Faculty of Forestry, UBC

Comparitive Analysis of Tree Canada's Afforestation and Reforestation Standard and BC's draft Forest Offset Protocol

FRST497

Erika Doyon
4/21/2010

Abstract

If the future of the forest industry lies partially in taking advantage of the emerging carbon market, the creation of credible forest-offsets must be guaranteed. As a biological sink and source, BC forests are subject to high variability. Success in generating real, additional, permanent and verifiable credits is largely dependent on the robustness of the protocol to address forest variability issues. Two recent protocols in Canada include the Tree Canada Afforestation and Reforestation Standard and the BC draft Forest Offset Protocol. The ease in which these protocols direct project implementation is determined by the methodologies adopted to address the key elements, such as permanence, leakage and quantification. The level to which the two protocols satisfy widely recognized ISO principles determines the level of fair GHG accounting achieved. BC's draft Protocol lacks comprehensiveness compared toTree Canada's protocol, which has fulfilled the ISO principles to a greater degree.

Table of Contents

1 Introduction

The forest industry in BC has faced multiple setbacks in the past few years including the rise of the Canadian dollar, the mountain pine beetle crisis and the soft wood lumber agreement. All of these issues have been compounded by the recent economic meltdown, evident in multiple mill shutdowns and forestry job layoffs. This has forced both industry and government to strategically re-think the role of forestry in emerging markets such as bio-energy and carbon.

In a speech to politicians and forestry company representatives in Campbell River earlier this year, Pat Bell, BC's Minister of Forests, suggested the future of the industry partially lies in carbon credits. As an emerging business venture, Bell outlined the revenue potential for coastal companies as upwards of $150 million per year (Warkentin 2010).

Both federal and provincial governments have legislated emission targets creating demand for forest offsets. In BC, forest-offsets are expected to fill a long-term supply gap in offsets contributing to 2010 public sector carbon neutrality (Pacific Carbon Trust 2009). In addition to legislated targets, demand from the voluntary carbon market is growing as both individuals and organizations take steps to offset their emissions (Kollmus *et al.* 2008).

The creation of credible forest-offsets must result in real, additional, permanent, measurable and verifiable emission reductions and removals. However, the ability to achieve real change strongly depends on the robustness of the protocol governing the development of the forest-offset project.

In Canada, the latest protocols guiding forest-offset projects include BC's draft Forest Offset Protocol and Tree Canada's Standard for Afforestation and Reforestation Projects. This report will review the methods used by each protocol to address key elements essential for establishing credibility of a forest-offset projects. It will then analyze the degree to which each protocol has fulfilled fundamental principles ensuring true and fair GHG accounting according to international standards outlined by ISO.

1.1 Protocol Background

The following section provides a brief introduction of the two protocols reviewed within this report. In addition, ISO 140464.2 is introduced as this report uses ISO developed principles to guide its protocol comparison.

2 Tree Canada Afforestation and Reforestation Standard

Tree Canada is a not-for-profit organization whose mission is to provide communities with the tools to maintain healthy urban and rural forests. The development of its protocol for afforestation and reforestation was in response to growing interest, expressed by both the public and clients, to provide reliable GHG offsets. Tree Canada mandates that its projects will meet the requirements outlined in Canada's Offset System as well as provide a rigorous standard for validation and verification (Tree Canada 2009).

2.1.1 BC Draft Forest Offset Protocol

The BC Ministry of Forests and Range, Forest Practices Branch released this draft protocol for review and comment on June 26, 2009. Its development is intended to assist in the provision of high quality offsets to Pacific Carbon Trust (PCT) to support BC's Climate Action Plan (PCT 2010). In addition to serving project proponents[1], this protocol was designed to assist in validation and verification of forest projects (Draft Protocol 2009). The 2010 Roundtable Report Update has reported the protocol will also support the Western Climate Initiative in the development of forest offsets (2010). Current forest activities covered under the protocol include afforestation, select seed use and fertilization.

2.1.2 CAN/CSA - ISO 14064-2

The International Organization for Standardization (ISO) is a global federation of national standards bodies. ISO 14064 consists of three parts providing guidance at the organization and project level for GHG accounting and validation and verification. Its purpose is to provide a level of consistency and credibility to GHG projects for organizations, governments and project proponents. Part two, applicable to this paper, specifies the principles and requirements for determining baseline scenarios, monitoring and quantifying and reporting at the project level. The six principles (completeness, consistency, accuracy, transparency, relevance, conservativeness) ensure GHG emission reductions are fairly represented and credible (ISO 2006).

[1] A project proponent is a person or entity that initiates a forest-offset project.

3 Key Elements

The quality of offsets generated by forestry projects has been questioned in recent years due to inherent levels of risk associated with relying on natural systems. Forest ecosystems are influenced by physical, political and legal variables making it difficult to ensure the integrity of forest offsets (CCFM 2009). Simple yet rigorous protocols enable carbon project developers to address this risk (Kollmuss *et al.* 2008).

Several key elements must be addressed within a protocol to ensure offset credibility and the ease in which a forest project is implemented. These key elements include the methods employed for defining project eligibility, ensuring project permanence and addressing leakage. In addition, clear baseline and additionality methodologies must be defined. Lastly, a protocol must include clear methods enabling carbon stock quantification, monitoring and verification. The following section outlines how each protocol has implemented the key elements.

3.1 Eligible Projects

The type of forest projects eligible within a protocol reflect the market they exist in and the ability to which offset credibility can be established and maintained. The types of forest-offset projects eligible in a protocol are also influenced by federal and provincial legislation, and regulations. Several types of forest management activities impact GHG emissions, however each activity is also associated with a degree of certainty regarding its impact on carbon pools (CCFM 2009). Establishing credibility requires the use of appropriate methods for measuring, quantifying and reporting GHG reduction and removals for specific project types (Greig and Bull 2008).

Tree Canada Afforestation and Reforestation Standard

Tree Canada's protocol is structured primarily after the Canadian Forest Service (CFS) draft afforestation protocol. This, in turn, was developed according to Environment Canada's draft *Guide to Quantification Methodologies and Protocols* released under Canada's proposed GHG Offset System for GHG. As such, only afforestation and reforestation are eligible projects under this standard (Tree Canada 2009). Additional project requirements, beyond meeting the United Nations Framework Convention on Climate Change (UNFCCC) definition of a forest, revolve around site prep and rotation length. All eligible projects must also have a start date

after January 1, 1992. Ownership of the land must be established however the nature of the ownership does not impact project eligibility.

BC Forest Offset Protocol

The three eligible projects under this protocol include: afforestation of land not forested since December 31, 1989; use of select seed for faster growth, increased timber volumes and resistance to insects and disease; fertilization for increasing tree growth on low productivity sites

Eligible project areas include private land, local government land, First Nations Reserves and land settled by treaty in addition to land held in long term tenures. The project start date of any three projects must occur after November 29, 2007 (Government of BC 2008).

3.2 Additionality and Baseline Scenarios

The basic premise of additionality is that a carbon-offset project must generate emission reductions additional to what would have occurred if the project did not take place. Other measures for additionality include financial and technological obstacles for project implementation. For example, a project dependant upon the sale of forest-offsets for implementation demonstrates additionality. Lastly, an additional forest-offset project must not be required by legislation or regulation.

Meeting additionality requirements establishes the need for defining the baseline scenario, a hypothetical base case representing the business as usual (BAU) conditions in absence of a project. A baseline enables net change in carbon stocks to be quantified. The difference between the baseline and the project represents the net carbon benefit and the number of credits a project may generate. This necessitates the baseline to be explicit enough to measure changes in carbon stocks yet conservative enough so as to prevent overestimation of emission reductions (Kollmus *et al.* 2008). The more accurate the BAU baseline the more likely it will generate real and additional forest-offsets.

Baselines can be established a number of ways. These include using projections, historical data, mean carbon stocks, direct measurement, by performance criteria or a combination of approaches. Baselines can be static and set for the duration of a project, or they can be dynamic and change to reflect the changing conditions of a project site (CCFM 2009).

Tree Canada Afforestation and Reforestation Standard

Afforestation Projects

Land not forested since 1990 and not expected to return to a forested state defines the simple baseline scenario. Additionality requirements outline that no regulations, plans or programs involving afforestation, be in existence prior to the project. The simple baseline scenario projects the current land use to continue in the absence of a project with no change in the level of carbon reservoirs, sources or sinks. Two alternate methods for establishing baselines suggested outline both a static and dynamic approach. The static approach uses a projection-based approach. The dynamic approach used a comparison-based approach requiring a control group and active monitoring.

Reforestation Projects

Tree Canada must prove that within 10 years, a forest will not develop or increase biomass levels on the project site and regulations must not exist for the area, requiring reforestation. The simple BAU case is defined by zero increases in carbon reservoirs. Other alternative scenarios are similar to afforestation in its use of both a static and dynamic approach.

BC Draft Forest Offset Protocol

This protocol requires a static baseline scenario and assumes carbon pools above and below ground would remain unchanged in the absence of a forest-offset project. The three eligible projects must exceed common forest management practice defined within the protocol.

3.3 Permanence

The length of time carbon remains stored after it is sequestered, ensuring land remains forested and assuring against risks of reversals, outlines the meaning of permanence. The inherent vulnerability of forests to reversals requires project proponents to provide the necessary assurance, through the employment of various methodologies, to create valid carbon credits.

There are several mechanisms to be used when managing for risks of reversals which may include the maintenance of buffer pools, discounting and purchasing insurance products. Assignment of liability associated with risks of reversal should also be addressed. Carbon standards may or may not address this to varying degrees (CCFM 2008).

Permanence is also addressed in the length of time a forestry project must yield offsets. Both the International Panel on Climate Change as well as the California Climate Action Registry (CCAR) Forest Project Protocol 3.3 require a carbon mitigation length of 100 years. The Canadian government on the other hand, requires a length of 40 years with a 25-year liability period after the credits have been issued (Tree Canada 2009).

Tree Canada Afforestation and Reforestation Standard

The duration of projects undertaken by Tree Canada will vary in length depending upon the type of project and tree species involved in addition to lack of scientific justification for establishing project length such as CCAR (Tree Canada 2009). Twp aspects related to permanence are addressed by Tree Canada. The first aspect of permanence refers to the ability to assure land remains forested over the length of the project. Due to the nature of Tree Canada, its offset projects often occur in municipalities where it is expected land zoning would prevent conversion in a way that would negatively impact afforestation or reforestation projects.

A more stringent approach to projects developed on private land is taken and provides two conditions that must be met to insure land remains forested. The first condition is the placement of an easement or covenant preventing land from conversion within the next century. Secondly, a legally binding agreement signed by the landowner and attached to the land title preventing land conversion permanently or for a specified amount of time (Tree Canada 2009).

The second aspect of permanence addresses assurance against reversals and the need to prevent shortfalls or the complete loss of carbon credits generated; the application of one of three approaches are suggested. The first includes the creation of a buffer pool, reserving 25% of the credits to be issued. The second approach would limit carbon credits to be issued from only above-ground biomass and not below-ground. This would create a buffer of 25-30% of total carbon stored in the project. The last approach suggests the use of insurance for replacement of lost carbon credits.

BC Draft Forest Offset Protocol

The only approach for maintaining permanence specifically described requires offset projects to endure for a minimum of 100 years. The project proponent is required to provide a

risk-mitigation and contingency plan to address the risk of reversals. Monitoring carbon stocks between reporting periods is expected to track potential losses however, accounting methods for the losses are not specified. Three approaches, including use of a discount factor, buffer pools, and reversal replacement, are outlined but none are recommended for use by this Protocol.

3.4 Leakage

Leakage is understood as the emissions that shift outside the project boundaries as a result of the project, partially or completely negating GHG reductions generated by the project. Internal leakage can occur within the project boundaries such as a change in forest operations. It can also occur externally in the sense that the actions of a forest owner may cause a change in behavior of other forest owners. In this sense, leakage could be seen as being positive or negative. Some carbon standards and protocols address internal leakage through forest-wide reporting in addition to forest carbon offset project certification (Journal of Forestry 2008)

Tree Canada Afforestation and Reforestation Standard

Leakage is accounted in the "system-wide adjustment factor" which estimates average emissions and reductions/removals from sources sinks and reservoirs (SSR). Tree Canada assumes leakage is limited by the scope of the protocol and the trend seeing farmland remain steady.

BC Draft Forest Offset Protocol

Three potential areas of leakage are identified within the Protocol however the project proponent is not required to address these risks for leakage. It is expected that governmental measures will address areas of leakage.

3.5 Quantification

Establishing offset credibility is dependent upon identification of all relevant carbon sources, sinks and reservoirs (SSR's) for quantification and measuring of baseline and project scenarios. This is required on a regular basis to ensure accuracy of estimated GHG reductions and removals. Methods incorporate the use of forest inventories, growth and yield modeling in

addition to carbon accounting modeling. Methods of quantification are important for the type of carbon offset[2] that is issued from a forest carbon project (Merger 2008).

Tree Canada Afforestation and Reforestation Standard

Tree Canada identifies above-ground tree biomass, below-ground tree biomass, litter and soil organic carbon as reservoirs potentially impacted by afforestation and reforestation projects. Litter and soil are however not required for quantification and will be determined on a project basis. Several upstream, onsite and downstream baseline and project SSR's are identified as being controlled by, related to or affected by Tree Canada's afforestation or reforestation projects. Not all are required to be reported and measures for determining which SSR's should be quantified for the baseline and project are provided, as are procedures and parameters for quantification. Methodologies for estimation or measurement of key SSR's is based on IPCC Good Practices for Land Use, Land-Use Change, and Forestry (LULUCF).

BC Draft Forest Offset Protocol

The BC draft Protocol identifies the same carbon reservoirs however soil carbon pools are optional for quantification. No method for determining when this pool should be accounted for in a project is provided. Other SSR's required for quantification listed are: onsite development and operations, fertilizer use on site, prescribed burning, living biomass reservoirs, dead wood reservoirs, materials facility operations, offsite materials transportation, labour and equipment transportation.

Methodologies for quantification provide limited guidance. However a list of approved models are also provided for estimation of baseline and project removals, in addition to forecasting future volumes and carbon storage.

3.6 Monitoring

Measuring and monitoring changes in carbon stocks over the duration of the project are critical to the development of carbon offsets. Procedures and requirements for accurate measurements and documentation are required for project verification (Merger 2008).

[2] Ex-ante credits are issued based on the amount of credits that are modeled to occur in the future. Ex-post credits are awarded for the carbon stocks present.

Tree Canada Afforestation and Reforestation Standard

Tree Canada lists its monitoring practices required by Environment Canada regulations and is also consistent with IPCC GPG LLUCF practices. Monitoring takes the form of survival and growth assessments, requirements for data management outlined. Monitoring is also required during the 25-year liability period after the last credit from project is issued. Requirements for field measurements are outlined. Only above ground carbon reservoirs are monitored for determining occurrences of reversals. Canada's Offset System dictates monitoring frequency, which is less than 5 years after the last offset credit has been issued.

BC Draft Forest Offset Protocol

Methods for inventory and monitoring prescribed, follow existing standards used by the BC Ministry of Forests and Range. These include silviculture stocking surveys, vegetation resource inventory (VRI) and national forest inventory (NFI) in addition to modeling. Monitoring frequency must occur within the 10-year validation time frame. This is left to the project proponent to establish unless otherwise directed by the Emission Offsets Regulation. Reversal assessments, however, must occur within a 5-year time frame.

3.7 Validation and Verification

Validation confirms a forest-offset project is in compliance with the protocol it is following. It also confirms a project is able to deliver the offsets originally intended by the proponent. The period in which this occurs is termed the validation period. Verification confirms and certifies the emissions reductions or removals asserted by a project in addition to evaluating project performance. Both validation and verification are performed by 3rd party auditors, and are only as good as the protocol or standard of the forest-offset project being followed (Kollmus *et al.* 2008).

Tree Canada Afforestation and Reforestation Standard

Validation and verification requirements are not included in this protocol. Tree Canada defers these key elements to an alternative verification protocol. It is not indicated within this Protocol eligible verification protocols. Registration of periods of biological sink projects, according to Canada's draft guidelines, lasts up to 8 years and can be registered for up to five registration periods.

BC Draft Forest Offset Protocol

Validation is a requirement of BC legislation, outlined by the Emission Offsets Regulation. Validation periods typically last for 10 years however validation periods for forest projects are extended. Projects beyond the 10-year time frame must be validated in subsequent plans. GHG reduction, however, can be verified over a longer period of time as follows:

- Fertilization projects: 10 – 20 years
- Afforestation and Select Seed projects: up to the year of planned harvest, but no more than 100 years

A separate verification protocol may be developed in the future to expand on this Protocol.

3.8 Co-Benefits

Co-benefits or secondary benefits refer to social and environmental benefits received in addition to the production of a credible forest-offset. Examples of co-benefits, in North America, might include protection or enhancement of biodiversity and unique habitat, watershed conservation or employment creation. This element commonly lacks provisions in voluntary carbon protocols (Kollmus *et al* 2008).

Tree Canada Afforestation and Reforestation Standard

The most common Tree Canada projects convert marginal agricultural land to forest. Positive impacts of forests compared to marginal land include an increase in biodiversity in addition to improved regulation of water and flow and runoff. Possible negative socio-environmental impacts are not addressed.

BC Draft Forest Offset Protocol

Impacts from implementing forest-offset projects are not specified within this protocol. It may be assumed that co-benefits comparable to Tree Canada may exist in similar forest-offset projects. As well, economic co-benefits may be produced by increased timber quality and employment. Possible negative socio-environmental impacts, which may also arise, are not addressed (CCFM 2009).

4 Criteria Analysis

The following analysis will discuss the level to which each protocol has fulfilled the ISO principles to ensure fair accounting. The widely recognized and implemented principles include relevance, completeness, consistency, accuracy, conservativeness and transparency. Additional criteria include cost effectiveness and environmental integrity. Cost effectiveness is important to measure, as it is often the limiting factor for project implementation. The level to which standards address and maintain environmental integrity is foundational to achieving overall forest-offset credibility.

4.1 Relevance

The principle of relevance is important in the context of the intended user. Baseline and project SSR's selection, quantification and monitoring methods must be chosen based on project relevancy. This relates to the way in which an adopted practice or procedure influences decision-making. The application of minimum thresholds to justify how SSR's are included or excluded from quantification is an example of this. It also has implications for both cost effectiveness and environmental credibility and integrity (ISO 2006).

Tree Canada applies the principle of relevance in its determination of project and baseline SSR's by the use of a *de minimis*[3] threshold and application of a system-wide adjustment factor[4]. These procedures provide significant guidance towards determining inclusion or exclusion of identified project and baseline SSR's. The system wide adjustment factor is significant in that it allows accounting for emissions leakage from upstream and downstream sources, otherwise not accounted for. This value, presently zero, is subject to change. A disadvantage is the lack of guidance for the way in which the system wide adjustment factor is applied and determined is deferred to Annex C of the August 2008 draft CFS Afforestation Protocol.

The BC draft Offset Protocol provides minimal procedural guidance for project and baseline SSR inclusion or exclusion. Several offsite emission sources are excluded from quantification, however no methods for accounting them demonstrate a lack of thoroughness. The risk of leakage from not accounting from these sources is not addressed.

---

[3] *De minimis* refers to emissions that are too minimal to report. SSR's must meet a threshold amount of of 10T or 0.1% of a project's largest GHG removal or whichever is larger, to be measured (Tree Canada 2009).

[4] System-wide adjustment factor: presently calculated by the Canadian Forest Service to equal zero, it accounts for net emissions from market effects and baseline activity shifting through deductions from the total value of the project (Tree Canada 2009).

4.2 Completeness

The principle of completeness is concerned with the level to which appropriate SSR's are identified, measured, monitored and reported. Fulfilling this principle ensures all relevant information is thoroughly reported and consistent with the project and baseline, timeline and project objective. Expert judgment is relied upon when data is not available. The level of completeness also relates to the degree of accuracy in measurements and the appropriate use of models to obtain reliable and accurate measures of GHG reductions or removals compared to the baseline scenario (ISO 2006).

The comprehensiveness of baseline and project SSR selection is limited by Tree Canada's conservativeness in GHG reduction/removal accounting. Specific sampling methods for SSR's and descriptions of parameters ensure monitoring completeness. While Tree Canada allows for the use of models, it is not explicit in which models it accepts which may lead to questions around consistency. In addition, there are limited instructions for validation and verification guidance.

BC's draft Forest Offset Protocol is limited in the level of completeness. Absent from the protocol are specific quantification methods and calculations beyond the provision of BC Ministry of Forests approved sampling techniques and models. For example, a basic framework for the minimum sampling requirements is provided however it lacks specific methods and parameters. A lack in procedural completeness may lead to a lack of consistency between and within projects.

4.3 Consistency

The principle of consistency can be applied to the provision of consistent methodologies throughout a protocol. This applies to the use of uniform procedures, tests and assumptions, and provision of expert judgment throughout eligible forest projects. Consistency is an important principle that both relates to and enables transparency of a protocol (ISO 2006).

Tree Canada's methodologies appear to be consistent across project types. The use of uniformly applied buffers to mitigate risk, as is the application of the *de minimis* principle is representative of this. Many of Tree Canada's methodologies originate from LULUCF Good Practice Guidelines, which also demonstrate a high level of consistency.

Much of the sampling and quantification methods are based on MoFR approved techniques however many methodologies, parameters and procedures are absent from the BC

draft Forest Offset Protocol. The draft Protocol specifies that project proponents are to determine appropriate methodologies for carbon pool accounting. This may lead to inconsistencies and possibly questions regarding standards of accuracy between projects and transparency for buyers. In addition, establishing optional carbon pools for reporting without the inclusion of a *de minimis* principle lacks consistency.

4.4 Accuracy

The criteria of accuracy is concerned with removal of bias and uncertainty associated with establishing baselines, quantification and monitoring. The level of credibility of a carbon credit requires removal of as much uncertainty as possible. Credibility is also dependent upon the availability, quality and integrity of data for measurements of emissions removals or reductions. Due to the nature of projecting baselines and the intangibility of carbon credits, achieving a high level of accuracy is impossible and needs to be balanced with both cost effectiveness and conservativeness (ISO 2006).

Tree Canada has deferred a high level of accuracy to achieve conservative estimates of project GHG reductions and removals. The exclusion of several upstream, onsite and downstream SSR's is due to the difficulty in ensuring accurate measurements and the provision of conservative estimates of net GHG reduction or removal. However, the allowance of a dynamic baseline enables accounting of future environmental changes leading to an increase in accuracy. This does not allow accounting of political, regulatory and market changes which would further increase accuracy and integrity although likely lead to an increase in investor risk (CCFM 2009). Detailed data management and quality practices also ensure a level of accuracy associated with monitoring.

The BC draft Protocol relies on inventory data and use of models for measuring forest carbon which tends to be more rigorous than reference factors used in Tree Canada's protocol (CCFM 2009). However, it does not account for setting a dynamic baseline, which limits accuracy of offsets generated in the future. Both protocols require acceptable levels of statistical accuracy within data collection and analysis.

4.5 Conservativeness

Application of the conservativeness principle is required to minimize impacts of uncertainties associated with accuracy, setting baseline scenarios and quantification of both

baseline and project SSR's. Conservativeness prevents an over-estimation of emissions removals and reductions or CO_2 sequestration. This principle, however, must be balanced between accuracy, relevance and cost-effectiveness (ISO 2006).

Tree Canada's protocol demonstrates a high level of conservativeness in its selection of SSR's. Several SSR's are excluded from quantification, such as dead wood and litter or fossil fuel combustion, as they contribute to a conservative estimate or are considered *de minimis*, static, or equivalent between the baseline and project scenario.

The BC draft Protocol specifies that all project plans must report the methods used to achieve conservative estimates of GHG reductions and removals. Absent throughout the protocol however, are specific directives towards achieving conservatism. However, the exclusion of several identified SSR's, such as enteric and other livestock emissions, will result in conservative estimates of GHG reduction and removal.

4.6 Transparency

The transparency of a protocol provides consumers with the confidence that forest-offset projects create real, measurable and verifiable emission reductions and removals. This criterion is crucial for establishing credibility. Specific aspects of transparency relate to the ability of a protocol to provide clear, easily followed and interpreted information on all levels of the protocol. ISO requires transparency on all levels of the protocol associated with provision of clear documentation and justification (ISO 2006).

Tree Canada's strategy for addressing permanence demonstrates transparency however, dependent on the level of risk of individual projects, may put less risky projects at a disadvantage. Not discussed in the protocol however, is the treatment of credits put aside in a buffer at the project end if they are not used up. Lack of a clear procedure may create conflicts in determining who is eligible for credit ownership.

Procedures for setting dynamic baselines add a level of transparency concerning environmental integrity for consumers. Measures for data collection and storage reflect transparency, although there is a lack of information regarding public availability. Future provisions of verification guidance, methods of bringing credits to the market, selling conditions and prices will bring further transparency to Tree Canada's protocol.

Clear procedures for dealing with end of project scenarios are also lacking in the BC draft Protocol. There are however, clear procedures outlined in the Pacific Carbon Trust to

ensure transparency of generated offsets through the prevention of double counting. Retired project details are made public on the Pacific Carbon Trust online registry (PCT 2010) Additionally, any information prepared by 3rd party auditors must be made publicly available.

4.7 Cost Effectiveness

Cost effectiveness, although not an ISO principle, is directly related to the above criteria. This principle seeks to balance stringency with flexibility in all aspects of developing a forest-offset project. Cost effectiveness applies to both administrative costs and transaction costs. Transaction costs are associated with costs of monitoring, validation and verification while administrative costs are associated with project design and approval (CCFM 2009).

Cost effectiveness is a result of a balance between many of the principles outlined above. Trade-offs exist between levels of accuracy achieved, completeness, environmental credibility and cost. More accurate methods for quantification tend to be more cost intensive depending on the size of the project (CCFM 2009). Tree Canada has taken many measures to reduce the cost of measurements and assessments while ensuring credibility by its application of conservatism. BC's draft Protocol addresses one issue of cost with its 10-year validation periods for project reductions and sees this as an opportunity to also address changes in the baseline scenario.

Both protocols specify the acceptance of ex-post credits, requiring the project proponent bearing the costs of establishing the project, monitoring, quantification and verification. In addition, both protocols provide flexibility in determining the most appropriate risk management strategy. Depending on the size of a project, the implementation of buffer pools may significantly reduce the economic viability of a project by reducing the amount of forest-offsets to be sold. When risk is calculated on a project-basis, the more cost-effective it will be (CCFM 2009).

4.8 Environmental Integrity

The ability to ensure real, measurable, additional, permanent and verifiable reductions or removals of GHG is impacted by the chosen methods for addressing ISO principles. The integrity of the voluntary carbon market rests on the ability of standards and protocols to provide a high level of assurance to consumers.

A major instrument for maintaining credibility is the baseline scenario from which carbon sequestration is measured. Accounting for changes in the forest ecosystem due to climate change and natural disturbance poses significant challenge, as do changes in the political and regulatory context of the project. While project cost is a significant determinant for baseline choice, ensuring additionality based on solid science is critical for BAU determination (CCFM 2009).

Tree Canada appears to find a good balance between achieving accuracy and conservativeness, cost effectiveness and environmental integrity. The lack of establishing project duration by a project, while other prominent protocols do including CCAR, may impact buyer perception. A lack of transparency in how environmental integrity is a result.

The BC draft Protocol has no *de minimis* provisions leaving it up to project proponents to determine if optional pools are quantified which calls environmental integrity into question (CCFM 2009). In addition, many people have questioned the environmental benefit of fertilization as a forest-offset project (Henschel 2009).

5 Discussion

BC's draft protocol is generally lacking in comprehensiveness, which can be attributed to the fact that it was released in draft form. Several issues regarding implementation of a forest-offset protocol in BC have been highlighted by the above analysis. A continuing theme is lack of specification of methodologies around permanence, leakage and quantification.

Subsequent to being released for review, the draft Protocol is in development and unavailable for access on the Internet. While none of the reviews have been made public, it is likely feedback was received concerning the lack of additional projects types, such as lengthened rotation ages or conservation. While these types of projects likely create a greater range of environmental and social co-benefits, the lack of methodologies highlighted above would need addressing.

Concerning leakage, the BC protocol suggested that it must be accounted for at the provincial level through legislation. While the government has introduced legislation for zero net deforestation by 2015, greater steps need to be taken to address identified areas of leakage. Especially appropriate is establishing means of determining market effects if the BC government is promoting forest-offset projects for forest companies.

Another consideration is the implementation of a regulated cap and trade market in BC through the Western Climate Initiative (WCI). Just recently, WCI released an *Offset Protocol Review* report outlining how well existing forestry protocols, among others, meets both ISO framework and WCI criteria. Protocols modification will occur before use within the regional cap-and-trade program (WCI 2010). The BC Protocol was not included in this report, which questions its ability to qualify for compliance with the WCI. This may discourage potential project proponents from implementing BC's Protocol.

Tree Canada's protocol, when compared with BC, is more robust and extensive in its provision of guidance and consistency throughout. While the context in which Tree Canada's protocol does not fit the BC forest industry, it may provide a better framework for ensuring high standards are followed.

One significant setback however is the way in which Tree Canada addresses project duration within the concept of permanence. Other protocol specifications are cited, including CDM, and point to the fact that these project lengths have no scientific basis. Most protocols are compared to CDM methodologies, which are highly respected and known for their high level of stringency. Without adequately supporting this claim, public perception of meeting the standard of permanence and the offset credibility may be negatively impacted.

Another potential setback for Tree Canada, despite a robust protocol, may also include the lack of movement by the federal government towards finalizing the Offset System. This is likely due to waiting on the US to finalize federal cap-and-trade legislation, when completed, would allow Canada to design its Offset System for easy integration into a North American carbon market (Valiante 2010). Tree Canada's protocol is intended to provide proponents with direction for project implementation within the voluntary Offset System, administered by Environment Canada (Environment Canada 2008). A delay by the federal government in fully establishing regulatory and voluntary framework does not create incentive for project proponents to initiate forest-offset projects.

6 Conclusion

Many variables require consideration in the design and development of a forest-offset protocol. Credible forest-offsets unmistakably stem from clear and specific methodologies associated with the key elements within a protocol. This is apparent within Tree Canada's Afforestation and Reforestation Standard compared to the BC draft Forest Offset Protocol. The

degree to which these methodologies fulfill the outlined principles will subsequently enable an associated level of consumer trust, forming the foundation of the carbon market. Yet balance must be achieved between protocol stringency and practicality (Coren 2009). The success of forest-offsets generated within the BC forestry industry will depend on how this balance is achieved.

7 References

Canadian Council of Forest Ministers. A framework for forest management offset protocols. Eco Resources Consultants Inc. www.ccfm.org/pdf/FFMOP_e.pdf (Accessed 25 March 2010).

Coren, Michael J. 2009. Methodologies tame forest carbon jungle. Ecosystem Marketplace. http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=6928&section=home&eod=1 (Accessed 6 April 2010).

Environment Canada. 2008. Turning the Corner: Canada's Offset System for Greenhouse Gases: Guide for Protocol Developers. http://ec.gc.ca/creditscompensatoires-offsets/default.asp?lang=En&n=7CAD67C6-1 (Accessed 25 March 2009).

Greig, M., G. Bull. 2009. Carbon Management in British Columbia's Forests: Oppotunuties and Challenges. FORREX Series 24. http://www.forrex.org/publications/forrexseries/fs24.pdf (Accessed November, 2009).

Government of BC. 2008. Greenhouse Gas Reduction Targets Act: Emission Offset Regulation. www.env.gov.bc.ca/epd/codes/ggrta/pdf/offsets-reg.pdf (Accessed November 2009).

Henschel, Chris. 2009. Climate Forests Blogspot. http://climateforests.blogspot.com/2009/06/british-columbia-sets-very-low-standard.html (Accessed 16 November 2009).

Journal of Forestry. 2008. Markets for Forest Carbon Offset Projects. *Journal of Forestry.* 106(6):157-162.

International Organization for Standardization (ISO). 2006. Greenhouse gases – Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas reductions or removal enhancements. ISO14064-2.

Kollmuss, A., H. Zink, C. Polycarp. 2008. Making sense of the voluntary carbon market: a comparison of carbon offset standards. Germany. World Wildlife Federation. http://assets.panda.org/downloads/vcm_report_final.pdf (Accessed November 2009).

Merger, Edward. 2008. Forestry carbon standards 2008: a comparison of the leading standards in the voluntary carbon market and the state of climate forest projects. Carbon Positive. http://www.indiaenvironmentportal.org.in/files/Forestry%20Carbon%20Standards%202008.pdf(Accessed 4 April 2010).

Ministry of Forests and Range. 2009. British Columbia Forest Offset ProtocolDraft. Victoria: BC Ministry of Forests and Range.

Pacific Carbon Trust. 2010. Frequently asked questions. http://www.pacificcarbontrust.com/FAQs/tabid/61/Default.aspx#OffsetQuality (Accessed 24 March 2010).

Tree Canada. 2009. Forest and urban tree carbon protocol: a standard for eligibility and measurement of Tree Canada carbon offset projects. www.treecanada.ca/site/resources/.../Carbon%20Protocol%20English.pdf (Accessed November 2009).

Valiante, Gluseppe. 2010. All smoke and no fire in Montreal carbon market. Financial Post. http://www.financialpost.com/news-sectors/story.html?id=2510164 (Accessed 24 March 2010).

Warkentin, Grant. 2010. Abandon tradition, minister tells forestry bosses. Campbell River Mirror. http://www2.news.gov.bc.ca/news_releases_2009-2013/2010FOR0029-000292.htm (Accessed 25, March 2010).

Western Climate Initiative. 2010. Offset committee releases offset system essential elements draft recommendations and offset protocol review report. http://www.westernclimateinitiative.org/news-and-updates/104-wci-offsets-committee-releases-offset-system-essential-elements-draft-recommendations-and-offset-protocol-review-report (Accessed 19 April 2010).

Working Roundtable on Forestry. 2010. January 2010 Status Update: Implementation of the Working Roundtable on Forestry's Recommendations. Victoria: Ministry of Forests and Range. www.for.gov.bc.ca/.../forestry_roundtable/20100120-RoundtableStatusUpdate.pdf (Accessed 25 March 2010).