Carbon Offset Projects for Land Trusts and Landowners in Southern Ontario: Challenges and Opportunities

by

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Executive Summary

Southern Ontario’s natural ecosystems have been subject to immense pressure from a historical prioritization of agriculture and population growth which has led to development pressure and urban sprawl. The combination of agriculture and development in this region led to an annual deforestation rate of 631 ha between 2006-2011. Ontario’s population is expected to increase by one-third by 2048, which will inevitably come at the expense of natural landscapes of the region, especially factoring in climate change. Despite these challenges, land trusts and some environmentally conscious landowners are doing positive work to conserve and sustainably manage important ecosystems. The former are non-profit organizations that rely on financial and property donations; all of which work towards their goal of conserving and protecting nature in perpetuity. However, relying solely on donations to fund conservation activities is a challenge for many land trusts and many private landowners don’t see the value in protecting their woodlots as opposed to harvesting. An emerging strategy to reward and promote the conservation and sustainable management of forests is the development of income generating carbon offset projects. Governments, companies, and individuals can offset their emissions by investing in projects that sequester green house gases (GHGs), including afforestation, reforestation, and forest management that improves upon the status quo. The carbon offset market has evolved rapidly in recent years. Opportunities now exist for land trusts and landowners to use their land to participate in forest carbon offset projects and be financially rewarded for doing so. This review paper offers an information package on forest carbon offset projects that highlights the history of carbon offsets, details the process of conducting forest carbon offset projects, and describes the challenges and opportunities attached to engaging in such endeavours. The recent experience of Ontario’s Escarpment Biosphere Conservancy (EBC) is utilized herein to inform readers about conducting an “Improved Forest Management” carbon offset project. Finally, a landowner’s guide to carbon offsets is attached (Appendix I) in order to provide landowners with a succinct guide to undertaking carbon offset projects that may compliment current conservation, preservation and restoration initiatives on private lands in Southern Ontario.
Development Pressures in Southern Ontario

Ontario’s population has grown rapidly in recent years, increasing from 8 million in 1970 to 13,448,494 in 2016 (Office of Economic Policy [OOEP], 2019). The bulk of this change has occurred in Southern Ontario, which comprises roughly 12% of Ontario’s land area yet accounts for 94% of Ontario’s total population. As a result, there has been significant land type transformation within the region. Southern Ontario, which used to be primarily forested, currently has an average forest cover of only 25% (Environment Protection Report [EPR], 2018). This is partially due to intensive agriculture that started in the 1800’s and still dominates southwestern Ontario today, where several municipalities have been left with only between 5-15% forest cover (Elliot, 1998). In the greater Toronto area (GTA) forest loss has been exacerbated by urban sprawl and development demanded by increasing populations (EPR, 2018; Tomalty, 2005). Combined, agriculture and urbanization put immense pressure on this region’s forestlands, with an estimated 631 ha of deforestation occurring annually (EPR, 2018).

Furthermore, with respect to forested landscapes, development pressures have led to forest fragmentation and a decrease in the number of large intact forests. Researchers have assessed the impacts of population growth on forest cover in the Regional Municipality of York between 1975-1988 and found that as the region’s population increased from 100,000 to 500,00, forest cover decreased by 30-50% and the number of small forest patches tripled (Puric-Mladenovic et al., 2000, Kenney, Csillag, 2000). Fragmentation reduces the size of, and increases the distances between, patches of residual forest, which challenges the survival of many wildlife species and overall forest health (Honnay et al., 2005). Reduction in the patch size of forests and the associated edge effects can increase competition among wildlife for resources, which often equates to a decrease in biodiversity (Lawrence, O’Connor, Haroutouain, Swei, 2018; Haddad et
al., 2015). Fragmentation also impedes wildlife migration, with obstacles such as roads and urban sprawl interfering directly with species survival (Haddad, 2000). Edge effects associated with forest fragmentation effectively reduce the micro-climatic benefits that large intact forests provide. As forests shrink due to development pressures, interior forest habitat is exposed to increasing wind and heat while moisture and light patterns are at the same time altered, all of which can impact forest succession and health (Ewers and Banks-Leite, 2013). Finally, fragmentation exposes remnant patches of forest to invasive species which often thrive along forest edges. In turn, invasive species can challenge the persistence of important native vegetation and the wildlife they support (Haddad et al., 2015).

Making things even more challenging, Ontario’s population is predicted to continue to grow rapidly. Provincial reports assume a population growth of 35-38% between 2018-2046, which could bring the population of the region to 19.8 million by 2050 (OOEP, 2019). Unabated by conservation efforts, this projected growth will place enormous pressure on the persistence of Southern Ontario’s natural ecosystems.

**Climate Change in Southern Ontario:**

Ontario’s natural ecosystems are also threatened by climate change. General circulation models (GCMs) have been used to simulate climate change scenarios based on the concentration of CO₂ in the atmosphere by 2100 (Parker et al., 2000; Columbo, McKenney, Lawrence, Gray, 2007). In a scenario where atmospheric CO₂ doubles, which is a likely scenario, the resulting changes in climate within Southern Ontario are predicted to include spring and summer warming of 3 to 5°C, a decrease in precipitation of approximately 10% during the growing season, and an
increase in extreme weather events such as drought and thunderstorms (Parker et al., 2000; Columbo et al., 2007).

In theory, increases in CO₂, warmer temperatures, and extended growing seasons could increase forest growth and productivity (Colombo et al., 1998). However, reduced precipitation and increased periods of drought are likely to counteract any such benefits (Colombo et al., 1998). In addition, warmer and dryer conditions will make forests more susceptible to fires and disease caused by insects (Parker et al., 2000). As temperatures rise, the presence of insect and pests may increase as Ontario’s warming climate provides opportunity for insect migration northward (Varrin, Bowman, Gray, 2007). Ultimately, these changing conditions may reduce tree vigor which will make forests even more susceptible to insect driven disease (Parker et al., 2000).

Climate changes are predicted to shift optimal growing conditions for most tree species 100km-500km northward (Malcolm, Puric-Mladenovic, Shi, 2005; Parker et al., 2000). However, natural migration may not occur fast enough to adapt to such rapid changes in climate. In addition, barriers to natural migration include the Great Lakes, agriculture lands, and human development (Kling et al., 2003). As a result, it is possible that large tracts of forests may degrade as local conditions for survival become sub-optimal (Colombo et al., 1998). Generalist species are likely to thrive over specialists, and early successional species that thrive in high disturbance environments may also do well (Colombo et al., 1998).

It may be the case that, without assisted migration of tree species northward (i.e., via seed dispersal and tree planting), species that are most tolerant to sub-optimal growing conditions will survive (Malcolm et al., 2005). A study which compared and modelled existing optimal growing conditions (soil moisture, precipitation, temperature) to future conditions by 2100 under a 2°C warming scenario found that optimal conditions shifted northward for most native tree species in
Ontario (Malcolm et al., 2005). Within Southern Ontario, if natural migration could occur as fast as climate is projected to change, modelling results showed that local forest types would change. For large areas, forest classifications would no longer apply due to an abundance of new tree species that currently aren’t incorporated in classification schemes within Ontario (Malcolm et al., 2005).

**Land Trusts**

A way to mitigate development, agricultural pressures, and combat climate change is to legally protect important natural ecosystems. A historic but increasingly popular technique to preserve land is through the work of land trusts.

The practice of legally protecting natural landscapes has been around since the late 19th century, when the first land trust formed in Massachusetts in 1891 (Brewer, 2003). The Hamilton Naturalist Club was the first land trust to form in Canada in 1919 followed by the Nature Conservancy of Canada in 1962 (Bunce and Aslam, 2016; Nature Conservancy Canada, n.d.). Over the last few decades there has been an increase in the number of land trusts, likely due a heightened environmental awareness among the public (Bunce and Aslam, 2016).

Land trusts are non-profit organizations typically concerned with protecting and conserving natural landscapes (Merenlender et al., 2004). They conserve land through securement which involves purchasing land outright using financial donations, receiving donations of land, or signing a conservation easement with a landowner. The latter means that a landowner still maintains ownership over the property, however, it prevents the landowner from developing on the land in perpetuity, ultimately to preserve the ecological integrity of a property. In return, the landowner receives a significant tax break (Merenlender et al., 2004).
**Land Trusts and their Importance for Conservation:**

In a region of Canada that has experienced significant land transformation from agriculture and development pressure, it is crucial that land of ecological significance is protected. Within Southern Ontario, land trusts have done laudable work protecting critical ecosystems and forestlands. Ontario land trusts have protected 34,000 ha of significant natural lands (Ontario Land Trust Alliance, n.d.). The Escarpment Biosphere Conservancy (EBC), a land trust that conserves natural systems along the Niagara escarpment is a leader in land protection. They have protected 14,030 acres of primarily forest land through fee simple purchase (purchasing property), land donations, and conservation agreements (EBC, n.d.). By protecting these lands, they also protect 53 rare and endangered species and estimate that the annual ecological services generated from their properties is around $26,000,000 (EBC, n.d.).

The Oak Ridges Moraine Land Trust (ORMLT) protects habitat on Oak Ridges Moraine, which is a glacial till landscape that spans 161 kilometers north of Toronto (ORMLT, n.d.). So far ORMLT has protected 59 properties on the moraine, totalling 4,400 acres. Landscapes being protected through the efforts of ORMLT include upland forests critical for bird diversity, wetlands, lakes, fens, tall grass prairies, and oak-pine savannah woodlands (ORMLT, n.d.).

In southwestern Ontario, where forest cover ranges from a 10-25% by municipality, several organizations work to conserve the limited forest land in the region (EPR, 2018). The Long Point Basin Land Trust (LPBLT) conserves areas of ecological importance in the counties of Norfolk, Haldimand, and Elgin (LPBLT, n.d.). They protect parts of the depleted Carolinian forest, a forest type that is among the most biodiverse in Canada but has been largely depleted due to land conversion for agriculture and development (LPBLT, n.d.). Land trusts often work
collaboratively to purchase adjacent lands to create larger preserves and promote connectivity which has major benefits for wildlife. Land trusts also achieve this through coordinating land purchases with conservation authorities (L. McLaughlin, personal communication, 2019).

The role of these organizations in protecting the environment is crucial, especially when considering that provincial support for private forest stewardship has decreased (EPR, 2018). In the last few decades the MNRF has cancelled their Agreement Forests Program, under which the provincial government established and managed forests, usually for Conservation Authorities or municipalities. More recently, the Provincial government reduced subsidies on seedling prices for landowners, and significantly reduced funding for the 50 million trees program (EPR, 2018).

The activities of land trusts are important because most provincial and municipal policies don’t guarantee the protection of forestland (EPR, 2018). There are forest conservation by-laws set out by the province, but municipalities don’t have to enforce them. Currently, 26 Ontario municipalities have tree cutting by-laws and 14 municipalities do not (EPR, 2018). The Provincial Policy Statement (PPS), which sets out land use planning guidelines, does not prohibit the clearing of forests for roads or sewage and septage treatment. In addition, the PPS allows landowners to clear their forests if they are expanding land used for agriculture (EPR, 2018).

**Land trusts as Mechanisms for Climate Change Mitigation**

**Climate benefits of Habitat Preservation:**

A land trust’s primary objective is to protect and preserve land, which is crucial for mitigating the impacts of climate change. The benefits of preserving natural ecosystems are abundant. Large intact forests provide a vast array of ecosystem services that benefits humans and wildlife. Forests purify the air we breathe, purify water, maintain biodiversity and habitats for wildlife,
and provide opportunities for recreation (Pajar, 2014). Once natural ecosystems are gone, they are hard to get back and, even if possible, costly to re-establish. Preserving natural ecosystems also provides opportunities to continue to conduct research and monitoring which is crucial for climate change adaptation (Pajar, 2014).

A huge benefit of preserving intact forest is that they are “carbon sinks”. Increasing levels of atmospheric CO$_2$ due to industrial activity is one of the major contributing factors to climate warming (Rosa and Ribeiro, 2001). Trees can help mitigate climate change as they sequester CO$_2$ and store the resulting carbon in their leaves, stems and trunk; while at the same time releasing oxygen through respiration (Pajar, 2014). Older forest systems store huge amounts of carbon in trees, root systems, and soil (Harmon, Ferrell, Frankin, 1990). Whether young to medium aged forest stands store more carbon than older untouched forests has been the subject of many debates. Young trees absorb carbon at a faster rate than older trees, but older trees and forests typically contain more biomass per unit of area in which they store carbon (Harmon et al., 1990). Older forests also typically encompass bogs, peatlands, and thick organic material that also store carbon and contribute to the value of leaving forests untouched. In addition, older established forests are often cleared in order to support young regenerating stands, which generates in a net release of CO$_2$ to the atmosphere in the short term.

**Climate benefits of Active Management:**

Active forest management can help mitigate climate induced stress by using management strategies that guide action towards making forests more resilient to climate change (Jandl, Spathelf, Bolte, Prescott, 2019; Pajar, 2014). This includes introducing tree species that will be better adapted to changing climatic conditions, thinning to promote the growth of better adapted tree species, and on extreme levels attempting stand conversion. Through monitoring and
responding to threats as they develop, active management of forests can also reduce the presence of invasive species and pest-related disease (Jandl et al., 2019).

Active management by land trusts, however, remains highly variable. An organization’s willingness to engage in active management is determined by the amount human and financial resources available, as well as the level of expertise within said organization (L. McLaughlin, personal communication, 2019). The Nature Conservancy of Canada, which is the largest land trust in Canada, has significant human and financial resources to restore the lands they purchase. Smaller land trusts most often only have the resources to focus on protecting land through purchase and thus struggle to implement climate positive management practices (McLaughlin, personal communication, 2019).

In addition, land trusts rely heavily upon conservation easements to protect land in perpetuity. While easements are effective tools for ensuring land is protected, most agreements don’t consider how land may be influenced by climate change and subsequently don’t necessarily allow for active management unless stated in the original agreement (Rissman et al., 2014). Furthermore, stewardship activities that do take place are the responsibility of the landowners, which may be determined by their financial situation and motivation (Rissman et al., 2014). In order for conservation efforts to succeed, it is important that land trusts generate revenues to enable the continued acquisition and protection of critical ecosystems and carry out monitoring to invoke climate change adaptation strategies. Carbon offset projects constitute a relatively new strategy to generate necessary revenues and reward landowners for the sustainable management of forest resources.
Introduction to Carbon Offsets:

Carbon offsets have recently emerged as a strategy to help mitigate climate change. Governments, companies, and individuals can offset their GHG emissions by purchasing carbon credits produced from projects that sequester GHG’s (Bumpus and Liverman, 2015). A carbon credit represents the reduction of one tonne of CO₂ equivalent (1tCO₂e) from the atmosphere (Bumpus and Liverman, 2015). Forestry projects such as afforestation, reforestation, and “improved forest management” absorb or have the potential to absorb large quantities of CO₂. Land trusts and some landowners own large tracts of forest, some of which is often managed for conservation objectives. Others set objectives to manage and utilize forest resources. Regardless of forest management objectives, opportunities usually exist for land trusts and landowners to conduct carbon offset projects.

In order to understand how land trusts and landowners have engaged in, or could engage in, carbon offset projects it is important to understand the history of carbon offset projects and carbon markets on a global and local scale. A global recognition that anthropogenic causes were significantly contributing to climate change began in 1988 with the formation of the International Panel on Climate Change (IPCC) (Gupta, 2010). The aim of the IPPC was to bridge scientific research on climate change with decision making on political levels and to inform global leaders on how to create policy that will help mitigate climate change (Gupta, 2010).

The United Nations Framework Convention on Climate Change (UNFCC) was established in 1992 with a non-binding commitment from 196 countries to reduce GHG emissions (Ramakrishna, 2000). However, the key inadequacy of the UNFCC was that it was not specific
enough to mitigate climate change, which eventually led to the establishment of the Kyoto protocol and associated GHG targets in 1997 (Ramakrishna, 2000).

The Kyoto protocol was the world’s first GHG emissions reduction treaty, centered on a recognition that developed countries were the predominant cause of climate change (Gupta, 2010). As a result, developed nations (Annex 1) committed to reducing GHG emissions by 5% of their 1990 emission levels by 2008-2012 (Gupta, 2010; Calel, 2013). Annex 1 nations had several options for reducing GHG emissions, which included emissions trading, the “clean development mechanism” (CDM), and “joint implementation” (Calel, 2013). It was through these three mechanisms that carbon offsets and the compliance carbon market were created.

**Compliance market:**

The clean development mechanism allowed Annex 1 nations to invest in carbon offset projects in developing countries in return for emission reduction units that could be counted towards their emission reduction targets under the Kyoto Protocol (Calel, 2013; Gupta, 2010). Similarly, joint implementation allowed countries that ratified the Kyoto Protocol to invest in emission reduction projects in other Annex 1 countries, in exchange for emission reduction units (Calel, 2013; Gupta, 2010). Under the CDM, Annex 1 nations could invest in different types of GHG reduction projects. These included investing renewable energy projects, methane (CH₄) reduction projects, implementing measures that improve energy efficiencies in industrial activities, and afforestation and reforestation projects (Godin, 2009). Forest carbon offset projects were not a popular GHG reduction investment under the CDM, making up only 1% of all CDM projects in 2009 (Forest Products Annual Market Review, 2009). Under joint implementation forest carbon projects were deemed not to be credible projects for Annex 1 countries to implement. As a result,
opportunities to conduct forest carbon offset projects within Canada were non-existent under the Kyoto Protocol (Godin, 2009).

**Emergence of regulated compliance markets in North America:**

The Kyoto protocol had very minimal relevance within North America, as the USA never ratified the agreement and Canada pulled out of it in 2012 (Maciunas and Saint-Genies, 2018). Nevertheless, several regional emissions compliance markets have been established with the goal of reducing GHG emissions on state and provincial levels. The Western Climate Initiative (WCI) was formed in 2008 through the collaboration of several states and provinces (Houle, Lachapelle, and Purdon, 2015). Currently the WCI is comprised of the state of California and the provinces of Quebec and Nova Scotia (Pallant and Hakes, 2017).

Quebec’s cap and trade system regulates emissions from major industrial sectors with an aim of reducing provincial GHG emissions by 37.5% from 1990 GHG levels. Industrial entities under the Quebec Cap and Trade system can purchase offsets credits generated from emission reduction projects within Quebec (“International Carbon Action Partnership” [ICAP], 2019). However, there is no protocol established to allow entities to invest in forest carbon offset projects (ICAP, 2019).

The California carbon market has made afforestation and reforestation, improved forest management, and urban forestry projects eligible projects for entities to buy carbon credits from (ICAP, 2019). However, entities must purchase credits from forest carbon projects based in the USA, which provides little opportunity for similar projects within Ontario (ICAP, 2019; Pallant and Hakes, 2017).
In 2016 the Canadian government implemented the Pan Canadian Framework on Clean Growth and Climate Change, which gave Canada’s provinces and territories the option of implementing a carbon tax or a cap-and-trade system in order to meet GHG reduction obligations under the Paris Agreement (Pallant and Hakes, 2017). The Ontario Liberal government at the time was in the process of implementing a cap-and-trade system. Forest carbon projects were slated to be an eligible project for entities to purchase credits from which would have been a massive opportunity for forest landowners in Ontario. However, the recently elected Progressive Conservative Party has (reluctantly) opted for the carbon tax (Pallant and Hakes, 2017).

**Voluntary Carbon Market:**

The Voluntary carbon market evolved around the same time as the compliance market, in the mid 2000’s. This market has traditionally been supported by governments, NGO’s, and individuals who purchase voluntary emission reduction credits from GHG reduction projects (Hamrick and Gallant, 2018). This market is supported by buyers purchasing carbon credits out of social responsibility rather than legal obligation (Hamrick and Gallant, 2018). The voluntary market has traditionally been defined by standards that are less rigorous, therefore more types of GHG reduction projects have qualified as viable carbon offset projects. Carbon offset projects that are eligible within the voluntary stream include:

- Agriculture
- Energy switching and fuel switching
- Forestry and land use (afforestation, reforestation, improved forest management)
- Reduced emissions from deforestation and degradation (REDD, REDD+)
- Renewable energy
- Transport (increasing access to public and or alternative transportation)
Forestry projects in the voluntary market:

Forest carbon projects have been more common in the voluntary market compared to the compliance market. However, compared to other project types such as renewables, energy switching projects, and investments in alternative transport technology, forest carbon projects still play a small role on a global scale. In 2009, forestry project carbon offsets only made up 2.9% of the total volume of carbon credits sold worldwide (Charnley, Diaz, Gosnell, 2010). The following table summarizes eligible forest carbon offset project types in the voluntary market (Table 1).
Table 1: Comparison of Eligible Forest Carbon Offset Projects in the Voluntary Carbon Market

<table>
<thead>
<tr>
<th>Eligible Project Types</th>
<th>Description</th>
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| Improved Forest Management                  | Reduced impact logging (RIL)  
  • Project proponents improve harvesting practices to reduce the impacts of logging  
  • This may involve a series of practical measure that reduce the environmental impact of normal logging approach  
  • GHG emission are reduced compared to baseline scenario  
Logged to Protected Forest (LtPF)  
  • Project proponents conserve a forest that would otherwise be logged, therefore reducing net GHG emissions that would have occurred from a logging scenario  
Extended Rotation Age/Cutting Cycle (ERA)  
  • Project proponents extend the rotation age, allowing stands to continue to sequester carbon for an addition number of years  
  • Thus, increasing the carbon sequestration above previous practices  
Low Productive to High Productive Forest (LtHP)  
  • Projects that increase carbon sequestration by converting low-productivity forests to high productivity forests  
  • This can be achieved by increasing stocking density and selecting the most effective tree species for carbon sequestration relative to normal forest conditions at project site |
| Afforestation and Reforestation (ARR)       |  
  • (Afforestation) Projects that involve planting trees in areas that had no previous or very minimal forest cover  
  • (Reforestation) involves restoring forest cover through planting, seeding, or other means of human-assisted natural regeneration  
  • In order to viable, project site must not have been cleared of forest cover within 10 years prior to implementation |
| Reduced Emissions from Deforestation and Degradation |  
  • Projects that prevent planned deforestation from occurring  
  • Projects that prevent unplanned deforestation from occurring (e.g., illegal logging)  
  • Example: not converting mature forests to plantations  
  • Primarily only relevant to developing countries |

1 Forest Carbon Credits: A Guidebook to Selling Your Credits On The Carbon Market  
**Important terminology**

The process of generating carbon offset credits from project start to finish can take several years. Here are few key terms that are important to the process:

**Project Proponent:** Initiator of a carbon offset project and typically legal owner of property being used in carbon offset project.¹

**Project developer:** Generally, these are professional consulting companies that specialize in helping project proponents successfully conduct a carbon offset project. They specialize in streamlining projects to meet registry standards. They help with the pre-assessment report, Project Design Document, marketing, and connecting project proponents to potential buyers.¹

**Registries:** Carbon credit registries create standards and have defined methodologies that a project proponent must follow in order to produce carbon credits. Registries can be run by governments, private-sector, or non-profits. Once a project becomes verified and receives credits, a registry assigns a serial number to each verified offset. Registries that have defined standards and protocols for forest carbon projects include¹:

- Verra (formerly known as the Verified Carbon Standard)
- American Carbon Registry (ACR)
- Climate Action Reserve (CAR)
- Clean Development Mechanism (CDM) (compliance)
- Gold Standard
- GHG clean projects registry

**Protocol:** The validation process of a registry follows a certain protocol. The protocol provides eligibility rules, methods to quantify GHG reductions, project-monitoring instructions, and procedures for reporting¹.

**Accredited Validation and Verification bodies:** are private companies that are accredited to conduct third-party auditing to access a projects compliance with registry standards.¹

**Ex-Post Crediting:** Project Proponents are credited for carbon sequestration activities that occurred in the past. Typical of Improved Forest Management projects, where project developer can prove that project activities were sequestering CO₂ above a baseline scenario in years prior to verification.¹

**Ex-Ante Crediting:** carbon offset credits are issued to project proponent in advance of a projects GHG reduction activities. Not a commonly accepted practice, however, ex-ante crediting has been issued for some afforestation and reforestation projects based of future estimated emission reductions.¹

**There a several key requirements that a project must demonstrate:**

**Additionality:** Project proponent must demonstrate that project activities sequester or will sequester additional carbon relative to a baseline scenario.¹
Baseline Scenario: hypothetical reference scenario to which a forest carbon project is compared. In most IFM scenarios the baseline reflects common practices in a region, “business as usual.”

GHG reduction/removal: difference between the baseline scenario and the project scenario. For example, a project may protect an unlogged forest from a baseline scenario that would result in 15% harvest every 10 years. The GHG reduction = Project scenario CO₂ sequestration - baseline scenario CO₂ sequestration. If this project absorbs 15,000 tCO₂e above the baseline scenario, the project will generate 15,000 carbon credits to sell.

Permanence: project proponents must demonstrate that a project will sequester carbon for a minimum of 100 years. An analysis of potential threats to permanence will be conducted, looking at natural and anthropogenic risks.

Leakage: project proponents must prove that a project will not lead to an increase in GHG emitting activities outside project boundaries. For example, a forestry company may decide to preserve a forest for use as a carbon offset project under an IFM protocol. The company must prove that harvesting activities will not increase outside project boundary in order to compensate for the lack of harvesting under the project scenario.

Relevant outcomes for local stakeholders/communities: project proponents must prove that they are engaging with local stakeholders and that stakeholders will benefit from project activities.

Key Components of the Process:

Although there is slight variation between the processes required for different registries, the following paragraphs outline common components involved in conducting a forest carbon offset project. Several existing documents provide great information on the process of conducting a forest carbon offset project. Information in this section was drawn from the non-profit organization, Forest Trends’, “Building Forest Carbon Projects” (2011) guide and Diaz and Davies’ “Landowner Guide to Forest Carbon Offsets Credits, and Incentives” (2016). The information is tailored for an Improved Forest Management project but most of the content applies to afforestation and reforestation projects as well.

Project proponents typically know very little about the rigorous processes required to conduct a carbon offset project prior to starting the process. The early stages of this process involve a
combination of self-education on the part of the project proponent and connecting with a project developer to conduct a pre-assessment report.

A **pre-assessment report** is conducted by project developers that have a combination of expertise in forest management and carbon registry standards. Through extensive review of documents and on-site field visits, project developers develop a pre-assessment report which outlines how a project proponent is meeting the basic requirements to potentially conduct a carbon offset project. The report also outlines shortcomings of a project and provides guidance towards how they can be resolved. The pre-assessment will determine/create:

- **GIS Shapefiles**
  - Prior to conducting a forest inventory, a project developer can get an estimation of forest cover density and type by using a stratification tool in GIS

- **Carbon benefits potential**
  - Typically, project sites do not have a forest inventory initially
  - A pre-liminary emission reduction estimation can be made by calculating tree growth on the basis of mean annual increment (m² ha⁻¹ y⁻¹) of a defined forest area, and converting this to the accrual of wood volume (m³).
  - Through a series of calculations tree biomass (m² ha⁻¹ y⁻¹) can subsequently be determined and converted to tCO₂e ha⁻¹ y⁻¹

- **Estimation of baseline scenario**
  - Project Developers will consult with local foresters and examine documents to access common land use activities in the region to determine if there is a baseline scenario
  - Through establishing a baseline scenario and having a gage on the carbon sequestration potential of a project site, project developers may be able to estimate the amount of carbon credits generated from a project

- **Assessing potential for leakage and permanence**
  - Through examining project proponents’ documents and past activities, project developers can determine if a project will lead to leakage outside project boundaries
  - Through examining project proponents’ legal documents and assessing local risks (fire, disease, illegal logging) project developers can determine if threats exist to the longevity of a project

- **Estimation of financial feasibility:**
  - Consultants provide an initial cost/benefit analysis
  - Ponder potential buyers and market for future credits
• Examination of community benefits
  o Through interviews with local community members and accessing the outreach activity of a project proponent, project developers can determine how a project will benefit or detriment local stakeholders
• Assessing outcomes:
  o Project developers provide project proponent with a better idea of financial feasibility of a project
  o Project developers identify most appropriate methodology (afforestation, reforestation, Improved forest management) and propose most suitable registry to comply with
  o Project developers identify areas of improvement for project to meet registry standards and create a plan to resolve weaknesses

Forest management plan and forest carbon inventory
• Typically, a forest management plan will be required, which states the proponent’s management goals
  o If the landowner doesn’t have a forest management plan, project developers can hire local foresters to consult with the project proponent and create a reasonable management plan
• A forest inventory needs to be created in order to calculate the amount of carbon storage at project site
• A forest inventory includes detailing tree species composition, wood volume and age
• Project developers will hire a Register Professional Forester to conduct a forest inventory
• The forest carbon inventory will need to be updated every 5-7 years which involves:
  o Setting up several plots in representative site within a project site (site that is representative of overall stand tree composition and age)
  o Recording diameter at breast height (DBH), height, and species of every tree with a DBH of 10cm or greater and within a 10m radius of plot center
  o By obtaining height and DBH, volume of trees can be calculated which can be converted into biomass and then to tCO₂e
  o Forest inventory data is accompanied by growth and yield modelling

Carbon Modelling:
• A landowner’s forest carbon inventory-information detailing tree species, age, and DBH will initially be used to estimate carbon storage potential of a project site by inputting inventory data into a growth and yield model
• If for example, a landowner currently clear cuts a white pine stand every 40 years, inventory data will be input into model to establish the baseline GHG scenario (40 year harvest of white pine)
• If the landowner plans to extend rotation age to 80 years, modelling will provide an initial estimate of carbon sequestration under this project scenario
Project Design Document (PDD):

Following the pre-assessment report, arguably the most resource intensive process begins, which is creating a project design document (PDD). The PDD must emphasize project details such as highlighting the roles of everyone involved in the project and project start date. The PDD outlines how a project will provide carbon benefits and using forest inventory and modelling, a quantification of GHG removal will be claimed.

The pre-assessment report allows for estimation of GHG removal and baseline scenarios, but the PDD needs to be more accurate. It is recommended that project proponents use the same project developer that conducted the pre-assessment report. The PDD highlights a project's accordance to a specified protocol and registry. The following are typically covered in a PDD:

A) Spatial Boundaries
   • Project developers will use GIS technology to show which sites will be part of the project

B) Assertion of baseline scenario:
   • Baseline scenario must be accurately established, which is typically done through a barrier test
   • A barrier test is a common technique used to help justify the most realistic baseline scenario; identified as the option which faces least significant barrier and is the most likely scenario in the absence of a project

C) Quantification of emission reductions:
   • From the results of forest inventory and application of growth and yield modelling, carbon storage of a project site must be asserted and supported with calculations

D) Leakage and risks to permanence:
   • Project developers must prove that a project will not be subject to leakage
     • This can be achieved by accessing project proponents past activity and company objectives
   • Risks to permanence can be evaluated through analyzing regional climate trends, harvesting activity, and project proponent’s property documents
   • If risks to project permanence are identified it is common for project proponents to be required to set aside a “buffer pool,” a percentage of future carbon credit sales as an insurance in case reversals do occur
Validation:
Third party auditors, who are accredited by the chosen standard, review the PDD to assess if a project meets the criteria of a standard. The auditing team conducts interviews with project proponents, analyzes documents, and visits projects sites. If the PDD meets required standards a validation report is created.

Registration:
Once a project passes validation most standards require the project proponent to submit a series of documents to the registry office. Documents include the PDD and validation report which the registry will access for completeness. Following, the project is now officially registered and eligible to generate credits.

Monitoring:
- Monitoring involves accurately detailing the carbon sequestration achieved by a project and documenting the results. The monitoring process must follow the exact guidelines set out in the PDD to achieve compliance with verification audits
- Monitoring data, calculations, and results need to be thoroughly documented and presented to third-party auditors during the verification process

Verification and Issuance:
An auditing team, accredited to the chosen standard, will evaluate the projects monitoring report which details the GHG reductions generated from a project. Verifiers visit project sites, meet with project proponents and project developers, and access all relevant documentation. Any issues raised by the auditors will have to be resolved before credits are issued. If auditors are satisfied that the project meets protocol and registry standards, a final verification report and verification statement will be established. At this point the verifier will confirm the amount of carbon credits that can be generated for a project over the corresponding monitoring period. The project proponent can now request issuance of carbon credits.
**Figure 1: Typical Carbon Offset Project Development Cycle** (Olander and Ebeling, 2011).

**Challenges and Opportunities for Land Trusts and Landowners**

**Funding:**

There are many challenges project proponents face when implementing a forest carbon offset project. A major barrier is finding the funding to cover the costs associated with developing a project (Charnley et al., 2010). These include costs associated with pre-assessment reports, developing a PDD, and paying for validation and verification services. Total expenses can range from tens of thousands to hundreds of thousands of dollars depending on the chosen registry (Charnley et al., 2010).
Low carbon prices and decreasing demand:

Carbon prices on the voluntary market have been unstable and are typically lower than the payout per credit sold in the compliance market. In 2017, the average price per credit sold from forest carbon projects was only $5.1/tCO$_2$e in the voluntary market (Hamrick and Gallant, 2017). Carbon offset prices in the California compliance market were recently $14/credit (tCO$_2$e) (californiacarbon.info, 2019). Prices in the voluntary market have fluctuated in recent years due to a decrease in demand (Pallant and Hakes, 2017). One major issue with the voluntary market is that the supply of carbon credits and the rate of issuance has increased while demand has decreased (Pallant and Hakes, 2017; Michaelowa et al., 2019). As a result, many project proponents have reported being unable to sell their credits despite going through the expensive process of achieving compliance with registry standards. In 2015, for every voluntary offset credit purchased, 1.6 credits went unsold and this trend hasn’t changed leading up to 2020 (Pallant and Hakes, 2017). It is crucial that project proponents find potential buyers prior to committing to project development, which can be aided by working with project developers.

The challenges associated with financing project development and finding buyers can be mitigated through collaborating with project developers. Companies such as Carbonzero specialize in streamlining projects to meet registry standards, they help market projects, and find potential buyers (Carbonzero, n.d.). In addition, project developers will help finance much of the project activities in return for a percentage of future carbon credit sales (Covell, 2011). The use of project developers is vital for small companies and landowners with minimal human and financial resources.
Landowners with small properties:

In both the compliance and voluntary market, small projects are rarely financially viable alone. The costs associated with project development are substantial. In order to make a project financially viable project land area needs to be large enough to produce enough carbon offsets to turn a profit. It is generally stated that landowners must have a minimum of 1000-1500 acres to achieve financial viability (Kerchner and Keeton, 2015). The average size of private family owned forests within Canada is 111 acres, so for most landowners conducting a carbon offset project alone is not viable (Rotherham, 2002).

In recent years, registries have begun to approve project aggregation. If landowners own several properties that have the potential to produce carbon offsets, most registries allow separate properties to be grouped together and counted towards one project (Charnley et al., 2010). Aggregation can also work to group multiple landowners into one project, whereby, they share the costs of project development. However, there are challenges associated with working with several landowners. Projects require long term commitments and if a landowner wants dismissal from a project that could jeopardize the other landowner’s involvement in a forest carbon offset project (Charnley et al., 2010).

Long term commitment:

Most registries will credit a forest carbon offset project for 40-50 years. However, to ensure that a project site is continuing to provide carbon benefits, project proponents are required to monitor and protect sites for up to 100 years (Eastern Ontario Model Forest, n.d.). For private landowners this level of commitment can be demonstrated through signing a conservation agreement which prevents any development on a site for 100 years. This level of commitment is a major deterrent
for many landowners (Charnley et al., 2010). However, for land trusts who already strive to protect land in perpetuity, this level of commitment is very achievable. Many landowners who operate private woodlots have kept their land within their family for many generations. For landowners that intend to continue this trend, the commitment period of a carbon offset project shouldn’t be a barrier.

**Challenges and opportunities related to different protocols:**

Afforestation and reforestation projects are less common than improved forest management projects. This is attributed to the relatively high project initiation costs associated with afforestation, which includes the costs of purchasing seedlings and planting. Another deterrent is that project proponents usually aren’t issued credits for at least ten years after planting a site (Schirmer and Bull, 2014). However, within Southern Ontario there are large tracts of degraded and sparsely forested land that could be planted and utilized for afforestation related carbon offsets. The high costs of purchasing and planting seedlings could be abated by government funded programs (EPR, 2018). Unfortunately, provincial government programs that support afforestation have become less accessible in recent years. In 1986 the MNR provided over-the-counter seedling sales which gave landowners the option to purchase seedlings at discounted prices of $0.04/seedling. Today, landowners can purchase seedlings at a discount through the government funded 50 Million Trees Program, but at a more costly rate of $0.50/seedling (EPR, 2018).

The greatest opportunity for landowners and land trusts to engage in forest carbon offset projects is through Improved Forest Management protocols. IFM is suitable for landowners that already own large tracts of forest land. In many cases, by simply tweaking management strategies that favor more sustainable practices landowners will be eligible to conduct IFM projects. For
example, landowners that have traditionally harvested their forest can qualify to conduct an IFM project by reducing harvesting volume and extending the rotation age (“Forest Carbon Projects,” 2012). Under this protocol, landowners can be credited for the difference between the amount of carbon that would be emitted had the full volume been harvested and the increase in carbon storage that occurs from harvesting older trees (“Forest Carbon Credits,” 2009).

Another option for landowners and land trusts is IFM logged to protected forest protocol. This applies to landowners who conserve their forest land, whereby, in the absence of their ownership the forest area would likely be subject to logging (“Forest Carbon Credits,” 2009). Landowners are credited for the difference between the amount of carbon that would be emitted under a logging scenario and the increase in carbon storage that occurs because the land is protected. An IFM low productive to high productive protocol is another option. This requires landowners to enhance the productivity of their land by increasing stocking density and planting trees that sequester a high rate of carbon, ultimately enhancing the carbon stocks on their property relative to previous forest conditions (“Forest Carbon Credits,” 2009).

Generally, landowners that have a forest land area that is more densely stocked than the regional average are likely earn carbon credits right away (Keeton, VanDoren, Kerchner, Fuqua, 2018). If a landowner’s forest under this scenario is sequestering more CO₂ than baseline scenarios, it will give the landowner revenue right away. Conversely, if a landowner’s forest is not as well stocked as regional averages, they could have to wait a number of years before their forest starts sequestering CO₂ above the baseline scenario and generating carbon offsets. This means they wouldn’t generate revenue early in the forest carbon project life cycle. Therefore, for landowners that have densely stocked forests, carbon offset projects are much more viable because they can
use the immediate initial revenue to cover costs associated with project development (Keeton et al., 2018).

Opportunities:

Within Ontario, opportunities for forest carbon offset projects to enter compliance markets have been limited. Under the former Liberal government Ontario implemented a cap-and-trade system to comply with GHG reduction commitments under the Paris Agreement. However, the current Progressive Conservative government terminated that program and has opted instead for a carbon tax (Pallant and Hakes, 2017). If the Liberals regain power, there is a belief that they will bring back a cap-and-trade system. This would be a huge opportunity for forest landowners because entities would be required to meet their emission reduction targets in part through purchasing carbon offsets from projects in Ontario (Pallant and Hakes, 2017). Before the cap-and-trade initiative was scrapped, the province was in the process of designing protocols for afforestation, reforestation, and improved forest management projects to be included as offsetting mechanisms (Pallant and Hakes, 2017).

Prior to the Progressive Conservatives victory, the Liberal government was in the process of designing a provincial voluntary carbon market, which would help the government go carbon neutral (Ministry of Environment and Climate Change [MECC], 2017). Under this strategy, provincial entities such as school boards and hospitals would have been encouraged to offset their emissions through purchasing carbon credits produced from projects sourced in Ontario (MECC, 2017). It was expected that afforestation and reforestation projects would be a major source of crediting under this voluntary system (Pallant and Hakes, 2017).
Despite the fact that Ontario’s provincial cap-and-trade and voluntary carbon offset credit system fell through, there is potential for these systems to be realized, contingent on the emergence of enabling legislation. Provincial Initiatives in British Columbia and Alberta have raised opportunities for forest carbon offset projects (Pallant and Hakes, 2017). In 2007 British Columbia launched the “Carbon Neutral Mandate,” which required provincial service entities to reduce their GHG emission by 30% below 2007 levels by 2020 (Hoberg, St. Laurent, Schittecate, Dymond, 2016). A significant pathway to reducing emissions under this mandate was to purchase carbon offsets from improved forest management projects within British Columbia (Pallant and Hakes, 2017). Offsets produced by these projects have sold for around $9-$19/tCO2e, which highlights the financial benefits for project proponents operating in regulated markets (“BC Carbon Offsets”, 2015).

There are also opportunities for forestry projects to benefit from investments made by the International Civil Aviation Organization (ICAO), which aims to make the aviation industry carbon neutral by 2031 (“Why Forests and Flight Go Together,” 2018). To achieve this, ICAO airlines will be required to offset some of their emissions by purchasing offset credits generated from forestry projects (“Why Forests and Flight Go Together,” 2018).

**Conclusion:**

Carbon offset projects have emerged as a way for forest landowners, whether they be private landowners or land trusts, to be rewarded for managing forests in ways that sequester carbon beyond a localized baseline scenario. In a region that has faced and will continue to face development and population pressures, it is important that forestland owners be incentivized to manage their land sustainably. Carbon markets, which have evolved over the last 15 years, are
providing an opportunity for Ontario landowners and land trusts to engage in forest carbon offset projects. Undoubtedly, there are challenges along the path to successfully creating a carbon offset project but there is also opportunity and in many cases revenue to be earned. Despite the rise of carbon offset projects and carbon markets, the average person knows very little about forest carbon offset projects. The main objective of this paper was to provide a forest carbon offset information package, with a hope that landowners read this paper and gain new understanding towards how they could manage their land to enhance carbon sequestration and subsequently benefit from doing so.
**Case Study: Escarpment Biosphere Conservancy**

In the mid 90’s Robert Barnett was working on the committee for Bruce Trail Conservancy. He recognized their great work protecting land around the Bruce trail, but he wanted to protect larger areas of forestland in the region. As a result, he formed the Escarpment Biosphere Conservancy (EBC) in 1997, which is non-profit land trust that protects critical habitats. Since 1997, EBC has protected 14,000 acres of forestland, grassland, and alvar ecosystems in Grey and Bruce County, Halton, and Manitoulin island.

![Map of regions where EBC’s nature reserves and conservation agreements occur](image)

**Fig 2: Map of regions where EBC’s nature reserves and conservation agreements occur**

EBC obtains the funding to protect these vital ecosystems through several different mechanisms. A large portion of their land is donated, while the rest is purchased using financial donations from environmentally conscious members of the public. EBC also achieves land protection through conservation agreements. However, out of a desire to find additional funding to continue to conserve valuable ecosystems, in the late 2000’s EBC began exploring opportunities to utilize their lands to produce carbon offsets.
Since that time EBC has helped pave the way for other land trusts and landowners to engage in forest carbon offset projects. In 2012 EBC retained Carbonzero, a project developer based out of Toronto, to have a pre-assessment report conducted for their properties. Carbonzero subsequently obtained an offset purchasing commitment from the Ontario Government, which cemented EBC’s commitment to move forward with the additional steps required to generate and sell carbon offsets.

The Niagara Escarpment Forest Carbon Project (NEFCP), EBC’s project title, consists of 111 properties all of which generate carbon offsets through a logged to protected Improved Forest Management Protocol following the standards of the GHG CleanProjects Registry. EBC’s nature reserves sequester more carbon than similar forests in the region that are frequently harvested, and it was determined that in the absence of EBC’s conservation efforts their properties would be subject to harvesting.

In 2017 the NEFCP was verified by Carbon Consult Group and it was determined that the length of the project would span from 1999 to 2048. The project extends into the past because EBC purchased some of their properties in 1998 and Carbon Consult Group was able to verify that their properties had been sequestering additional carbon above and beyond typical forests in the region since their original purchase date. EBC will receive carbon credits over 50 years, which is a typical project length, but they will be required to monitor the carbon benefits of their properties and ensure they are conserved until 2099. This 100-year commitment is a requirement for most carbon registries.

With the help of Carbonzero EBC went through a rigorous process to create their project design document (PDD) and getting the project verified by Carbon Consult Group. In the seven years since, the NEFCP has contributed to a total removal of 31,737 tonnes of CO₂ equivalent, which
equates to around $300,000 in profit that EBC re-invests to purchase and protect more properties.

To date, the Desjardins Group have purchased the majority of EBC carbon credits.

![Fig 3: Site locations contributing to the Niagara Escarpment Forest Carbon Project](image)

**Details of the process:**

The Escarpment Biosphere Conservancies (EBC) conservation efforts, protecting vast areas of mixed wood plain forest which includes 4000 acres of mature forest, naturally gave them a great opportunity to pursue a carbon offset project. However, EBC had never conducted a forest inventory and as a result didn’t know the extent to which their protected lands were sequestering carbon above and beyond neighbouring forests which are often harvested. Carbonzero hired a team of foresters to conduct forest inventories on their properties and subsequently determined several different baseline line scenarios.

Through consultation with local foresters, Carbonzero was able to estimate several different baseline scenarios for the different forest types found within EBC’s properties. Upland tolerant hardwood forests, which occupy the elevated regions of the escarpment, are typically harvested every 7-15 years. They are often harvested by diameter limit cutting, which results in a removal
of approximately 1000-2000 board ft/acre. Lowland forests, which occupy wet areas adjacent to riverbanks, streams, and floodplains, are typically harvested every 10 years, which results in an average removal of 1000-2000 board ft/acre. Cedar and coniferous forests in the region are harvested every 60 years at a 30% removal rate. EBC doesn’t harvest on their lands, so the amount of crediting they receive is the difference between these baseline scenarios and their project scenario.

Challenges:

The Escarpment Biosphere Conservancies (EBC) commitment to the project has allowed them to avoid many of the challenges other project proponents face. However, an initial hurdle they faced was finding buyers. Prior to connecting with Carbonzero they hired another project developer, but they couldn’t find any committed purchasers. Working with a project developer requires building a rapport and investing countless hours working together. As was the case with EBC, finding the right project developer may take time.

EBC have had success working with their main purchaser, Desjardins Group, but there have been some challenges that required action outside of the scope of the carbon project itself. For Instance, companies in the voluntary carbon market invest in offsets to raise their profile as promoters of corporate social responsibility. As a result, companies like Desjardins Group often seek recognition for their investment in so-called “green projects”. In this case, EBC has been asked to recognize Desjardins efforts through advertising. As a result, the Desjardins Group is listed on signs throughout EBC’s nature reserves.
Moving forward:

Only a portion of the Escarpment Biosphere Conservancies (EBC) protected forest land has been utilized under the Niagara Escarpment Forest Carbon Project (NEFCP). EBC hopes to eventually increase the project size from 2700 acres to 9000 acres. This provides an amazing opportunity to generate more revenue which will go back into purchasing additional nature reserves. Robert also hopes to encourage landowners who have signed a conservation agreement with EBC to consider utilizing their land to join the NEFPC.

Although EBC has done well selling their credits through the voluntary market, the prices per carbon credit are much higher in compliance markets. As previously stated, there is no regulated compliance market for EBC to sell their credits to within Ontario. Robert believes that could change if another government in elected and if so, he would seek that opportunity.

The NEFPC is projected to sequester 125,000 t CO$_2$e over the project lifetime. If EBC can sell their credits for an average price of $5/credit (t CO$_2$e) that would result in earnings of $625,000. If they could sell their credits for $8/credit (t CO$_2$e) that would result in approximately $1,000,000 in earnings. Of course, by the nature of EBC’s company ethos this money will be reinvested into protecting more land in the Niagara Escarpment Region.
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A Landowners Guide to Conducting a Forest Carbon Offset Project in southern Ontario
Basics:

- Governments, Businesses, and individuals can offset their emissions by investing in projects that sequester GHG emissions.
- This is done through the voluntary carbon market, where people/groups offset their emissions out of social responsibility.
- Trees naturally absorb large quantities of CO$_2$, storing it in their leaves, branches, trunks, and root systems.
- As a result, landowners who own large tracts of forests are in position to conduct a forest carbon offset project.
- Landowners must follow the guidelines of a carbon registry; registries validate your carbon sequestration activities and issue credits. Here are carbon registries applicable to landowners in Ontario:
  - CSA GHG Clean Projects ([https://www.csagroup.org/](https://www.csagroup.org/))
  - Gold Standard ([https://www.goldstandard.org/](https://www.goldstandard.org/))

Landowners must prove the following:

**Additionality**: prove that their activities increase carbon sequestration on a property above a baseline scenario (regional average/alternative scenario).

- Example: Jim protects his land and doesn’t harvest trees in a region where forests just like his are typically harvested. By taking a conservation approach, Jim’s forests are sequestering more carbon than the most likely alternative scenario: local forests subject to harvesting.
- Jim can be rewarded for this additional carbon sequestration; he can earn carbon credits (1 credit=1tCO$_2$e) representing the difference between carbon sequestration under his management scenario and the baseline scenario sequestration rate.
- Carbon credits are sold at $5-9 in the voluntary market to purchasers wanting to offset their emissions.
- Any activity that increases carbon sequestration above an alternative scenario makes a landowner eligible to conduct a carbon offset project.

**Projects that are eligible:**

- Afforestation/reforestation
- Improved forest management
  - Logged to protected forest (protecting a forest that would otherwise be logged)
  - Increasing forest productivity (increasing stand density)
  - Extending your rotation age and reducing harvested volume
- Avoided forest conversion

**Permanence**: landowners must be willing to commit to monitoring and assuring that their land provides carbon sequestration benefits for up to 100 years.

**Leakage**: landowners must be able to prove that their carbon offset activity doesn’t lead to an increase in GHG emitting activity outside project boundaries.
• Example: Jim protects his favorite forest, but in order to compensate for the lack of harvesting at this project site he increases harvesting rates in his other forests; This activity would make Jim ineligible to conduct a forest carbon project

Ask yourself the following?

• How many acres of land do you have? Typically, if you have 1,000-1,500 acres of forest land you are in a position to conduct a stand-alone project

• If you have less than 1000 acres you may still be able to participate through a group carbon offset project, by combining your land with other landowners’ lands to register for carbon offsets

• Do you currently harvest your forestland? If so, you could commit to reducing harvesting volume and increasing rotation age which may make your property eligible for an improved forest management (IFM) extended rotation age protocol

• Do you currently protect your forest land by not harvesting? Is harvesting of forests similar to yours a common scenario in your region? If so, your conservation practice makes you eligible to conduct an Improved Forest Management logged to protected protocol

• Do you have large areas of sparsely treed land (fields or degraded low density forest)? If so, you could use your land to conduct and afforestation or reforestation carbon offset project

Step by-step guide:
Do your research:

• get in contact with organizations/landowners that have already conducted a forest carbon offset project

• Escarpment Biosphere Conversancy currently operates an IFM project (https://escarpment.ca/)

• Eastern Ontario Model Forest oversees a group owned carbon offset project (https://www.eomf.on.ca/)

Work with a carbon project developer (PD):

• Project developers specialize in helping landowners meet the standards of a chosen registry and cover the up-front costs associated with developing a carbon offset project. Check out:
  o http://www.carbonzero.ca/
  o http://www.bluesource.com/

  They will do the following:
  A) Conduct a pre-assessment report

  • PD’s will conduct an initial assessment of your land identifying carbon sequestration potential, potential crediting amount, and they will identify areas which need improvement in order to meet registry standards

  • The pre-assessment report gives a landowner a gauge on the financial feasibility of a conducting a carbon offset project
B) PD’s connect with foresters to conduct a forest carbon inventory:

- Local foresters will create a forest inventory, identifying stand age, density, species, tree height and diameter at breast height (DBH)
- Data from inventory will be used in a growth and yield model to predict the current carbon sequestration and future carbon sequestration potential of a project

C) Project Development Document

- Project developers will compile relevant paperwork, including project details (start date, project proponent, roles of each party), and provide a quantification of carbon sequestration from project and baseline scenario
- PDD is a document that highlights how a project will conform with a registry’s standards

D) Validation

- Project developers will hire a third-party auditor that will access the project details and if the PDD meets registry standards a validation report is created
- To learn more about Validation and verification bodies: [https://carbonconsultgroup.com/en/](https://carbonconsultgroup.com/en/)

E) Registration:

- Project developers will send PDD and validation report to a carbon registry; upon review, the registry will officially authenticate the project

F) Verification and Issuance

- Final step before landowner will be issued carbon credits
- Auditing team (usually company that validates project) reviews the monitoring report and accesses if claimed carbon sequestration values are correct
- The team will visit project sites and conduct interviews with landowner(s). If satisfied that a project is meeting registry standards, the auditors will verify the offset and landowners can known request issuance of carbon credits from a registry office

**Ongoing Commitments:**

- The landowner will be required to conduct monitoring annually and report risks to a project site’s ability to sequester CO₂ (forest fire, pest damage, illegal logging)
- Every 5-7 years a landowner, with the aid of project developer, will be required to update their forest inventory
- This is done by establishing plots in representative locations throughout the project site(s) (locations representative of project sites’ forest cover, density, and topography)
- All trees that are within a 10 m radius and have a DBH of 10 cm or
greater are measured for height, DBH, and distance from plot center.

- This data is sent to the auditing team who then calculate the tCO2e stored in each plot which can be compared against “business as usual” scenarios.

**Important Considerations**

- From project start to time of credit issuance can take up to 2-3 years.

- Costs associated with developing a project can be expensive but are often covered by project developers in return for a percentage of future carbon credit sales.

- Project developers will help you find a buyer which is crucial before investing time and money into project development.

- Landowners who are likely to succeed at a forestry carbon offset project:
  - Those who are open to working with a project developer.
  - Those who have 1000+ acres of forested land.
  - Those who are committed to the sustainable management of their forest lands.
  - Landowners who intend to keep their land within their extended family for the next 100 years or are willing to sign a conservation easement (committing them to protecting their forest land).

- Resources that explain forest carbon offset projects in detail:

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**Figure 2: Offset Project Development Cycle**

- Certification and Issuance of credits
- Project idea
- Preparation of project documentation
  - Feasibility study
  - Project Idea Note
  - Selection or development of protocol
  - Project documentation
- Verification
- Monitoring
- Registration
- Validation