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Key elements and challenges in monitoring, certifying and financing forestry carbon projects

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EXECUTIVE SUMMARY

A reliable monitoring, reporting and verification (MRV) of carbon removals or emissions reductions is necessary to access most carbon payments. After an overview of forest carbon finance, this Climate Brief presents the different options and challenges associated with forest carbon MRV.

Projects developers face three key choices: the **project scope** (carbon pools to be considered, geographical perimeter and the related leakages or indirect emissions reductions), the different **techniques and tools** for forest carbon monitoring (field measurements, modeling or) remote sensing) and the **baseline definition and additionality demonstration**.

Despite the different tools and guidelines available to help projects developers trigger impactful mitigation action, six main technical and political challenges are identified:

- **The non-permanence risk and carbon debt:** while standards provide tools (*e.g.* buffer account, ex-ante credits) to deal with this challenge, finding the right balance between environmental integrity and project profitability remains delicate.
- **Monitoring uncertainty** is often put forward as a barrier to the implementation of carbon pricing in the forestry sector. Reduce uncertainty is costly and the interest of doing so depends on whether carbon pricing is voluntary, on the importance of information asymmetry and on projects profitability.
- **The risk of windfall effects:** additionnality can never 100% guaranteed. There again, striking the right balance between avoiding both the "false positives" (non-additional projects getting registered) and the "false negatives" (additional projects that are shut out by the cost and risk of the additionnality demonstration) is delicate.
- **Verification costs:** verification can weight up to half the MRV costs and cannot usually be internalized.
- **Low carbon prices:** typical MRV costs for forestry projects are around €0.15-1.4 per tCO_2eq which is substantial when carbon prices average around €3 per tCO_2eq on voluntary markets. How to combine a robust certification with the financial viability of carbon projects in this context is challenging.
- **The double-claiming of climate action issue:** the Kyoto Protocol safeguards against double-counting between countries have been adapted by some voluntary carbon standards to prevent that a private entity and a country claim the same emission reduction. This has slowed down projects implementation in Annex I countries, but several standards, including the Gold Standard, are moving towards a new paradigm for voluntary carbon markets.

Introduction: No finance without monitoring

The concept of payments for environmental services (PES) – such as reducing greenhouse gas (GHG) emission or enhancing their sinks through forestry projects – has been very popular since the mid-2000s. Although the development of actual PES schemes has not kept pace with the popularity of the concept, the amount of finance for forest carbon projects has never been as high as in 2015 when it reached USD 888 million (Goldstein & Ruef, 2016). It also stayed important in 2016 with USD 662 million (Hamrick & Gallant, 2017). In most cases, these payments – be they part of mandatory or voluntary programs – are contingent on successful certification of the program. Indeed, the 19th COP[1] of the UNFCCC in 2013 has enshrined the result-based payment principle. Certification is necessary in order to guarantee the quality of a project and to assure that it yields tangible environmental benefits, such as reduced GHG emissions. Economic benefits for forestry carbon projects can come in various forms including payments based on the amount of CO_2 emissions reduced/sequestered, payments based on implementing sustainable practices or indirectly through certification of wood products. The most widespread type of forest carbon finance is carbon crediting. It consists of issuing carbon credits for certified GHG emission reductions, which can in turn be sold on compliance or voluntary carbon markets. In any case, monitoring and certification practices are similar across carbon pricing and management mechanisms, no matter whether they entail the issuance of carbon credits.

This Climate Brief begins with an overview of forest carbon finance. The main options in forest carbon MRV are then presented along three categories: the definition of project scope, the different techniques available for forest carbon monitoring, and the accounting choices pertaining to baseline definition and additionality demonstration. Finally, a list of six challenges is discussed: non-permanence, uncertainty, windfall effects, comparability of reported figures, low carbon costs and double-claiming of climate action.

1 Conference of Parties

1. Overview of forest carbon finance

1.1. Result-based payments

Despite their climate change mitigation potential, forestry activities have been largely excluded from the Kyoto flexibility mechanisms – the Clean Development Mechanism (CDM) and Joint Implementation (JI). The CDM allows only for afforestation and reforestation (A/R) projects delivering temporary carbon credits (tCERs), while other types of forestry projects, such as improved forest management (IFM) projects, cannot be credited. Although JI does not have such a restriction on forestry project crediting, there were only few IFM projects implemented under the JI framework. This could be explained by the fact that forestry carbon credits are not eligible for use under the EU ETS[2], which until recently was the main source of demand for JI and CDM carbon credits. Consequently, carbon credits from forestry projects thus account for less than 1% of total issuance under both the CDM and JI schemes (UNEP DTU 2016).

Beyond Kyoto project-based mechanisms, jurisdictions like California and New Zealand have implemented specific compliance domestic markets, in which forestry projects are eligible. In 2016, most of the forest carbon finance came from Australia's ERF, which provides funding for forestry and agriculture projects in order to achieve Australia's 2020 Kyoto target.

In voluntary carbon markets, forestry projects account for a small quarter of all transactions in terms of volume. The Verified Carbon Standard (VCS) is one of the most widely used standards in the voluntary market accounting for more than 80% of all voluntary forestry and land-use projects credits retired in 2016 (Hamrick & Gallant, 2017). So far, all these credits have been coming from individual projects, including those that allow for the reduction of emissions from deforestation and degradation of forests (REDD). Since 2013, the UNFCCC has an operational certification framework for REDD+ at the national level. The use of this framework is mandatory when the Green Climate Fund is financing a REDD+ program (Dupont *et al.* 2013).

In 2015, companies, governments, and individuals channeled a record amount of carbon finance to forests of USD 888 million. Of this committed money, 10% flowed through voluntary market, 8% through compliance markets including California's and New Zealand's, 66% through Australia's Emissions Reduction Fund (ERF) and 14% through non-market agreements (especially to Brazil for avoided deforestation) (Goldstein & Ruef, 2016).

More than 1,500 forest and land-use projects are currently operational or under development around the world, with the vast majority in three countries that have signaled compliance-driven markets or government-sponsored voluntary carbon market: Australia (511), the United States (238) and the United Kingdom (242) (Goldstein & Ruef, 2016).

2 European Emissions Trading Scheme

FIGURE 1. REPARTITION OF RESULT-BASED FINANCE TO FOREST PROJECTS IN 2015 (TOTAL: $888 M)

*Source: Ecosystem Market Place, 2016 **

** The 2017 update of this study signals difficulties in retrieving figures from California.*

Carbon finance is most often associated with strictly codified monitoring, reporting and verification (MRV) procedures, based on methodology development and third party certification. This certification comes at a cost that can be a challenge for project developers, especially with the current low levels of carbon prices.

1.2. Other carbon-related finance

Other forest sustainability finance channels are not primarily focused on carbon, although carbon definitely is one of the expected co-benefits. These include REDD+ readiness funds, sustainable forestry standards and zero-deforestation products. As they are not strictly focused on carbon, they are not further discussed beyond this section.

REDD+ readiness

Sustainable forest finance can also flow through non-market approaches, especially with the REDD+ "readiness phase", which includes activities such as stakeholder engagement and institutional capacity-building and lays the groundwork for result-based finance (Goldstein & Ruef, 2016). The main providers for readiness funds are developed country governments, which bear a "historical responsibility" for climate change. Multilateral institutions such as the World Bank, the Forest Investment Program, and the multilateral development banks as well as private foundations have also financed REDD+ readiness activities over the years (Goldstein et al, 2015). These readiness funds are often intended as a stepping stone for result-based finance, which can be expected to keep growing through different channels. These channels include the World Bank's Forest Carbon Partnership Facility (FCPF) Carbon Fund, the Amazon Fund (funds from Norway, Germany, and the Brazilian oil company Petrobas to Brazil), the REDD+ Early Movers program (Germany, Norway, and the United Kingdom to Colombia and the Brazilian state of Acre), the Green Climate Fund or bilateral agreements.

Sustainable forest management

Sustainable forest management standards are based on management plans. Contrary to carbon projects, they do not directly monitor carbon benefits or generate carbon credits. They rather deliver forest certificates and label wood products.[3]

Two major international standards certify the sustainability of forest management: Forest Stewardship Council (FSC) and Program for the Endorsement of Forest Certification schemes (PEFC). They ensure both forest management sustainability and wood traceability all along the production chain, up to the customer. Among other criteria, the controlled wood should not come from illegally deforested areas (FSC).

Zero-deforestation supply chain

Civil society and companies launched initiatives, such as Forest 500, Supply Change or Global Forest Watch Commodities, to promote and assess 0% deforestation commitments. These pledges are mostly related to raw materials that are the main causes of deforestation: palm oil, wood products, soybeans and livestock.

However, they do not constitute a proper standard certifying that a specific product is deforestation-free. So far, work has been initiated to assess the traceability of products, to select relevant indicators and to harmonize sustainability procedures between companies.

Nevertheless, for some raw materials such as palm oil, the elaboration of global schemes evaluating the impact of the production on deforestation is more advanced:

- In 2008, the Roundtable on Sustainable Palm Oil (RSPO) developed a so-called CSPO certification, based on the analysis of socio-environmental criteria. This scheme ensures that the commodity has been cultivated on non-deforested lands.
- Since November 2016, the High Carbon Stock Convergence (HSC) Agreement works on the harmonization of two existing approaches aiming at fighting deforestation induced by palm oil plantations.

2. Technical and accounting options for forest carbon certification

Result-based payments rely on monitoring, reporting and verifying (MRV) the amount of emissions avoided or of carbon sequestered by a given program. Monitoring stands for the collection of the data, *e.g.* through direct measurements or the use of proxies, necessary for calculating the amount of emissions within a given scope and timeframe. Reporting includes the aggregation, recording and communication of this data to the relevant authorities. Finally, verification aims at detecting errors and/or fraudulent reporting and is usually conducted by an independent accredited third party. The object of MRV is either GHG emissions or – in the case of carbon projects – GHG emissions reductions, *i.e.* the difference between actual and counter-factual – or baseline – emissions.

3 For more information, see Brûlez *et al.* (2018) : Building synergies between sustainable forest management certification and carbon certification: what bases are there and for what impact?

2.1. Define the scope of the project

Monitoring reforestation or improved forest management projects amounts to counting carbon sequestration – or emissions – in the newly planted forest or improved forest and the emissions related to forestry operations (transportation, plowing, seeding, thinning, …). Carbon sequestration/emissions can occur in six compartments or carbon pools (IPCC 2006), although, depending on the methodology, not all six necessarily need to be monitored:

- Above-ground biomass: including stems, branches and the foliage of trees as well as non-woody vegetation and shrubs.
- Below-ground biomass: including living roots.
- Dead wood: including non-living biomass such as standing or lying on the ground stumps or buried dead roots.
- Litter: non-living biomass with a diameter less than a certain threshold defined in the methodologies. It also includes decomposing lying deadwood.
- Soil organic carbon: including all soil components derived from plants and animals.
- Harvested wood products.

In most cases, the project developer has to prove that all six pools do not decrease and then choose to account specifically for some of the categories. Thus, most generic methodologies only require accounting for above-ground and below-ground biomass. IFM methodologies usually include the harvested wood products pool, which may decrease in reduced logging methodologies for example (Deheza, 2014). Non-biomass related emissions sources such as field operations or input transportation are often considered de *minimis and* are therefore not monitored (Deheza, 2014).

Along with carbon sequestration and emissions directly linked to the project activity, standards usually require calculation of emissions indirectly affected by a project, most commonly referred to as "leakage". For example, leakage can result in emissions from the displacement of pre-project agricultural activities, or from increased harvest indirectly driven by an IFM project that decreases harvest locally.

A forestry project can also allow for emissions reduction in other sectors through substitution effects: wood can be a substitute for fossil fuels or energy-intensive construction materials and allow emissions reduction in energy or building sectors. However, those indirect effects are not taken into account in current project-based mechanisms on voluntary or compliance markets.

2.2. Monitor carbon stocks

Three main types of methods can be used to measure forest carbon stocks and their evolutions: field measurements, modeling and remote sensing.[4] Each of these approaches have different levels of precision and therefore, evaluating carbon sequestration sometimes requires a combination of tools in order to improve the accuracy while reducing the costs of monitoring.

Field measurements – generally restricted to the diameter and height of trees from a representative number of sample plots – have historically been the only type of monitoring allowed in forestry projects. It was indeed feasible to use this technique for reforestation projects covering limited areas. However, as the share of IFM and REDD+ programs covering large and diverse forested areas rose, the use of modeling and remote sensing became unavoidable. The second way to assess carbon stock and flows in forests is based on empirical and process models that, according to a given initial stock, estimate the evolution of that stock over time. The most simple and commonly used type of model is the so-called "look-up tables", which predict the evolution of a series of forest stand variables with age for a given species and fertility index in a given region. More generic and complex models exist which require data such as project boundaries, temperatures, precipitations, soil type, slope, species, etc. Several studies (Vashum *et al.* 2012[5] & Kuyah *et al.* 2015[6]) stressed that the use of such models could be less expensive than on-site measurements. Finally, remote sensing methods also allow monitoring of land area changes (and notably leakages that the project could potentially create), stratification of the project area, and analysis of vegetation types.[7]

Current methodologies for forest carbon projects often mix these three approaches to evaluate carbon sequestration. For example, the methodology for Improved Forest Management Through Extension of Rotation Age (IFM ERA) of the VCS will monitor project area through remote sensing, require data from the most relevant literature to run models estimating carbon sequestration and on-site measurements to make sure the allometric equations used in the model fit well with reality.

2.3. Determine baseline and demonstrate additionality

The carbon impact of a project is assessed against a reference, or baseline scenario. The carbon benefits of a forestry project do not equal its total sequestration, but rather the difference in sequestration between the project and reference scenarios over time. The construction of this reference scenario is therefore an essential step of carbon project monitoring.

The accumulation of fifteen years of experience in the CDM resulted in a tool dedicated to baseline construction and additionality demonstration. The general idea is to start from all alternative land use scenarios considered realistic and credible with regards to relevant national and/or sectoral policies, and narrow them down to the most profitable and/or most common practice. Some methodologies also have specific requirements on the type of reference eligible. For

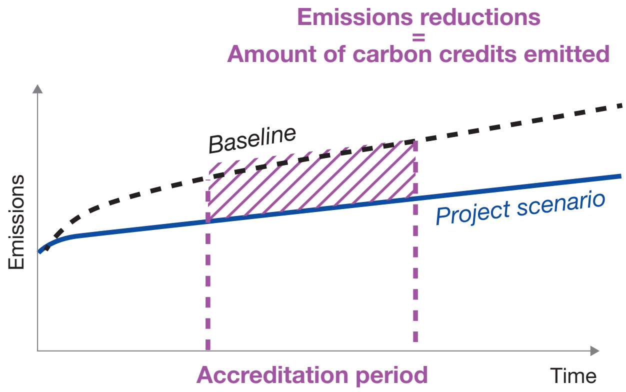
4 R. Birdsey *et al.* 2013, Approaches to monitoring changes in carbon stocks for REDD+, Carbon Managementrke

5 https://www.omicsonline.org/methods-to-estimate-above-ground-biomass-and-carbon-stock-in-natural-forests-a-review-2157-7625.1000116.pdf

6 http://samples.ccafs.cgiar.org/measurement-methods/6-quantifying-tree-biomass-carbon-stocks-and-fluxes-in-agricultural-landscapes/

7 http://pdf.usaid.gov/pdf_docs/Pnacq963.pdf

FIGURE 2. ILLUSTRATION OF A CARBON PROJECT



Source: I4CE

instance, methodology VM0005 from VCS requires the baseline to be a logged-over natural Evergreen Tropical Rainforest with no or insignificant regrowth and this needs to be proven in order to apply this methodology for the accounting of GHG emissions and absorptions.

In all existing standards, the baseline is set at a small scale – the project scale – and is not standardized: it is up to the project proponent to propose "realistic and credible" alternatives to the project. In the literature however, the pros and cons of this choice are discussed. A regional or national average has been considered a pertinent baseline in some cases. Van Benthem and Kerr (2013) show that whenever large scales can be chosen for both project and baseline, the efficiency of the PES is improved. Similarly, Bento *et al.* (2015) show that a stringent standardized baseline may be a good option to limit windfall effects.

In order to be certified and generate offsets, carbon projects have to be additional: carbon finance is key to the project implementation. In close relation to baseline determination, two main options are used by certification standards to demonstrate additionality:

- A standardized method ("positive lists"), which sets the objective criteria that the project has to meet. The methodology can propose for example a list of under-implemented technologies, so a project using one of these technologies would automatically be considered additional.
- An individualized method, which consists in submitting the project to a set of «tests» and requires alternative scenario(s). The common tests are the legal test (the project activity is not a legal obligation), the financial test (the project activity is not the most profitable scenario), the barriers test (technical or cultural barriers prevent the implementation of the project activity), etc.

In 2016, over half of forest carbon projects reporting to Ecosystem MarketPlace on their funding sources declared receiving their entire revenue from the sale of forest carbon offsets (Hamrick & Galant, 2017).

3. Key challenges linked to forest carbon certification

Bellassen and Stephan (2015) provide a detailed description of challenges related to the MRV of GHG emissions and emissions reductions, based on the actual decisions made by the regulators of the fifteen most important carbon pricing and management mechanisms. Two of these mechanisms are specific to forestry programs. The following section is largely inspired from this book.

3.1. Forestry specificities: non-permanence risk and carbon debt

The main specificity of forestry carbon projects is that the permanence of the climate mitigation benefit they provide cannot be fully guaranteed: the storage of carbon in forest biomass and soil is reversible. Different methods are used to assess and deal with this non-permanence risk, which comes with afforestation and improved forest management projects. Certification standards provide tools relying on the analysis of relevant criteria describing the occurrence of natural disasters, the political context of the project implementation's region, or the financial capacity of the project proponent. Most standards set aside a part of the project's total credits into a 'buffer account', which is debited to replace offsets that have been issued from projects where the carbon initially sequestered has been re-emitted. Those credits are not delivered to the project proponent and therefore lower the total carbon revenue. Other solutions have been implemented – such a temporary credits – or proposed – such as ton-year accounting – to transform non-permanent sequestration into carbon credits.

Many potential IFM projects face another challenge, namely a kick-off period during which carbon benefits are small, if not inexistent. Indeed, improving management practices often implies cutting trees to replace them or allow their neighbours to grow faster in the long run. This may entail an initial "carbon debt" which can take decades to be offset by enhanced tree growth and fossil fuel substitution (Agostini, Giuntoli, and Boulamanti 2013). This differs from other types of projects (agriculture, energy), which may deliver credits within a year after the beginning of the project. The "carbon debt" adds to the economic challenges for forestry projects, especially when the project implies high costs at the beginning (plantation, thinning…). Some carbon finance channels thus include ex-ante payments or ex-ante carbon offsets to address this challenge and provide an incentive for the project to be launched.

3.2. Monitoring uncertainty and costs

Monitored values come with an uncertainty, *i.e.* may differ from the real values. This uncertainty stems from systematic errors (bias) and/or random errors. Uncertainty of carbon stocks is often put forward as a barrier the implementation of carbon pricing mechanisms in the forestry sector (European Commission 2012). In order to limit uncertainty, the regulator may prescribe the uncertainty level by mandating the use of default values, set a minimum certainty threshold, or discount the benefits of emissions reductions proportionally to uncertainty. Among these three options, the most efficient choice is sometimes not to care about uncertainty and in any case depends on the nature of the certification framework – mandatory or voluntary, on the importance of information asymmetry and how profitable mitigation projects are (Bellassen and Shishlov 2016). Most existing carbon pricing mechanisms provide only limited (if any) incentives to reduce monitoring uncertainty (Bellassen *et al.* 2015).

For CDM reforestation methodologies, sampling error is the only source of error considered in the computation of uncertainty. The other possible sources of error, such as the carbon density of wood, measurement errors or allometric factors[8], are neglected.

More precise monitoring may be costly, which in some cases constitutes a major barrier to the implementation of projects. For example, Pearson *et al.* (2013) quantified monitoring costs in carbon sequestration projects to be in the range of 3% to 42% of total project costs. Monitoring costs in forestry projects are subject to both fixed and variable costs as generalized by Cacho *et al.* (2004)O. *et al.*, 2004. Fixed costs include for example the costs of transporting monitoring teams into project areas, while variable costs depend on the size of the project and the number of plots (salaries, transportation costs between the plots, data entry and analysis costs). The presence of important fixed costs explain why monitoring costs are proportionally higher for small projects than for bigger ones. The project developer has to make trade-offs between costs and monitoring precision. A higher precision is sometimes rewarded with more offsets but is always more costly.

Most forest methodologies require stratification of the project area into relatively homogeneous units. The different strata can be defined according to vegetation types, planting date and management plans, soil types, natural impacts altering the pattern of biomass distribution, etc. Stratification is useful as it can either increase the measuring precision without unduly increasing the cost, or reduce the cost without reducing measuring precision because of the lower variance within each homogeneous unit. When performing stratification, the differences among various strata should be easily identifiable. A faulty stratification increases the uncertainty estimate, which encourages the project proponent to come up with a robust stratification. The more effort is put on stratification and sample size, the lower the uncertainty, and if lower uncertainty is rewarded, hence the more credits are received.

3.3. Additionality demonstration: the risk of windfall effect

Additionality demonstration also represents an important part of certification costs. Half of the costs of drafting the project document is spent on additionality and reference scenarios in the case of «individualized» demonstrations (Guigon, Bellassen, Ambrosi, 2009). A «standardized» additionality demonstration can contribute to the reduction of certification costs: it is objective and simple and makes the project validation easier as it avoids individual demonstrations. Indeed, 65% of failures for CDM certification are due to an «individualized» demonstration deemed unconvincing by the standard (Castro and Michaelowa, 2008). Of course, it also comes with the pitfall of a possibly high “windfall effect” due to projects which fulfill the standardized demonstration without the need of any additional action or incentive.

More generally, the problem of the additionality evaluation is that it requires the assessment of alternative hypothetical scenarios, which will never materialize if the project is implemented. This means that additionality can never be established with a 100% certainty. In this light, the additionality issue becomes a question of finding the right balance between the amount of non-additional projects that manage to get registered – so-called “false positives”– and the amount of additional projects that do not manage to pass the additionality test or that are frightened away by the cost and risk of the demonstration – “false negatives” – that represent lost opportunities (Trexler, Broekhoff, and Kosloff 2006).

The French Energy Saving Certificates scheme, for example, opted for standardized methods. These have been praised for their ease of use and the low costs entailed, but the resulting additionality is between 0% and 50% (Cueugniet *et al.* 2014). The CDM opted for a more expensive, case-by-case and ex-post approach (Bellassen *et al.* 2015), but additionality was probably around 60-80% (Schneider 2007; Michaelowa and Purohit 2007; Wara and Victor 2008; Schneider 2009).

3.4. Reporting and verification: relevance vs comparability

The challenges and opportunities related to reporting are quite simple and mostly revolve around the trade-off identified by Cochran *et al.* (2015) between information relevance and comparability. Reporting frequency, reporting language, the level of aggregation of emissions sources and the level of standardization of the reporting format are the four most important considerations in this regard (Bellassen and Stephan 2015).

In practice, verification rules are relatively similar across carbon pricing and management mechanisms (Bellassen *et al.* 2015). In particular, most of them do require the verification of the reported information by independent and accredited third parties. Variations are found on verification frequency, the nature of the third party (individual vs firm), the materiality provisions[9], the control modalities of this third party and the support provided to them.

The auditor, which is often a firm, shall confirm that that the requirements of the standard and the method have been followed. This entail checking the accuracy of the estimates and the consistency between the monitoring report and field evidence (supporting accountancy documents, stakeholder

8 Allometric factors are commonly used to estimate whole tree biomass, including branches and roots, by extrapolating easily measurable parts such as the trunk.

9 Materiality implies that an auditor should focus on the riskiest parts of what is being audited, and pay more attention to larger numbers than to smaller ones (Bellassen and Stephan, 2015).

feedbacks, etc.). In most cases, verification includes a site visit. Classical auditing principles such as risk-based assessment and materiality are applied: the auditor spends more time on the most important or uncertain sources of emissions reductions, and often cannot mandate a revision of the monitoring report when the errors found are below a materiality threshold (often set to 5% of the amount of emissions reductions at stake).

Most of the time, the balance between auditing costs and revenues from carbon credits drives verification frequency, estimated between 5 to 10 years for forestry projects (Deheza, 2014). In terms of verification costs, Chenost and Gardette (2010) estimate a cost range between 20-50k€ per verification incurred by project developers. Third-party verification represented between 25% and 50% of forest projects revenues in 2016 (Hamrick & Gallant, 2017).

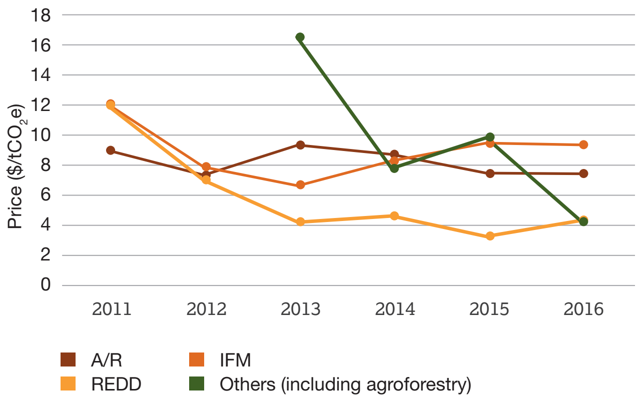
3.5. Combining robust and comprehensive MRV with low carbon prices

On the demand side, robust MRV and certification is of paramount importance for buyers. On voluntary carbon markets, nearly all offsets transacted in 2015 (98%) were developed under a third-party standard (Hamrick & Goldstein, 2016). In France, robustness of certification is a key parameter for organizations to get involved in carbon offsetting. Certification of multiple social and environmental co-benefits is also a key driver of demand (I4CE, 2017). Those high certification requirements often imply high MRV costs – typically €0.15-1.4 per tCO_2eq for forestry projects (Bellassen and Stephan 2015), which contrast with the relatively low prices companies are willing to pay for carbon credits (I4CE, 2017).

The importance of MRV costs for the financial viability of carbon projects naturally depends on the carbon price. In the "golden age" of the CDM – before carbon prices collapsed in 2012 – MRV costs did not seriously impact the financial attractiveness of projects in most sectors. However, as the cumulative supply of CERs hit the upper limit for their use in the EU ETS – the main source of demand for carbon credits – market prices collapsed below USD 1/ tCO_2eq (Stephan, Bellassen, and Alberola 2014). Carbon prices on the voluntary market seem to be more resilient in the time of crisis than JI/CDM credit prices as they remained above USD 3/tCO_2eq, but are still relatively low. The price for voluntary forest carbon offsets is slightly higher: $5,2 for all project types, and it rises up to USD 9.5/tCO_2eq for IFM projects and USD 7.5/tCO_2eq for A/R projects (**Figure 3**). In theory, voluntary credit buyers are usually ready to pay a small premium for carbon credits with multiple social and environmental benefits, which is often the case for forestry projects. In practice, this premium is not visible in actual carbon prices (Ecosystem MarketPlace, 2016).

That is why, in the current market circumstances, transaction costs play a significant role for the financial viability of carbon projects, especially for small-scale projects implying high investment costs, as it is the case for most European forestry projects.

FIGURE 3. AVERAGE PRICE FOR FOREST AND LAND-USE OFFSETS EXCHANGED FROM 2011 TO 2016 (48.8 $MTCO_2EQ$ SAMPLE)



Source: I4CE (Club Carbone Forêt-Bois) based on data from Hamrick & Gallant, 2017.

3.6. Overcoming political challenges: country vs firm crediting

Over the past decade, domestic forestry carbon projects have been hampered by political considerations in Annex I countries, and especially in Europe. Safeguards against double-counting – first developed under the Kyoto Protocol to prevent that two countries claim the same emission reduction – have been adapted by the dominant voluntary carbon standards to prevent that a private entity and a country claim the same emission reduction. Although this position is discussed (Foucherot *et al.*, 2014), these provisions have slowed down carbon projects implementation in Annex I countries. Fortunately, with the upcoming implementation of the Paris Agreement, which is reshuffling the cards and re-opening this debate, voluntary standards are currently reviewing their position on the issue.[10]

Those obstacles have slowed down carbon projects implementation although several countries have already started to answer those issues and develop their own certification frameworks (the UK, Spain, Australia…). Those new frameworks also create new grounds to answer the different challenges mentioned above: low carbon price, costs of monitoring and verification etc.

10 http://www.goldstandard.org/sites/default/files/documents/a_new_paradigm_for_voluntary_climate_action.pdf

Conclusion

Solid MRV is a necessary condition to forest carbon finance. However, forestry projects face technical, accounting and economic challenges that the current carbon prices do not always allow to overcome easily.

Many tools have already been implemented in the past decade by the different carbon standards to deal with forest projects specificities and simplify the certification processes (buffer account, standardized additionnality demonstration…). However, several avenues can still be explored to reduce certification costs while insuring environmental integrity: methodology requirements, additionality demonstration, verification processes… These options must be weighed against potential losses in economic efficiency and environmental integrity on a case-by-case basis.

In France, stakeholders have been addressing these challenges related to MRV and project certification with the development of the Label Bas-Carbone[11]. It is a national carbon certification framework designed to support various policies and needs, such as carbon offsetting, environmental subsidies, public sector procurement, etc. Inspired from the literature and experience summarized in this document, its guidelines offer different options – revolving around the discount principle – to strike the best trade-off between cost and precision of MRV on a project per project basis.

However, reducing transaction costs is not the only option to promote the development of mitigation projects in the forest sector. The current carbon price on voluntary markets (\$3/tCO_2eq for all project activities) is considered low to allow for a strong development of mitigation projects, especially when compared for example to carbon taxes levels in developed countries – where lies most of the demand for offset$_s$: \$139/tCO_2eq in Sweden, \$76/tCO_2eq in Finland, \$55/tCO_2eq in France, \$25/tCO_2eq in the UK, \$27/tCO_2eq in British Columbia, \$23/tCO_2eq in Alberta for example[12]. Better communication to all stakeholders about MRV and carbon finance is also therefore needed, in order to solve the paradox between buyers' high expectations on environmental integrity and low willingness to pay for certification standards which support it. Finally, one must keep in mind that the guaranties offered by MRV can be a basis for several types of carbon related finance for forestry, far beyond carbon offsetting. Those applications of MRV legacy to different types of finance for forestry needs to be assessed and further developed.

Acknowledgements

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11 http://www.consultations-publiques.developpement-durable.gouv.fr/projet-de-decret-et-d-arrete-portant-creation-d-un-a1843.html

12 I4CE, Global Carbon Account 2018

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