology for Rewetting Drained Tropical Peatlands, v1.0 (VM0027) see: http://www.v-c-s.org/methodologies/methodology-rewetting-drained-tropical-peatlands-v10

The very nature of REDD+ offset mechanisms requires that monitoring of forest cover extent, at a minimum, needs to be incorporated into offset quantification. This can be readily achieved through fairly cost-effective means, such as interpretation of Landsat satellite imagery.

There are also ways in which REDD+ projects can measure forest *condition*, for example delineating between 'degraded' and 'intact' forest condition. However, the process of monitoring forest condition usually requires a 'higher resolution' form of analysis which is both time- and resource-intensive. For this reason, current REDD+ methodology frameworks usually incorporate this type of monitoring as an optional element of REDD+ offset quantification. Developing both technology to improve the cost-effectiveness of degradation monitoring, and methodologies that capture these improvements, is currently also a rapidly evolving area in REDD+.

Case study

FFI explored the potential trade-offs between monitoring forest condition in addition to forest cover extent during its implementation of REDD+ activities in Kon Plong District, an area of approximately 130,000 hectares in the central highlands of Vietnam.

FFI applied different levels of resolution for its forest cover analyses at different stages of the project. The first REDD+ project-scoping phase used freely available information and low-cost data sources to determine historical deforestation rates and assess project feasibility. Later, the project progressed to higher-resolution and higher-investment forms of analysis (including ground-truthing through field data collection), to capture the impact of both deforestation and forest degradation as part of the second phase of REDD+ project development activities.

Comparing both the inputs and the results of these two phases provides a tangible example of the trade-offs between investing in the generation of higher resolution and 'higher quality' versus taking a more 'cost-effective' approach to monitoring deforestation for REDD+ offsetting.

FFI lessons and conservation outcomes

The results of each phase of the high- and low- resolution analyses of forest cover and condition in Kon Plong District are presented in Table 5 and

Figure 5 below.

Table 5. A comparison of the methods and resources invested into low- versus high- resolution analyses of forest cover and condition changes in Kon Plong District, Vietnam

Remote sensing analysis component	'low resolution' analysis of forest cover extent	'high resolution' analysis of forest cover extent and condition
Analysis method	Freely available Landsat-7 ETM satellite imagery acquired from the USGS archive (30 x 30m resolution) was processed and interpreted using a forest cover classification algorithm combined with ground-truth data, applied using remote sensing software[27].	High-resolution satellite images from the SPOT-5 (5m resolution) sensor were procured and an iterative classification algorithm developed based on ground-truth datasets[28].
Time and resources	Satellite images can be downloaded freely. A remote sensing expert was needed to select, download, format and process and analyse the satellite images. Time from satellite image procurement to final maps was approximately two months.	A remote sensing expert was used to select, order, procure, process and analyse the satellite images. Time from satellite image procurement to final maps was approximately six months, working with an experienced remote sensing provider.
Results	The analysis detected an annual deforestation rate of 0.6 – 0.8% (degradation was not detectable). Annual average net baseline emissions from deforestation, based on this rate, were estimated to be within the range of 210,000 – 280,000 tCO2-e per year across the study area (Kon Plong District).	The analysis detected a 1.0 – 1.2% annual deforestation rate, and a 2.0 – 2.5% annual degradation rate (i.e. proportion of intact forest area being degraded). Annual average net baseline emissions from deforestation, based on these rates, were estimated to be within the range of 330,000 – 490,000 MtCO2-e per year across the study area (Kon Plong District).

Based on these results, FFI was able to identify the pros and cons of investing in a higher-resolution approach for measuring forest condition, as follows:

Advantages (pros)

- A key conservation outcome for FFI has been much greater awareness of location and extent of illegal logging, detected as areas of permanent loss in forest condition, and as a result FFI has been better able to develop effective mitigation measures.
- Incorporating forest condition monitoring and reporting has increased the carbon value of prospective future REDD+ offsets (see results in Table 5), which ultimately provides the project with more direct incentives and rewards for both forest patrolling and law enforcement activities that prevent illegal logging.

Disadvantages (cons)

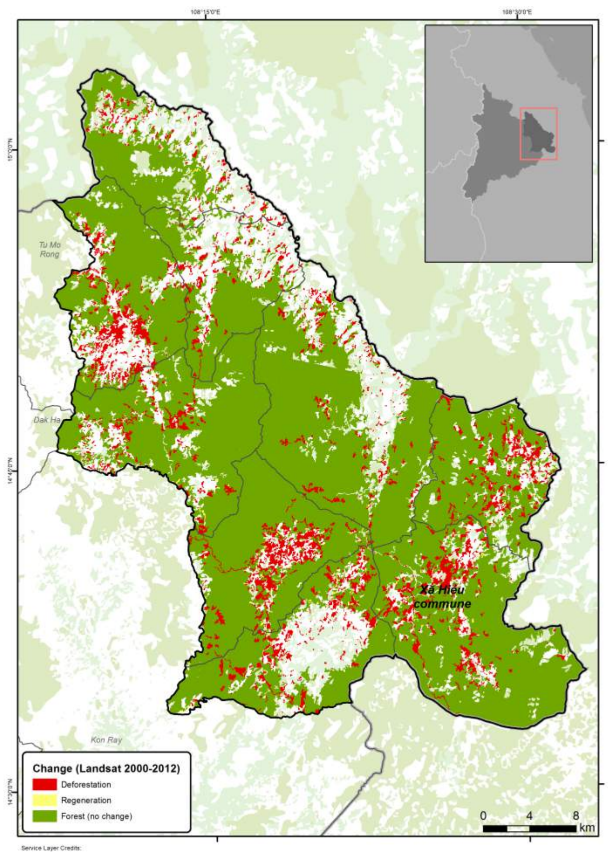
- Significant time and resources were required to develop the higher-resolution analyses, in comparison to the lower-resolution analysis of forest cover extent (only).
- A significant investment into capacity building and training would be required in order to develop local-level capacity to use and process information on forest condition over the long term.

[27] Remote Sensing Solutions GmbH (2012) *Remote sensing-based assessment of the land use/ land cover change in Kon Plong District, Vietnam Phase 1,* report prepared for Fauna and Flora International 2012.
[28] Remote Sensing Solutions GmbH (2014) *Remote sensing-based assessment of the land use / land cover change in Kon Plong District, Vietnam, Final Report,* prepared for Fauna and Flora International 2014. Satellite images used in this study include images granted to FFI by Spot Image under the Planet Action Initiative, ©CNES (2013), distribution Spot Image S.A

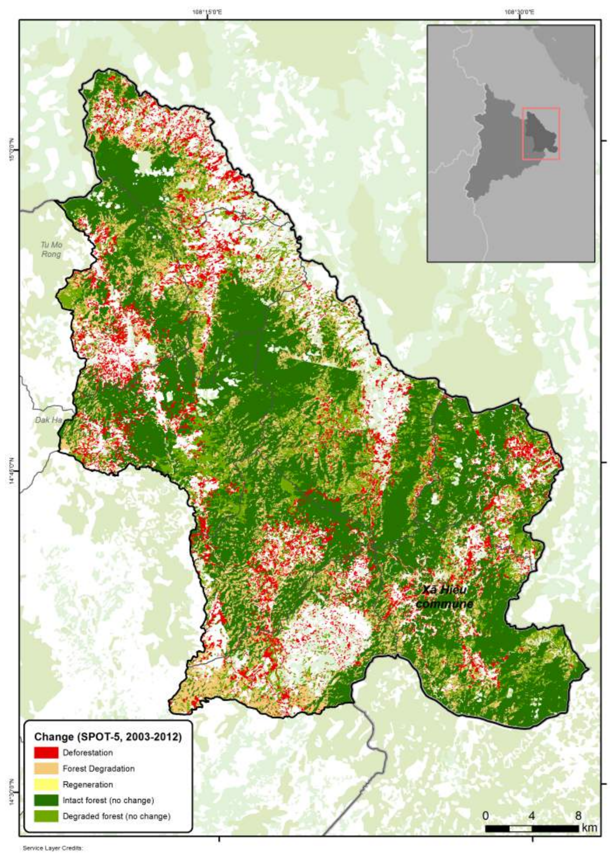
Ultimately the project determined that the higher resolution was important for both increasing the value of emissions reductions (number of credits) and also for providing information on the prevalence of illegal logging. In Vietnam, these results have also contributed to national discussions on forest cover monitoring and detection of deforestation, given the prevalence of illegal logging issues throughout the country.

Figure 5. The results of forest cover change analysis in Kon Plong District using different data sources[29]

Landsat forest cover change analysis 2000 – 2012



SPOT deforestation and degradation analysis 2003 - 2012



4.1.2 *Case study: FFI's lessons learnt to date in working with different methodologies for REDD+ offset quantification*

As the field of REDD+ has developed and expanded, there has also been a proliferation of different approaches to REDD+ offset quantification.

The Verified Carbon Standard (see case study 5.1.1) continues to be one of the most frequently applied standards for third-party certified REDD+ offsets globally, but its onerous and scientifically rigorous requirements have faced growing criticism from REDD+ practitioners.

FFI has been piloting REDD+ implementation using both the VCS standard and the Plan Vivo Standard, which is a boutique approach tailored specifically to community-based REDD+ projects. A key aim of the latter is to

[29] **Source:** Maps generated by FFI based on outputs from RSS 2012 and 2014

manage the depth of complexity, developing practical methodologies that can be cost-effectively deployed at modest scales and in a participatory fashion, such as on clusters of individual smallholder farmer plots and within community-managed forest areas.

FFI lessons learnt to date

Key lessons to date from FFI's work with different approaches to REDD+ offset quantification include the following:

- Pilot projects are important for trialling and understanding the requirements and implications of different offset quantification approaches;
- Technical reporting requirements can present a substantial burden to REDD+ projects where technical and linguistic capacity to both interpret and prepare reports may not always be readily available;
- The process of reducing technical complexity is a time-consuming and challenging process in itself. It involves a series of decisions that must be agreed among technical experts; and
- A minimum level of complexity is required in all approaches to ensure that calculations remain robust, thus key components of FFI's REDD+ pilots and the application of different methodologies have converged;
- A similar process may be anticipated in the context of biodiversity offsets, though it should be noted that in one respect measurement of carbon offsets is simplified by virtue of having a single, standardised unit (tCO_2e). Whilst the measurement methodology must be tailored to the ecosystem, the range of potential metrics in biodiversity offsets is considerably broader and thus analogies between REDD+ and biodiversity offsets in terms of standardisation of fungible units may be limited.

4.2 Comparison with FFI ecosystem approach to biodiversity offsets

To address identified barriers to the application of biodiversity offsets, and recognising the increasing need to take account of the landscape context in the development of biodiversity offsets, FFI has piloted the application of a process framework for the prioritisation of biodiversity offset receiving areas within a landscape. This process is referred to as *offset scoping*. The purpose is to demonstrate a transparent, repeatable and practical approach to the identification, comparison and prioritisation of offset receiving areas within a landscape that meets both site-level requirements and landscape-level goals.

The process framework follows a systematic conservation planning approach that is spatially explicit and data-driven enabling project proponents to identify offset receiving areas in the landscape under a series of different scenarios, compare outputs, and prioritise offset receiving areas. These areas would then be subject to further, fine-scale assessment through offset network design.

With sufficient input data, the model is then able to identify sites that satisfy the specific requirements decided by the proponent. It could, for example, be asked to search for sites that are comprised of affected habitat types x and y; are only within community-managed conservation areas; support the persistence of specific endangered species that are a national conservation priority; and maximise connectivity across the landscape, and so on.

The offset scoping process involves the following steps:

1. **Develop offset design and methodology.** This requires a review of the project scope and activities, an understanding of the legal framework and/or policy context, and initial stakeholder

consultations to understand constraints and opportunities for biodiversity offsetting within the landscape. With this information offsetting goals can be agreed – for example, do the offsets need to meet regulatory requirements, international best practice, internal company standards, or all of these? Is the goal no net loss or net positive impact? Must the offsets be like-for-like or is like-for-better permitted? What are the biodiversity and landscape features that need to be quantified? With these inputs, the most appropriate methodology can then be determined.

2. **Prepare datasets**, collating all available data for the landscape that will be fed into the model. The types of data required will depend on the focal landscape, the offsetting requirements (i.e. IFC PS6, national offset policy and company policy), and data availability but wherever possible should incorporate data layers for land cover (i.e. maps of vegetation or habitat types), biodiversity features such as species ranges, ecosystem services, development footprints and infrastructure, land tenure and land use, and information on national and/or regional conservation priorities. All data must be represented in spatial format (i.e. mapped) for the model to use them. Where data are lacking, surrogates or proxy datasets will be needed, and their selection must be based on expert consultation and evidence.

3. **Choose and apply methods to calculate loss/gain and quantify residual losses.** This will involve consideration of how the required areas and types of habitats will be calculated and whether this will be based on mandated ratios, international best practice or some other method.

4. **Decide which scenarios or alternatives to consider through a computer modelling process** – i.e. which different biodiversity, social or financial priorities and constraints need to be evaluated and what future development scenarios need to be analysed when considering identification of offset receiving areas.

5. **Run the model for each scenario and assess the results,** comparing optimal receiving areas prioritised under the alternative scenarios. This step can be re-run multiple times in an adaptive manner as outputs help to inform the constraints that should be applied to the model.

6. **Analyse the model's outputs.** Ideally this should be done in a quantified manner to determine the priority offset receiving areas from the perspective of biodiversity, landscape goals, cost efficiency, etc. These prioritised areas will then be the focus of further investigation through subsequent offset network design.

This systematic planning process has the following benefits:

- **Transparent:** analysis is systematic and thorough, based on sound science and expert opinion, and incorporates the assessment and comparison of scenarios.
- **Objective:** outputs are based on meeting specific objectives (site-level NPI, landscape-level NPI, minimise costs, maximise representation, etc.), rather than being subjective and based on opinion/values.
- **Efficient:** the systematic approach can find potential solutions to very complex scenarios
- **Flexible:** allows for the inclusion of any combination of true costs, impacts, opportunities and constraints that are important in the landscape and can assess different scenarios.

- **Repeatable:** the modelling is repeatable as new data become available and the framework itself is repeatable over different landscapes, scenarios and offset objectives.

- **Stakeholder driven:** the framework relies on stakeholder and expert input and is a valuable platform for stakeholder engagement.

- **Trade-offs:** the modelling approach allows for the analysis of trade-offs between different objectives across the landscape, including biodiversity, social benefits and economic costs.

4.3 Lessons learnt and considerations for biodiversity offsets

REDD+ lesson: in exploring the question of 'what' should be measured, REDD+ offsetting methodologies have converged on delineating biomass carbon pools and using the significance of their contribution to the overall offset value as a means to decide whether they should be included or excluded for measurement.

Considerations for biodiversity offsetting:

- The idea of 'carbon pools' could be translated into a biodiversity offset context. There needs, however, to be sufficient agreement on which aspects of biodiversity are most tangible, significant and delineable in biodiversity offsetting.

- Taking an ecosystem approach, it may be possible to conceive and delineate what 'biodiversity pools' would be most affected by a particular impact for which an offset is intended to be created.

- The idea of 'significance' could be translated into a biodiversity offset context, in particular considering the significance of different biodiversity values across different ecosystems and different types.

- Flexibility needs to be built in so that offset projects may choose to go above and beyond an agreed 'minimum' of what should be measured and can still be rewarded for the additional investment.

REDD+ lesson: in exploring the question of 'how' to measure offsets; at this stage a key observation of FFI's experience piloting two different approaches to REDD+ offset quantification is that over time there has been gradual convergence in core elements of the methodological approaches. The findings indicate that there is both a minimum level of complexity inherent in offset measurement and thus fundamental elements of the approach should be common to all methodologies.

Considerations for biodiversity offsetting:

- There are clearly delineable aspects of biodiversity offset quantification that are likely to have inherent complexities. Whilst these may be difficult to simplify, assessing the patterns and processes at an ecosystem scale and using an ecosystem approach may help to identify clear elements of the ecosystem that can be both measured and monitored without exhaustive, field-based assessments. However, monitoring and evaluation programmes with a robust field element should be instituted to verify and enhance early higher-level information. It is important, however, to be rigorous in the application of any simplification and be realistic about what cannot be simplified.

- Probably a more important feature in the evolution of REDD+ offset quantification methods has been the flexibility that has been built into quantification frameworks, which allow improvements to approaches to be developed if and/or when project methods and technological innovations emerge; see Case study 4.1.2)

REDD+ lesson: exploring both the possibilities and potential implications of different approaches to offset quantification is a substantial area of work. In particular, reaching an effective consensus on where to 'draw the line' on both what and how to measure may be difficult to determine without exploration through practical pilots that trial different methodological approaches and different adaptations at the site level (e.g. to different ecosystems).

This is a major field of development in biodiversity offsetting, as discussed above.

Considerations for biodiversity offsetting:

- Learn from biodiversity offset pilot projects with information that may be useful to compile and further explore the questions of 'what' and 'how' to measure in quantification of biodiversity offsets.
- Can case study data be compiled to inform the discussion of 'how much is enough' when it comes to investing time and resources into biodiversity offset measurement and data generation?

5 ENSURING ACCOUNTABILITY IN OFFSET IMPLEMENTATION

Currently in biodiversity offsetting there remains much debate over whether individual offsets do in fact achieve a biodiversity value that is fully equivalent to (or exceeds) the losses for which they are intended to compensate. One of the most pressing current problems with biodiversity offsetting in this respect is accountability during the implementation phase.

In many cases while a plan for the offset is developed (and the development impact approved on that basis), the primary actor involved in offsetting does not implement the offset according to the plan – e.g. due to inadequate allocation of resources to the offset, partially completing the plan or completing the plan to a poor level of quality. In many cases the plan itself is flawed because the mitigation hierarchy has been inadequately applied and residual impacts have not been comprehensively or accurately determined, such that the offset requirement is underestimated or improperly focused. Whether through poor implementation or poor planning, the end result is that the impact is not truly compensated for by the offset in the intended way. This challenge is symptomatic of a broader issue in biodiversity offsetting, namely a general lack of monitoring and under-reporting of biodiversity outcomes (positive or negative) in offset areas.

Improved accountability in REDD+ offsetting was predominantly introduced through the emergence of third party standards. Third-party certified offsets for REDD+ have been increasingly recognised in the evolution of global carbon offset markets. Part of this recognition has arisen out of increasing awareness and value for the role of third-party standards in providing an independent and transparent framework, in particular in two key ways:

- They articulate a process that translates the complex realities of offset accounting into a transparent, pragmatic and tangible set of common criteria (for example see Case Study 3.1.3);
- The process of certification provides offset project investors with assurance that offsets are of a certain standard and quality, as well as that appropriate mechanisms are in place to monitor and mitigate reversals (offset failures) in the case that they occur.

Currently, demand for third-party certified offsets is sustained by a wide range of interests[30], and in particular recent trends indicate that demand is increasing and higher than market average prices are being commanded by REDD+ projects that are certified for emissions reductions alongside certification of '*co-benefits*' (e.g. certification under the Climate Community and Biodiversity Standard of community and biodiversity impacts)[31].

An important contribution of third-party standards for both biodiversity offsets with the BOS and REDD+ offsetting is that they have designed, operationalised and 'normalised' key aspects required for accountability in offsetting, for example:

- *Ex-post* (versus *ex ante*) crediting, where offsets receive benefits only after a verifiable result has been imposed as a requirement by most standards;
- Global 'offset registries' have been established and operationalised (public registration of offsets, to avoid 'double counting');
- Public reporting/provision of project documentation online describing quantification and monitoring methods applied to the offset has become the norm;

There is now greater recognition of the need for, and role of, independent, qualified third-party auditing of project outcomes, both to verify evidence and to adjudicate on scientific questions and uncertainties.

In the case of biodiversity offsets, the BOS and BBOP guidance and reference frameworks for the principles, criteria and indicators are now referred to as key texts in the IFC PS6, the Aluminium Sustainability Standard and the Better Coal Standard, amongst others.

Case study 5.1.1 describes in further detail key features of one third-party standard; the Verified Carbon Standard.

Note: In addition to enhancing accountability, another benefit of third-party standards in the field of REDD+ offsetting has been the platform they have provided for trialling and developing practical methods for site-level implementation of global principles and best practice (for example see Case study 3.1.3). FFI is also actively involved in an ongoing debate about the value and the necessary level of rigour required by third-party standards for REDD+ projects (see Case study 0). The adoption of such approaches in biodiversity offsetting is recommended.

5.1.1 Case study: Key features of the Verified Carbon Standard: an example of third-party standards and how they provide accountability in REDD+ offsetting

Background

The Verified Carbon Standard (originally the Voluntary Carbon Standard) was established in 2005, founded by a collaboration including The Climate Group, International Emissions Trading Association (IETA) and The World Economic Forum, and in 2009 it was incorporated as a non-profit organisation[32]. It is currently one of the most widely used third-party standards for greenhouse gas (GHG) emissions offsets in the voluntary market[33]. The VCS offers third-party certification of GHG offsets from a range of different sectors, including renewable

[30] For example: fewer than 20% of buyers in 2013 reported their motivation to be based on compliance markets; either compliance (17% of buyers) or pre-compliance (2%). The remaining proportion of buyers reported voluntary market and resale (20%) and 'other' (3%) as their motivations (SoFCM 2014).
[31] At the time of writing the most prominent standards are: the Gold Standard, Plan Vivo, and Verified Carbon Standard
[32] http://www.v-c-s.org/who-we-are
[33] http://www.v-c-s.org/how-it-works/why-vcs

energy, industrial processing, construction, transport, waste, agriculture, forestry (including REDD+), and mining.

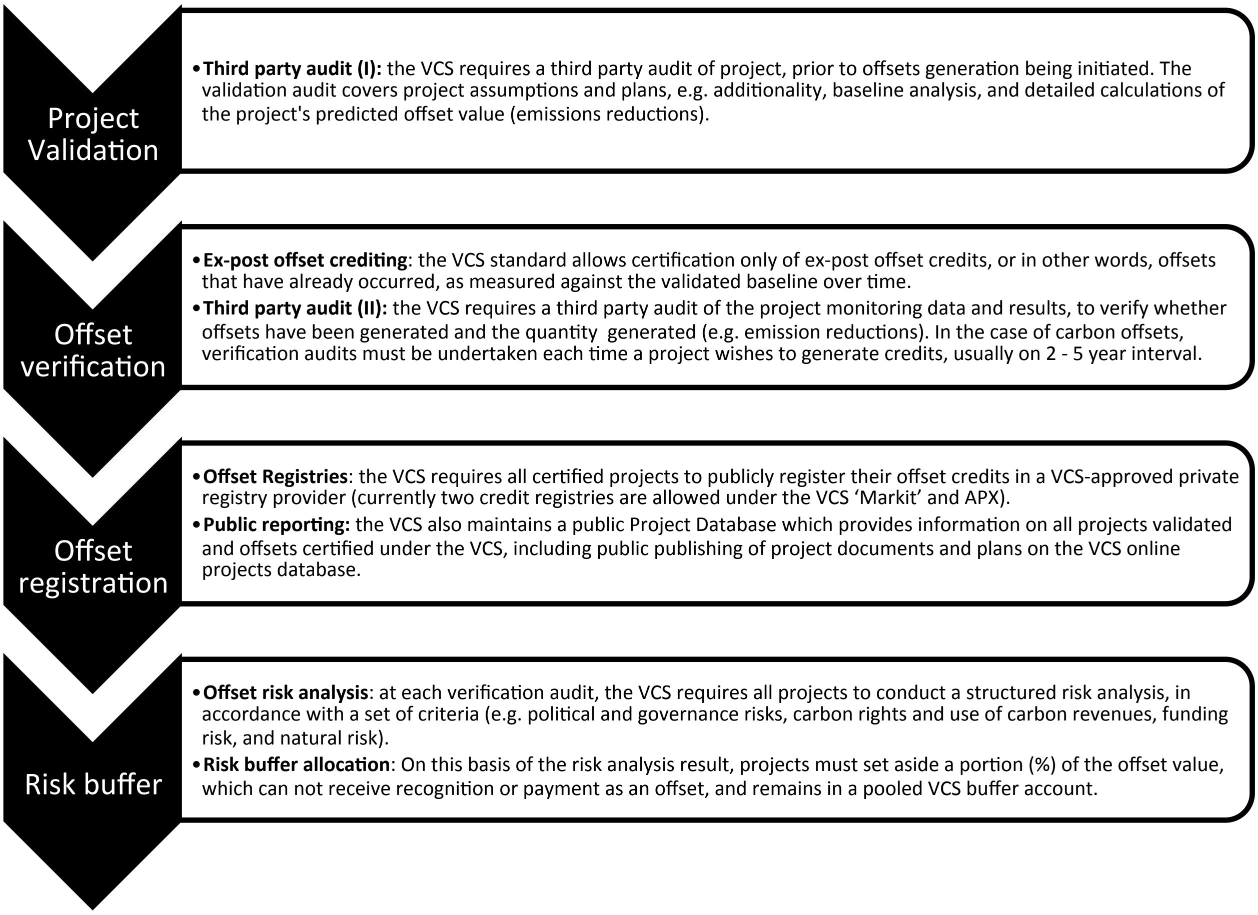
REDD+ offsets and the VCS standard - background

Soon after the establishment of the VCS, an Advisory Group of leading experts was convened to develop and publish offsetting requirements for offset crediting from Agriculture, Forest and Other Land Use (AFOLU) projects. The VCS AFOLU guidelines are now published in their third version[34], and set out overarching requirements for AFOLU sector offset projects (including REDD+ projects), such as requirements on defining the project types, project crediting period, carbon pools, baseline determination, leakage calculations and GHG emission reductions and removals calculations.

The VCS AFOLU Requirements also cross-reference overarching global principles and best practice guidelines, including the IPCC 2006 guidelines for National GHG Inventories (see Case study 3.1.1). The VCS also established an 'entrepreneurial' framework whereby individual REDD+ projects can propose detailed 'methodologies' as practical interpretations of its AFOLU requirements (including global principles and best practice). The first methodologies for REDD+ projects were published by the VCS in 2010 and numerous REDD+ methodologies are currently published and under development (see also Box 2).

Applying a third-party standard framework in practice: the VCS validation and verification process

A chronological summary of key features of the VCS standard process for certifying project offsets is provided in the figure below.



[34] See: http://www.v-c-s.org/sites/v-c-s.org/files/AFOLU%20Requirements%2C%20v3.4.pdf

Offset failures and enforcement mechanisms

The VCS has mechanisms in place to address if and/or when offset 'reversals' occur. In the first instance, the VCS employs preventative measures to mitigate risk in the project validation and verification audit processes, whereby projects are required to assess, report and put in place appropriate risk mitigation measures.

The VCS also has a 'pooled risk buffer account', which acts like an insurance against potential future losses. Every project registered under the standard is required to set aside a portion of the offset value to a 'buffer account', and the proportion of the offset value required for the buffer account is determined based on a standardised risk assessment (and is also audited during verification audits). The VCS has a strict set of procedures and guidelines that projects must follow in order to register and 'spend' offsets registered in the buffer account if reversals do occur[35].

Maintaining the value of third-party certified offsets

The VCS continues to be one of the most widely used standards in offsetting. It has maintained a large share of the overall market in REDD+ credits, for example the VCS was reported as the most popular standard among project developers, attracting 46% of market share, in the *State of the Forest Carbon Markets 2014* report[36].The VCS has also formed strategic partnerships and developed a streamlined process for projects to jointly receive third-party certification under the VCS alongside other third-party standards that provide certification of offset co-benefits, such as the Climate, Community and Biodiversity (CCB) standards, the Social Carbon standard, and the Crown Standard[37]. The VCS now also provides third-party certification not just of REDD+ offsets, but of REDD+ offset governance frameworks, through its Jurisdictional and Nested REDD+ Requirements[38] (see also Section 6).

5.2 Lessons learnt and considerations for biodiversity offsets

REDD+ lesson: as an accountability mechanism, third-party standards have designed, operationalised and 'normalised' key aspects required for accountability in REDD+ offsetting, such as *ex post* crediting, public registration and reporting on offsets etc. Whilst third-party standards per se are not the only means to achieve and implement accountability frameworks, key characteristics important to their success[39] in achieving accountability are that they (i) build on existing standards frameworks (ii) are linked to, but independent of, global best-practice forums and working groups; (iii) clearly segregate aspects of offset measurement from co-benefit quantification.

Considerations for biodiversity offsets:

- Have biodiversity offset markets sufficiently grown or evolved in a way that helps to create industry pressure and interest in offset accountability mechanisms (such as standards) and frameworks?

- Can BBOP fulfil the role of a third-party standard? Or is it better playing a role as more of a global consensus model (e.g. global principles and best-practice expert working groups, case study 3.1.2)?

[35] See; http://www.v-c-s.org/sites/v-c-s.org/files/Registration%20and%20Issuance%20Process%2C%20v3.6%280%29.pdf
[36] For example, The VCS was reported as the most popular stand amongst project developers again, attracting 46% of market share in the *State of the Forest Carbon Markets 2014* report, see: http://www.forest-trends.org/documents/files/doc_4770.pdf
[37] http://www.v-c-s.org/multiple-benefits-and-linking
[38] http://www.v-c-s.org/sites/v-c-s.org/files/Jurisdictional%20and%20Nested%20REDD%2B%20Requirements%2C%20v3.2.pdf
[39] There is evidence of success in achieving accountability, which comes largely in the form of a public, online database of REDD+ projects, including public project documents, audit reports, and credit issuances, infringements/buffer accounts issued, kml files/googlemap-accessible project boundaries etc. See http://www.vcsprojectdatabase.org/#/home

Are there other independent mechanisms that could be further developed to enhance accountability?

- Is there a role for global third-party standards to certify biodiversity offset standards? Do third-party biodiversity offset standards exist? Are they prominent or well known among offset actors? If not, why not? Can they be further developed?
- Can existing carbon standards and associated 'infrastructure' (such as offset registries and frameworks) be built upon or adapted for biodiversity offsets?
- Is there sufficient clarity or value in further segregating technical components of biodiversity offsetting, from 'co-benefit' components of biodiversity offsetting?

REDD+ lesson: inclusion of third-party scrutiny and audits is an important component of the certification process because it increases trust and transparency through verification of evidence and 'adjudication' of scientific questions and uncertainties.

Considerations for biodiversity offsets:

- How can third party assurance and scrutiny of biodiversity offsets be improved? How would the process of increasing third party oversight differ between regulated and voluntary offsetting contexts? Or between offsets achieved through 'banks' vs proponent-led offsets?
- How regularly should biodiversity offsets be audited? What is the minimum time interval required to ensure proper implementation and maintenance of offset activities? Does this need to be tailored to specific ecological, social and political contexts?

6 ACCOUNTING FOR IMPACT AT SCALE (AGGREGATED OFFSETS)

6.1 Offsets within the landscape

Establishing the landscape context from an ecological, socio-cultural and political perspective is critical if biodiversity offsets are to deliver on their potential contribution towards no net loss and sustainable development. Often the biodiversity and ecosystem values that exist at a larger landscape scale (cumulative value) are overlooked when measuring impacts and identifying potential offset sites.

For example, at a country level, project-by-project offset site selection and design may be contributing to a disparate, fragmented collection of potential offset sites that fail to take account of key ecosystem functions such as connectivity and resilience, and/or do not effectively protect an ecologically viable set of ecosystem values to the level required to ensure the persistence of important biodiversity. To date, the approach to biodiversity offset planning and implementation has remained fragmented both within and between countries.

Very similar issues have been encountered in the development and evolution of REDD+, where needs were recognised for expanding and 'scaling up' the implementation of REDD+ to a jurisdictional scale, in particular:

- The need to account more fully for leakage, and ultimately make sure emissions reductions 'add up' across a jurisdiction or landscape;

- The need to recognise and incentivise the role of governments and their actions that reduce deforestation, which are not necessarily implemented at the project level, for example forest governance policy development, implementation and enforcement;

- The need for 'early mover' REDD+ pilot projects to be able to integrate and participate in developing national or subnational REDD+ governance frameworks and schemes.

6.2 Aggregating REDD+ offsets at the 'jurisdictional' scale

Whilst there were some initial discussions on using 'biozones', global REDD+ objectives have converged on the idea of 'scaling up' REDD+ programmes to the 'subnational' jurisdictional level. This is in part due to inherent links between the role of government entities and governance of offsets, but also because subnational REDD+ is recognised as a logical step towards achieving the longer-term global objective of national-scale REDD+, agreed on under the UNFCCC[40]. As such, efforts to scale up REDD+ in this context are now commonly known as 'Jurisdictional and Nested REDD' (JNR); whereby site-level REDD+ projects can be 'nested' within a framework that operates at the 'jurisdictional' scale, based on administrative national and subnational governance boundaries.

6.3 Realising the complexity of implementing REDD+ 'at scale'

Despite recognition of the needs and consensus on objectives for scaling up REDD+ in the future, many complex challenges on how such objectives could be operationalised need to be resolved.

The JNR Initiative[41] established under the VCS standard in 2010 (see Case Study 6.3.1) was one of the first global initiatives formed with the aim of developing operational guidance for the implementation of REDD+ at scale. The initiative involved a large collaboration of global REDD+ experts who worked across a series of specific issues, over a period of four years. Ultimately this work culminated in the development of a 'world first' set of standards for implementing, measuring and monitoring REDD+ at a jurisdictional scale, in combination with one or more 'nested' REDD+ projects[42].

Currently around the world there are a number of programmes developing jurisdictional and nested REDD+ (JNR) programmes, including VCS JNR pilots, UN-REDD+ provincial pilots, and the World Bank FCPF programme. At the time of writing there is not yet a jurisdictional REDD+ scheme fully operational and third-party certified, but Acre, Brazil is considered one of the most advanced JNR programmes under development globally[43].

6.3.1 Case study: Key features of 'nested REDD+ offsets' under the VCS Jurisdictional and Nested REDD+ requirements

The Jurisdictional and Nested REDD+ Initiative (JNRI) was founded under the VCS in 2010, and formed international working groups of experts from a range of backgrounds (including FFI) to develop ideas for addressing implementation challenges. The JNRI working groups worked on a wide range of complex issues associated with aggregating and scaling up REDD+ activities to the jurisdictional scale from its formation in

[40] In particular; COP guidance decision 1/CP.16 and UNFCCC Decision 9/CP.19 paragraphs 5 and 6 Decision under the UNFCCC *Warsaw Framework for REDD+*
[41] http://www.v-c-s.org/JNR
[42] Note: parallel development of UNFCCC REDD+ rule book at this stage is higher level but consistent with the JNR VCS requirement: Gibbon, A.E., Rey, D., Casarim, F.M., Pearson, T.R.H. Sidman, G. 2014. *A Gap Analysis of the FCPF's Carbon Fund Methodological Framework and the UNFCCC's REDD+ Rulebook relative to the VCS Jurisdictional and Nested REDD+ Requirements*.
[43] See also: http://www.v-c-s.org/jnr-pilot-programs

2010, up until 2014[44], such as: aggregating baselines, establishing 'jurisdictional additionality', MRV (monitoring, reporting and verification), leakage, crediting and credit allocations, and under-performance and credit 'reversals' [45].

The work of the JNRI culminated in the publication of a set of guidance documents with requirements for implementing Jurisdictional REDD+ programmes, in three main parts;

1. The 'JNR Requirements', as overarching requirements for JNR programmes to develop a baseline and measure offsets at the jurisdictional scale;
2. The JNR Leakage Tool[46], for identifying and estimating different types of leakage at the jurisdictional scale; and
3. The JNR Non-Permanence Risk Tool[47], for assessing the risk of offset reversals and determining allocation of unsold offset 'insurance buffer'.

These requirements are designed to be sufficiently flexible that they can be applied within any national or subnational jurisdiction around the world. Specific features of the JNR requirements and guidelines relevant to current thinking in biodiversity offsets are outlined in the following.

Minimum scale for offset aggregation

The JNRI concluded that REDD+ programmes should be applicable to different levels of governance, up to two levels below the national level (i.e. usually provincial and district level). This is because the original proposal of allowing only jurisdictions one administrative level below the national level (in line with the UNFCCC decisions) did not provide sufficient flexibility for some countries and their governance structures, and did not take into account that some countries plan to develop subnational delineations for REDD+ accounting at scales based on eco-regions, rather than administrative jurisdictions[48]. The question of a minimum size geographic area threshold for a jurisdiction was discussed by the JNRI. Whilst it was ultimately decided not to impose requirements for a minimum area, it was noted that the issue may be revisited again if 'very small jurisdictions are observed' and begin to raise concerns with regard to environmental integrity[49].

Principles for measuring offsets at the jurisdictional scale

The JNRI effectively developed a new set of principles, rules and guidelines for measuring offsets (and leakage) at the aggregate scale; in this case a national or subnational jurisdiction[50]. These rules differ from rules developed for accounting for offsets and leakage at the individual REDD+ project level, albeit they are still based on the same global carbon accounting principles.

An underlying principle of the JNR framework is that offsets are accounted for at the jurisdictional level, against a common jurisdictional-level baseline, shared by both projects and the jurisdiction. As such, offsets awarded to REDD+ projects within a given jurisdiction are reconciled as a proportion of the jurisdictional-level offsets (i.e. not by 'adding up' REDD+ project contributions). Likewise, the same principle applies to the measurement of leakage (see below).

Procedures for measuring leakage at scale

[44] The JNRI worked over a two-year period from 2010-2012 to produce the JNR requirements, and further progressed a working group on leakage tools up until 2014, see: http://www.v-c-s.org/JNR-history
[45] For further details see: http://www.v-c-s.org/sites/v-c-s.org/files/JNRI%20Scoping%20Paper_1.pdf
[46] http://www.v-c-s.org/methodologies/jnr-leakage-tool-v10
[47] http://www.v-c-s.org/sites/v-c-s.org/files/JNR%20Non%20Permanence%20Risk%20Tool%2C%20v3.0_0.pdf
[48] See *VCS Jurisdictional and Nested REDD Initiative, Summary of Technical Recommendations* 2012, Version 2.0 (page 15);
[49] ibid
[50] See the *VCS Jurisdictional and Nested REDD+ (JNR) Requirements*, Version 3.2, October 2014

As noted above, the VCS JNRI also developed a new set of procedures and tools for measuring leakage at the jurisdictional scale. Developing leakage requirements proved particularly complex and challenging. The JNRI programme established a specific Working Group on Leakage and Permanence in Jurisdictional and Nested REDD+ [51] in 2012 and published leakage tools for jurisdictional-scale REDD+ two years later.

The VCS JNR Leakage Tool[52] incorporates consideration of estimation and measurement of the following forms of leakage at a jurisdictional scale:

- Activity shifting leakage (movement of activities causing deforestation to another area);
- Market leakage from global commodities, domestically traded products and subsistence activities; and
- 'Deforestation-to-degradation' leakage.

Distributing offsets between projects and jurisdictional proponents

The VCS JNR framework provides some guidelines, but ultimately flexibility and relative autonomy for jurisdictional proponents to determine how offsets and leakage are apportioned between projects and the jurisdictional entity itself[53].

With regard to *apportioning jurisdictional offsets to projects*, the JNR framework allows projects to monitor offsets generated within their project areas, in parallel to jurisdictional-level monitoring, and provides guidelines on how to reconcile any discrepancies between the project-level and jurisdictional-level monitoring results. However, ultimately it provides the jurisdictional REDD+ programme with autonomy to decide how to reconcile any such discrepancies.

With regard to *apportioning jurisdictional leakage to project(s)*, two types of leakage are considered;

i. **Leakage attributable to a project, but which remains within the boundaries of a jurisdiction**. Accounting for and attributing this form of leakage to an individual project is optional, and ultimately the project and the jurisdictional proponents decide who receives deductions for this leakage (i.e. the project or the jurisdiction).
ii. **Leakage attributable to a project**, which contributes to the overall jurisdictional leakage that occurs outside the jurisdictional boundaries. The proportion of jurisdictional leakage attributable to an individual project must be calculated for each project using a standardised leakage tool, and deductions applied accordingly to project-level offsets[54].

6.4 Lessons learnt and Considerations for biodiversity offsets

Lessons learnt: Despite substantial theoretical concepts, ideas and frameworks published in the grey and scientific literature, a considerable investment of time, and collaborative working groups, were required to develop the first practical conceptualisation of a REDD+ jurisdictional offsetting framework (equivalent to the concept of 'offset aggregation' in biodiversity offsets). This was convened under the auspices of a third-party standard (the VCS), with the clear objective of developing a practical set of requirements that jurisdictions and projects could then apply, and required four years of work to develop operational guidance.

[51] See VCS *Terms of Reference (ToR) Working Group on Leakage and Permanence in Jurisdictional and Nested REDD+*, June 2012
[52] See: http://www.v-c-s.org/methodologies/jnr-leakage-tool-v10
[53] Note: The VCS JNR requirements provide requirements for programmes working towards JNR, as well as JNR programmes themselves. These notes are based on the *VCS JNR Requirements version 3.2*, and considering only requirements related JNR scenarios that are fully nested (i.e. VCS JNR scenarios 2 and 3).
[54] At the time of writing VCS is in the process of developing a standardised tool for calculating leakage from nested REDD+ projects, and requirements currently allow the use of an 'approved leakage tool' (see *VCS Jurisdictional and Nested REDD+ (JNR) Requirements*, Version 3.2, October 2014, section 3.12.11)

- Do we have the scope, resources and an appropriate practical context for developing a similar framework for biodiversity offsetting at scale, through international expert working groups?

- Are there ways or opportunities for biodiversity offset frameworks to build directly on the process and work completed by the JNRI for jurisdictional REDD+ offset governance frameworks in developing countries?

- Are there any opportunities to link aggregated biodiversity offset initiatives with the JNRI, rather than establishing another parallel initiative or at least to ensure cohesion across initiatives?

Lessons learnt: The field of REDD+ has converged on the idea of aggregating offsets at the jurisdictional level, based on national and subnational administrative governance boundaries of a given country. A new set of rules (separate to individual project-level rules) has been developed for measuring offsets at the jurisdictional scale. In particular these rules also include new tools to estimate jurisdictional-level leakage, and to apportion jurisdictional leakage between individual projects nested within a jurisdiction and the jurisdiction itself. Ultimately the framework provides: (a) relative flexibility and autonomy to the jurisdictional programme to determine whether project leakage remaining within the jurisdiction should be accounted for by projects (or remain the responsibility of the jurisdiction); and (b) requires a standardised tool to be applied to determine what proportion of jurisdictional leakage, occurring outside the jurisdiction, is attributed to an individual project.

- Is the jurisdictional level also likely to be a logical unit within which biodiversity offsets and leakage could be effectively aggregated and governed?

- Is a new set of principles, rules and tools required, different to those for individual project-level biodiversity offsets, to (a) guide implementation of aggregated offset measurement and (b) determine a fair allocation of both offsets and leakage attributable to individual projects (versus the jurisdiction itself)?

- Given the complexities involved in accounting for offsets at scale, is there a role for a third-party organisation to develop and adjudicate rules related to measuring and apportioning offsets and leakage in aggregated contexts?

Aggregated offsets in the biodiversity world generally means offset 'banks' – which are larger areas that sell credits to multiple developers. The concept does exist, therefore, but not at the scale of municipalities etc. – the banks are smaller than that. REDD+ mechanisms can inform the allocation of credits for conservation banking, and potentially the formulation of credits for aggregated offsets. Whilst species banks in the USA can create accumulations of credits (rather than aggregated credits), they do not currently allow for effective bundling of credits for different species unless registered separately when the species bank is initiated. Aggregated offsets, in their simplest and probably most effective form, would enable landscape level biodiversity offset interventions that ensure an optimum outcome for ecological patterns and processes as well as function, species composition and climate resilience.

7 CONCLUSIONS

This report has covered key topics related to challenges common to REDD+ and biodiversity offsets, illustrated with practical examples from FFI's REDD+ projects and experience. Four key areas are highlighted, where lessons learned in the field of REDD+ may prove applicable to the field of biodiversity offsetting, as follows:

1. **Progressing standardisation of REDD+ offset measurement principles and frameworks**, through achieving international consensus on best-practice principles for REDD+ offsetting and consistency in protocols for offsetting at site level, and in particular developing the latter through 'entrepreneurial-style' frameworks for individual REDD+ projects to develop 'methodologies' consistent with international norms and best practice.

2. **Developing cost-effective REDD+ offset measurement methods** firstly through consensus on protocols for determining 'what to measure', and then subsequently exploring the question of 'how' to measure offsets by piloting different approaches to understand the implications and trade-offs in cost-effectiveness, knowledge generation and risks and opportunities inherent in applying different levels of rigour to offset monitoring and quantification.

3. **Ensuring accountability in REDD+ offset implementation** primarily through a formalised, enhanced role for third-party standard mechanisms, which have operationalised monitoring framework elements required for accountability in REDD+ offsetting, and ultimately increased trust and transparency through verification of offsets and 'adjudication' of scientific questions and uncertainties.

4. **Developing frameworks for REDD+ offset aggregation (JNR)** based on the considerable work done under international collaborative initiatives designed to develop practical conceptualisations of the highly complex and theoretical concepts inherent in offset aggregation.

It is hoped that the specific lessons and considerations proposed throughout this analysis will not only instigate further discussion and prospective collaborations between the two fields of offsetting in the future, but also ultimately lead to better outcomes for biodiversity through global offsetting mechanisms.

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This document is one of a series of outputs from FFI's assessment of biodiversity offset policy and practice.

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