

Forest Carbon Offsets

Robin B. Clark
2016

Carbon Cycle



20,000 gallons PER DAY
An acre of maple trees can put as much as **20,000 gallons of water into the air** each day.

DAVEY
Proven Solutions for a Growing World

Reduce noise BY 50%
Trees muffle urban noise almost as effectively as stone walls. A properly designed buffer of trees and shrubs can reduce noise by about 5-10 decibels.
—USDA National Agroforestry Center

Controls SOIL erosion
In 50 years **one tree produces** \$31,250 worth of oxygen, provides \$62,000 worth of air pollution control, recycles \$37,500 worth of water and controls \$31,250 worth of soil erosion.
—USDA Forest Service

one person causes 10 TONS OF CO₂ PER YEAR
One person causes about 10 tons of carbon dioxide to be emitted a year. **One tree removes about 1 ton of CO₂ per year**, and 1 acre of trees absorbs 2.6 tons of CO₂ per year.

enough OXYGEN for a Family of 4
A single tree produces approx. 260 lbs of oxygen per year, meaning two mature trees provide enough oxygen for a family of four.
—CarbonDay.com

Image taken with permission from Davey Tree

City of Vancouver Urban Tree Strategy

Vancouver only has about 18% canopy cover.

Ecosystem Services Provided by our Urban Forest

- 34 metric tonnes of particulate matter (dust, smog, soot) are removed by our urban forest each year
- 20,000 metric tons of carbon dioxide are absorbed by our urban forest each year
- Managing rainwater
- Providing wildlife habitat
- Shade, fruit, stress reduction
- Tourism (cherry blossom trees)
- Health benefits



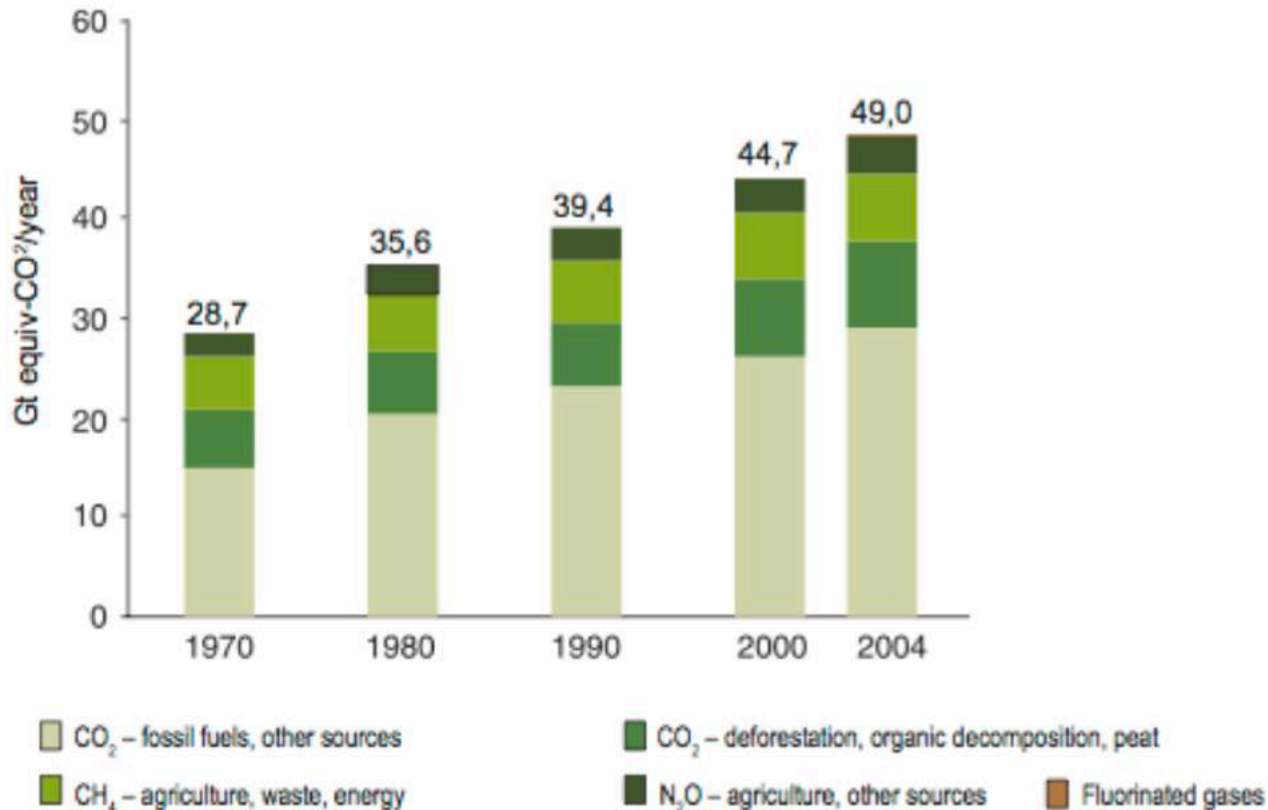


City of Vancouver Urban Tree Strategy

Plan to grow our urban forest canopy – Plant 150,000 trees by 2020

- Select specific tree species to prevent root conflicts (with infrastructure) and canopy conflicts (with overhead wires)
- Ensure resiliency to disease and climate change
- Plant in parks and on private property
- View our urban forest as green infrastructure that provides immense benefits
- Coordinate with Integrated Stormwater Management Plan

GHG Emission Ranking



#1 Energy Sector

#2 Industry

#3 Land-use change
(deforestation +
degradation)

6 Agriculture

#5 Transportation

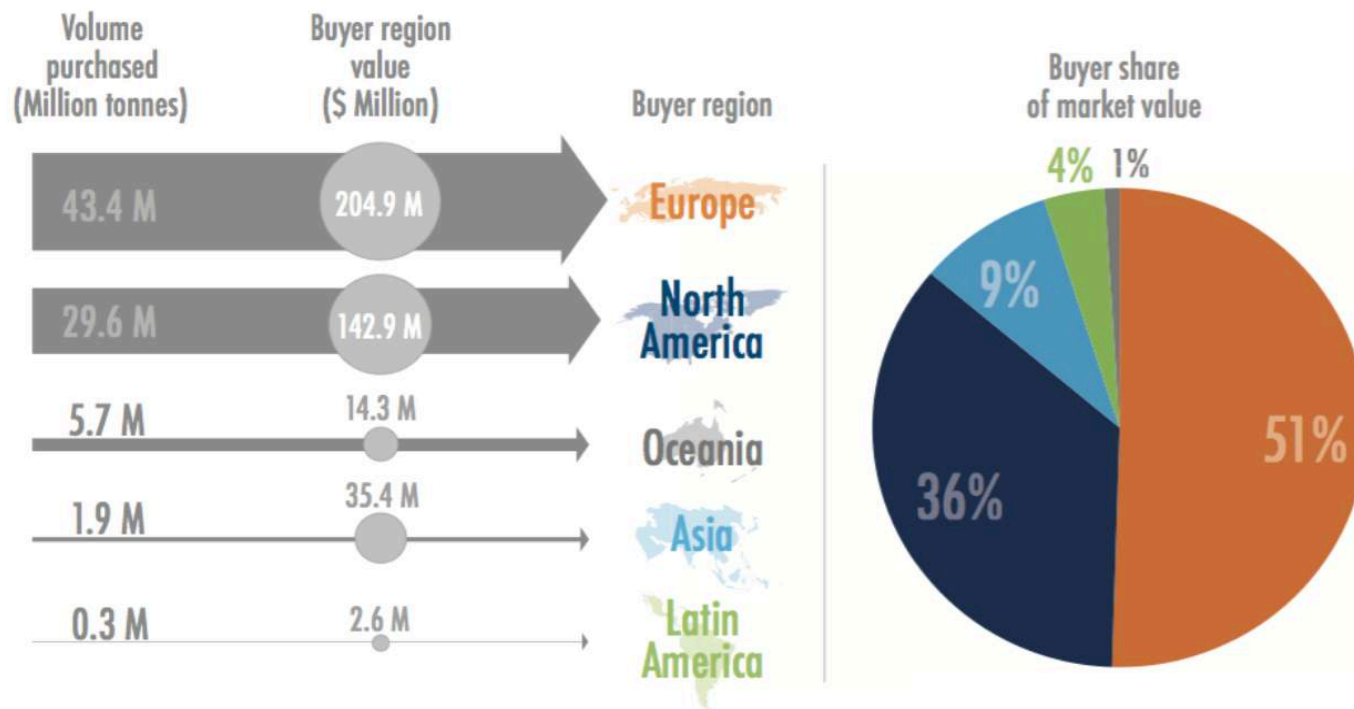
Chart from Clive Welham UBC
From presentation 'Forestry and
Carbon Markets'

Carbon Market Size

Opportunities for Forest Carbon Offsets in B.C.

	FOREST MANAGEMENT TYPE	PROJECT TIME FRAME	AVAILABLE HECTARES	FEASIBLE TREATMENT OPPORTUNITY	ESTIMATED ADDITIONAL CO ₂ IN TONNES CO ₂ e IF FEASIBLE AREA IS TREATED
Coast	Improved Forest Management	10-20 years	147,655	147,655	4,061,000
	Reforestation and Afforestation	50-60 years	212,282	7,522	1,605,000
Interior	Improved Forest Management	10-20 years	1,209,246	762,079	10,517,000
	Reforestation and Afforestation	80 years	6,482,600	672,689	143,403,000
Total	all Project types		8,051,783	1,589,945	159,586,000

Who Buys Carbon Offsets?



Notes: Based on 81 MtCO₂e associated with a buyer region.

Source: Forest Trends' Ecosystem Marketplace. *State of the Voluntary Carbon Markets 2013*.

Carbon Offsets

Offsets represent emission reductions that have been achieved outside of the capped sector.

1 Company A needs to meet its emissions cap



2 Company A invests in an emission reduction project that produces carbon offsets



INVESTMENT

3 Company A receives carbon credits for its investment



One carbon credit = One tonne of greenhouse gas emission reductions.

Carbon offsets programs can include:

- Reforestation
- Renewable energy
- Methane capture/combustion



Carbon Markets

- **Compliance Markets:**
 - Governments and regulated facilities have mandatory legal emission obligations
 - Emissions tax
 - Cap & Trade (Alberta)(Quebec linked with California)
- **Voluntary**
 - Offset emissions for corporate or social responsibility
 - Gold Standard
 - American Carbon Registry
 - Verified Carbon Standard



Forest Carbon Offsets

On a Global Perspective

- REDD (reducing emissions from deforestation & forest degradation)
- Afforestation and reforestation
- Improved Forest Management
- Biomass

Main Supporters	Market Share	Additionality Tests (relative to CDM)	Third-party Verification Required	Separation of Verification and Approval Process	Registry	Project Types	Excludes Project Types with high chance of adverse impacts	Co-Benefits (relative to CDM)	Price of Offsets
Clean Development Mechanism									
UNFCCC Parties	large	=	yes	yes	yes	All minus REDD, new HFC, nuclear	no	=	€14–30
Authors' Comments:	The CDM is part of the Kyoto protocol and aims to create economic efficiency while also delivering development co-benefits for poorer nations. It has been successful in generating large numbers of offsets. Whether it also has delivered the promised development co-benefits is questionable.								
Gold Standard									
Environmental NGOs (e.g. WWF)	small but growing	=/+ ¹	yes	yes	Planned	EE, RE only	yes	+	VERs: €10–20 CERs: up to €10 premium
Authors' Comments:	The GS aims to enhance the quality of carbon offsets and increase their co-benefits by improving and expanding on the CDM processes. ¹ For large scale projects the GS requirements are the same as for CDM. Yet unlike CDM, the GS also requires the CDM additionality tool also for small-scale projects.								
Voluntary Carbon Standard 2007 (VCS 2007)									
Carbon Market Actors (e.g. IETA)	new; likely to be large	= ²	yes	no	Planned	All minus new HFC	no	-	€5–15 ³
Authors' Comments:	The VCS aims to be a universal, base-quality standard with reduced administrative burden and costs. ² The VCS plans to develop performance based additionality tests. These tools have not yet been developed and are thus not included in this rating. ³ Prices are for projects implemented under VCS ver. 1.								
VER+									
Carbon Market Actors (e.g. TÜV SÜD)	small but growing	=	yes	no	yes	CDM minus large hydro	yes	-	€5–15
Authors' Comments:	VER+ offers a similar approach to CDM for project developers already familiar with CDM procedures for projects types that fall outside of the scope of CDM.								
Chicago Climate Exchange (CCX)									
CCX Members and Carbon Market Actors	large in the US	-	yes	yes	yes	All	no	-	€1.2–3.1 ⁴
Authors' Comments:	CCX was a pioneer in establishing a US carbon market. Its offset standard is part of its cap-and-trade programme. ⁴ Sales in USD: \$1.8–4.5 per metric tonne (October 07–February 08)								
Voluntary Offset Standard (VOS)									
Financial Industry and Carbon Market Actors	N/A	=	yes	no	Planned	CDM minus large hydro	yes	=	N/A
Authors' Comments:	VOS closely follows CDM requirements and aims to decrease risks for offset buyers in the voluntary market.								
Climate, Community and Biodiversity Standards (CCBS)									
Environmental NGOs (e.g. Nature Conservancy) and large corporations	large for LULUCF	=	yes ⁵	no	N/A	LULUCF	yes	+	€5–10
Authors' Comments:	The CCBS aims to support sustainable development and conserve biodiversity. ⁵ The CCBS is a Project Design Standard only and does not verify quantified emissions reductions.								
Plan Vivo									
Environmental and social NGOs	very small	=	no	no	yes ⁶	LULUCF	yes	+	€2.5–9.5
Authors' Comments:	Plan Vivo aims to provide sustainable rural livelihoods through carbon finance. ⁶ It verifies and sells ex-ante credits only. Third party verification is not required but recommended.								

Image taken from WWF Germany pdf. Title: "Making Sense of the Voluntary Carbon Market: A Comparison of Carbon Offset Standards" by Anja Kollmuss (SEI-US), Helge Zink (Tricorona), Clifford Polycarp (SEI-US). Date March 2008

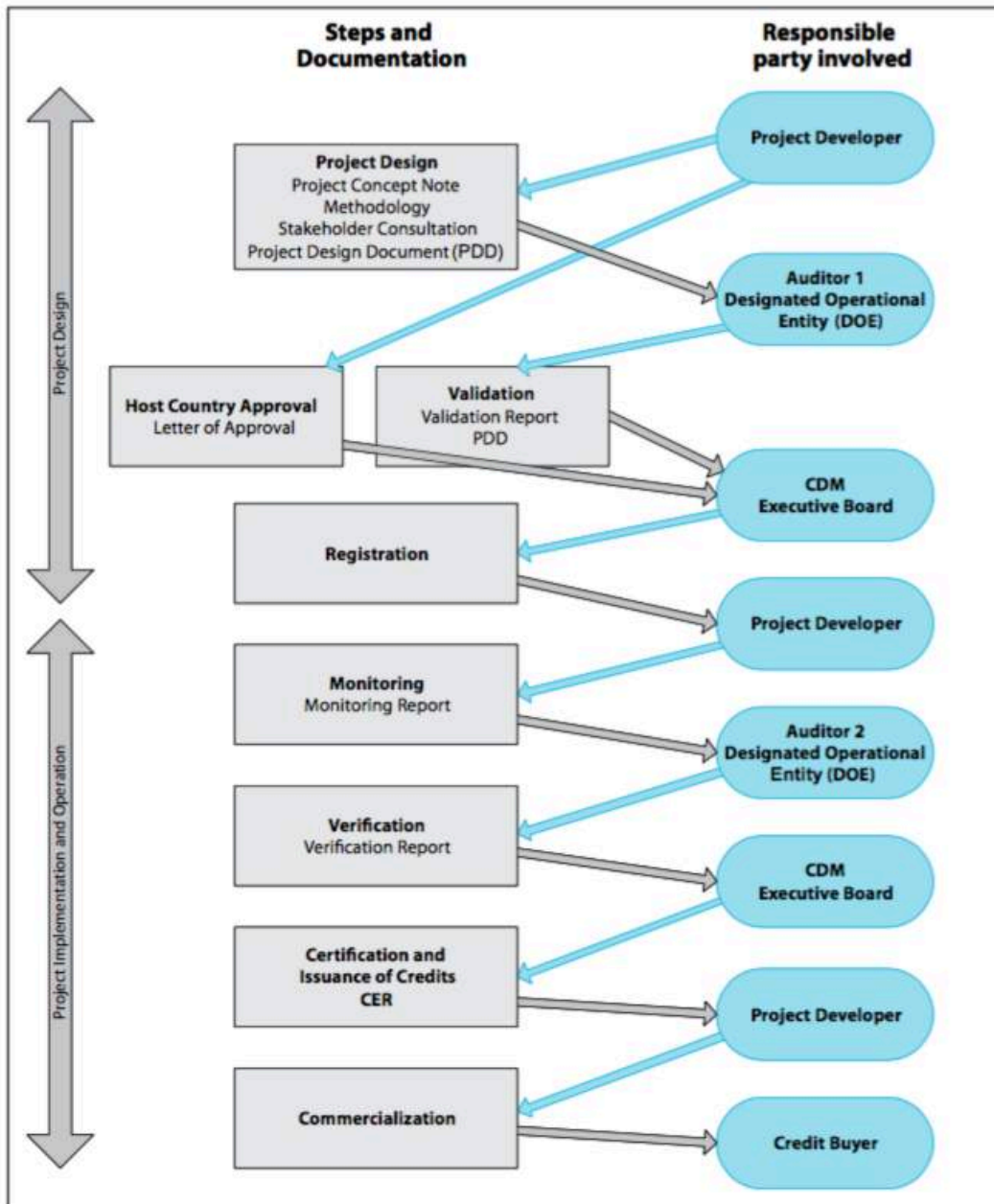
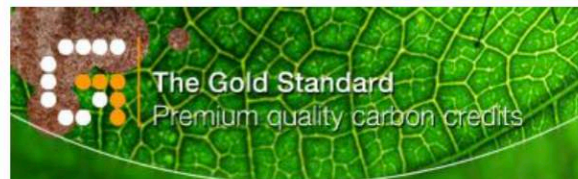


Image taken from WWF Germany pdf. Title: "Making Sense of the Voluntary Carbon Market: A Comparison of Carbon Offset Standards" by Anja Kollmuss (SEI-US), Helge Zink (Tricorona), Clifford Polycarp (SEI-US). Date March 2008

Qualification

- Third Party Certification
- Typical certification standards include:
 - Additionality
 - Baseline Analysis
 - Carbon Management Plan
 - Third party monitoring at planned intervals
- Receive investment through a carbon broker





Criteria for Attaining Carbon Offset Program

2.3.1 Description of Eligible Project Types

This protocol may be applied to forestry projects that

- Comply with all the applicable requirements of the BC Emissions Offset Regulation;
- Meet the general forest project eligibility criteria specified below; and
- Fall into one or more of the forestry project types described later in this section, including meeting any project type-specific eligibility criteria noted.

In considering the eligibility criteria below, the following definition of “forest Land” consistent with BC and Canadian GHG Inventory definitions, shall be used.

Forest Land, an area

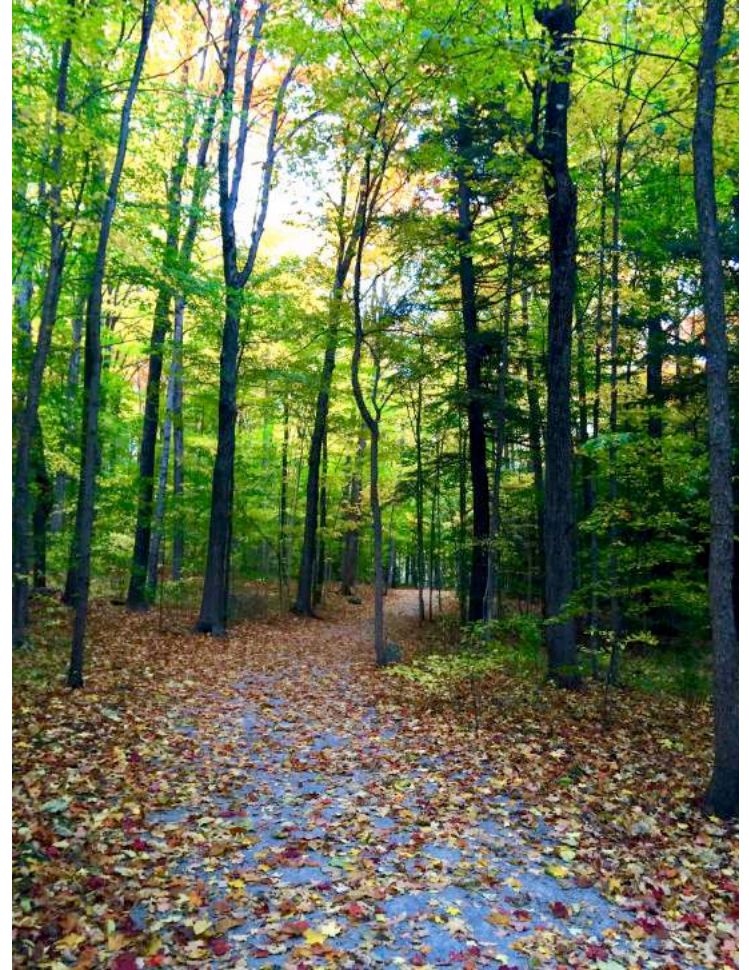
- That is greater than or equal to one hectare in size measured tree-base to tree-base (stump to stump)

Forest Project Eligibility

- Afforestation
- Reforestation
- Improved Forest Management
- Conservation / Avoided Deforestation

*Additionality

Additionality is the reduction in emissions that are additional to any that would occur in the absence of the certified project activity (Kyoto Protocol in Article 12.5)





EX. Cheakamus Community Forest

- The Chekamus Community Forest Society is a forest tenure partnership between the Resort Municipality of Whistler, Squamish Nation, and Lil'Wat Nation.
 - CCF partnered with Brinkman Group and Ecotrust Canada to design an Ecosystem-Based Management plan
- Project is registered under the BC Forest Carbon Offset Protocol (FCOP)
 - Forest carbon emission reductions achieved by reducing baseline harvest by 50%
 - Without the sale of offsets, the CCF would not be able to afford halving the revenue and more expensive EBM logging practices

The project reduces GHG emissions by approximately 10,000 tonnes CO₂e/ year through avoided forest harvesting



Attaining Funding from Corporate Sponsors

- Eg. TD Green Streets program
 - provided support to 34 municipalities for street trees and our employees helped plant nearly 50,000 trees



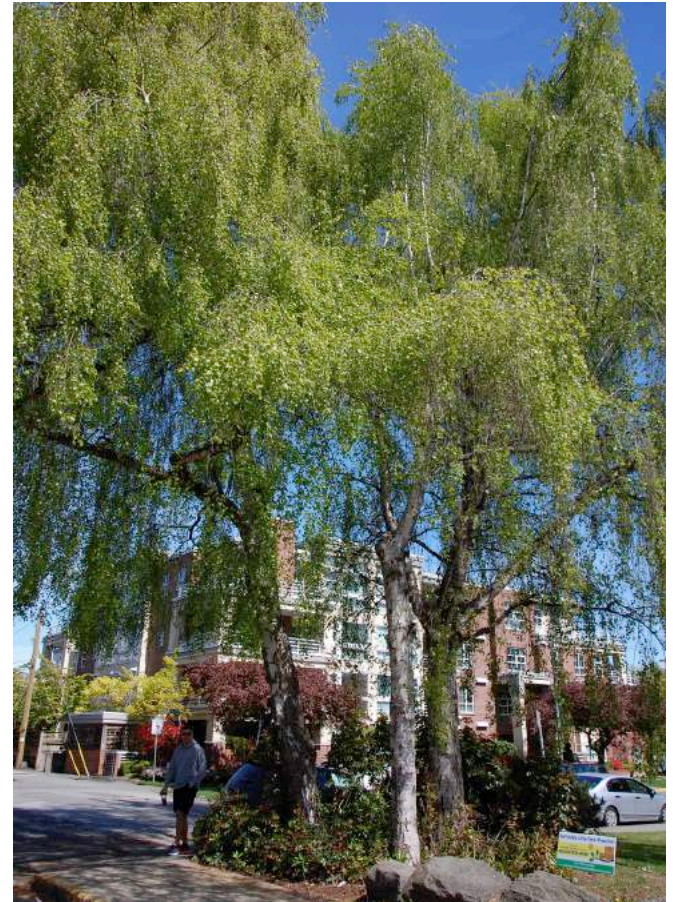
Urban Trees as Carbon Offsets

Considerations:

- Permanence
- Urban trees are costly (planting, maintenance)
- To act as an offset fees are high (initial + verification fee, annual account fee, annual registration fee)
- A study on quantifying urban forest project costs and offsets in Santa Monica suggests that it is unlikely that these projects will fully recapture the costs

Future of Urban Forestry

- Greater valuation of ecosystem services
- Forest carbon offsets
- Green spaces for social well-being
- Urban forests, more than just street trees – city / rural border
- “Green infrastructure”





How can we increase our urban forest canopy?

- Take back road space & parking lots
 - Ex. University of Toronto has been greening parking lots and industrial areas
- Increase green spaces in areas around the Vancouver airport
- Land areas not being utilized
- Areas with invasive species
- Potential ecosystem restoration sites

Corporation of Delta



Boundary Beach Park, Delta, BC

Offset activities can bring a wealth of values, including beauty, team-building, biodiversity, and community benefit. This plantation, a partnership between Urban Impact Recycling and the Corporation of Delta is a beautiful and inspiring example of a multi-value offset project.

Questions?



For more information,
please contact Robin
robin@rbc.bc.ca
(604) 737-1112
www.rbc.bc.ca



Robin B Clark Inc.
NATURAL RESOURCE
CONSULTANTS