Deloitte.

Natural Capital

Keeping Manitoba Liquid

October 3, 2016

Context

What is Natural Capital?

- is the stock of assets that provide products and services, such as food, fibre, energy, and water.
- creates value through ecosystem services, the “free” deliverables provided to business and society by a healthy planet, including clean water, breathable air, pollination, recreation, habitat, soil formation, pest control, a livable climate and other things we generally take for granted because we don’t directly pay for them.

Societies, municipalities, companies and all of us both affect and rely on “services” that flow from well-functioning ecosystems

What does that mean? Examples include:

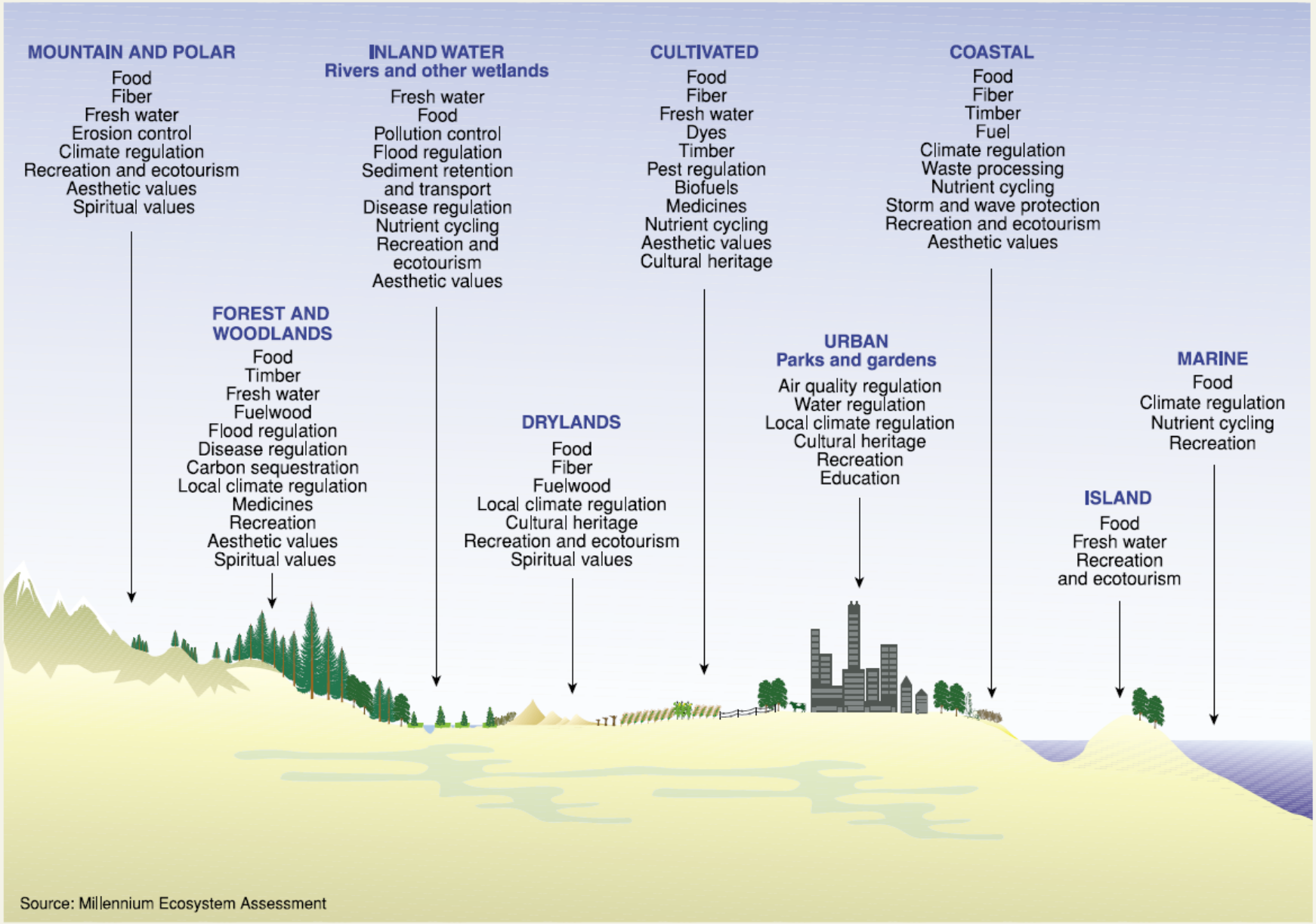
- Wetlands can buffer flooding and filter excess nutrients
- Coastal mangroves can diminish the impact of storm surges.
- Forests sequester carbon and filter water, while also addressing soil loss and erosion.
- Many other ecological features provide important “services” to businesses and societies alike.

Investments in restoration and maintenance of well-functioning ecosystems should be considered along with other investments to ensure the resilience of both natural and built infrastructure — particularly within a climate change context.

[1] Natural Resources Canada, Key Facts and Figures on the Natural Resources Sector. Accessed May 3, 2016

Ecosystems and Some Services They Provide

Different combinations of services are provided to human populations from the various types of ecosystems represented here. Their ability to deliver the services depends on complex biological, chemical, and physical interactions, which are in turn affected by human activities.



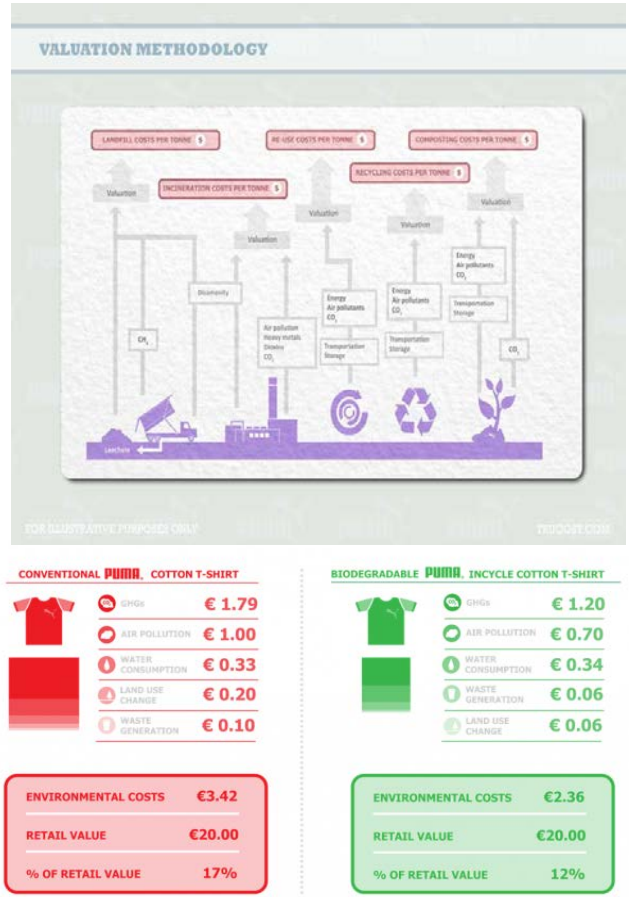
Source: Millennium Ecosystem Assessment

Context

Governments and business play a meaningful role in addressing environmental challenges; however, these entities lack critical information to fully account for the value of environmental assets.

- Corporate profits are at risk as the **environmental and social impacts** increase associated with natural capital waste, pollution, degradation, and depletion.
- **Companies and governments** are increasingly examining and piloting how to understand and improve the management, restoration, and conservation of natural capital.
- Natural capital provides **wealth** for Canada; it underpins the economy contributing **one-fifth of annual GDP and 1.8 million jobs** directly and indirectly, and related companies contributing ~$26B in revenue from all governments[1].
- Corporate profits and public revenue generation are at risk as the **environmental and social impacts** increase associated with natural capital waste, pollution, degradation, and depletion.
- **Puma**, for example, released an **Environmental P&L** in 2011 in order to quantify the economic value of the environmental impacts across the entire value chain. This effort produces benefits such as **enhanced business intelligence**, **effective and proactive risk management**, and **innovation**.

Puma's 'E' P&L Methodology & Output



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What does this really look like?

Portland Water District – Natural infrastructure for water security

- In 2009, the Portland Water District (PWD) partnered with several conservation organizations to determine if investing in natural infrastructure was feasible. Using a cost-effectiveness analysis framework, they compared the cost of a new filtration system with the cost of a 20-year natural infrastructure investment program.
- PWD determined that investing in natural infrastructure would sufficiently protect water quality, at a small fraction of the cost of installing a new filtration system. Under the most optimistic scenario examined, the **natural infrastructure program would generate a savings of $110 million**.

Source: Gartner et al. 2013.

Unilever Tea Kenya – Corporate investments in natural infrastructure

- In 2000, Unilever Tea Kenya (UTK) faced critical water shortages at its tea plantations, due to high rates of regional deforestation. As forests were cleared and degraded for fuel wood and grazing, aquifer and stream recharge declined in the region, threatening tea productivity.
- UTK started growing native tree seedlings and donating them to the surrounding farmers and communities for planting. Between 2001 and 2009, **850,000 trees were planted to help protect regional water supplies.**

Source: Unilever 2009

Brazil – Combating drought with natural infrastructure

- Deforestation in the watersheds that supply water to Sao Paulo have exacerbated droughts by causing sedimentation, water pollution, and reductions in water storage capacities.
- The Brazilian Water Agency, The Nature Conservancy, the Sao Paulo State Environmental Agency, and the Extrema Municipality have implemented the Water Producers Program (WPP). The WPP pays landowners $95 per hectare to protect or restore forests.
- Between 2006 and 2012, the project had protected more than 1,500 hectares. TNC projects that protecting 14,300 hectares of forestland could amount to $2.5 million annually in avoided costs.

Source: TNC 2012.

Business Risks and Opportunities

	Risks	Opportunities
Operational	Higher costs for freshwater due to scarcity, lower output for hydroelectric facilities due to siltation, or disruptions to coastal businesses due to flooding	Increasing water-use efficiency or building an on-site wetland to circumvent the need for new water treatment infrastructure
Regulatory and legal	New fines, new user fees, government regulations, or lawsuits by local communities that lose ecosystem services due to corporate activities	Engaging governments to develop policies and incentives to protect or restore ecosystems that provide services a company needs
Reputational	Retail companies being targeted by nongovernmental organization campaigns for purchasing wood or paper from sensitive forests or banks facing similar protests due to investments that degrade pristine ecosystems	Implementing and communicating sustainable purchasing, operating, or investment practices in order to differentiate corporate brands
Market and product	Customers switching to other suppliers that offer products with lower ecosystem impacts or governments implementing new sustainable procurement policies	Launching new products and services that reduce customer impacts on ecosystems, participating in emerging markets for carbon sequestration and watershed protection, capturing new revenue streams from company-owned natural assets, and offering eco-labeled wood, seafood, produce, and other products
Financing	Banks implementing more rigorous lending requirements for corporate loans	Banks offering more favorable loan terms or investors taking positions in companies supplying products and services that improve resource use efficiency or restore degraded ecosystems.

Case Study – Canadian Insurance Company

Deloitte

Natural capital valuation approach

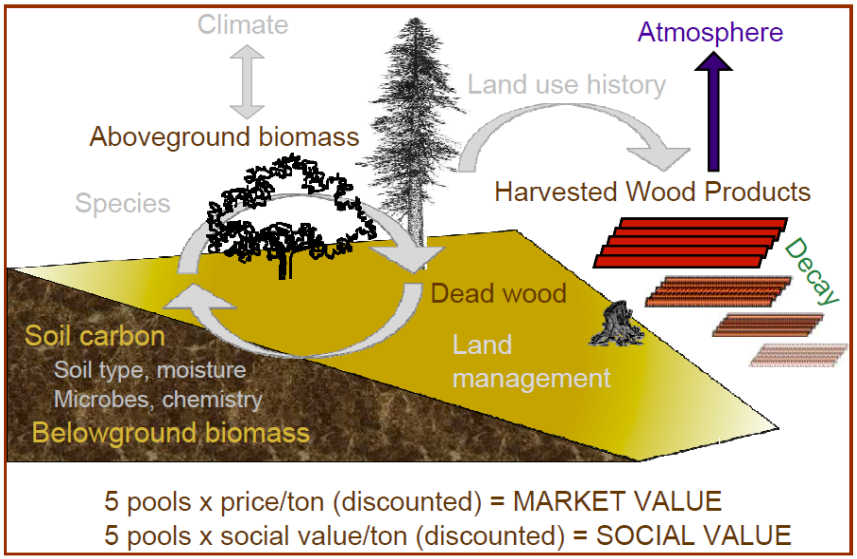
Deloitte applied an established methodology to map and calculate the amount of carbon stored by an insurance companies forestry assets. The methodology is GIS-based and designed to provide a snapshot view of the total carbon stored over the current life for a mix of natural forests and plantations. Based on the type, age and geographic location of each tree, reference carbon stock values from various literature sources are used, e.g. IPCC (2006) greenhouse gas inventory methodology.

The InVEST Carbon Model calculates the total carbon as a function of four carbon sources (mg/ha):

- above ground biomass
- below ground biomass
- soil
- dead organic matter

Data requirements
GIS shapefiles defining the location of forestry assets
Type of forest (natural forest/plantation)
Type and age of trees in stand (pines/hardwood/mixed)
Soil type
Reference values on carbon stocks

Primary forest carbon stocks



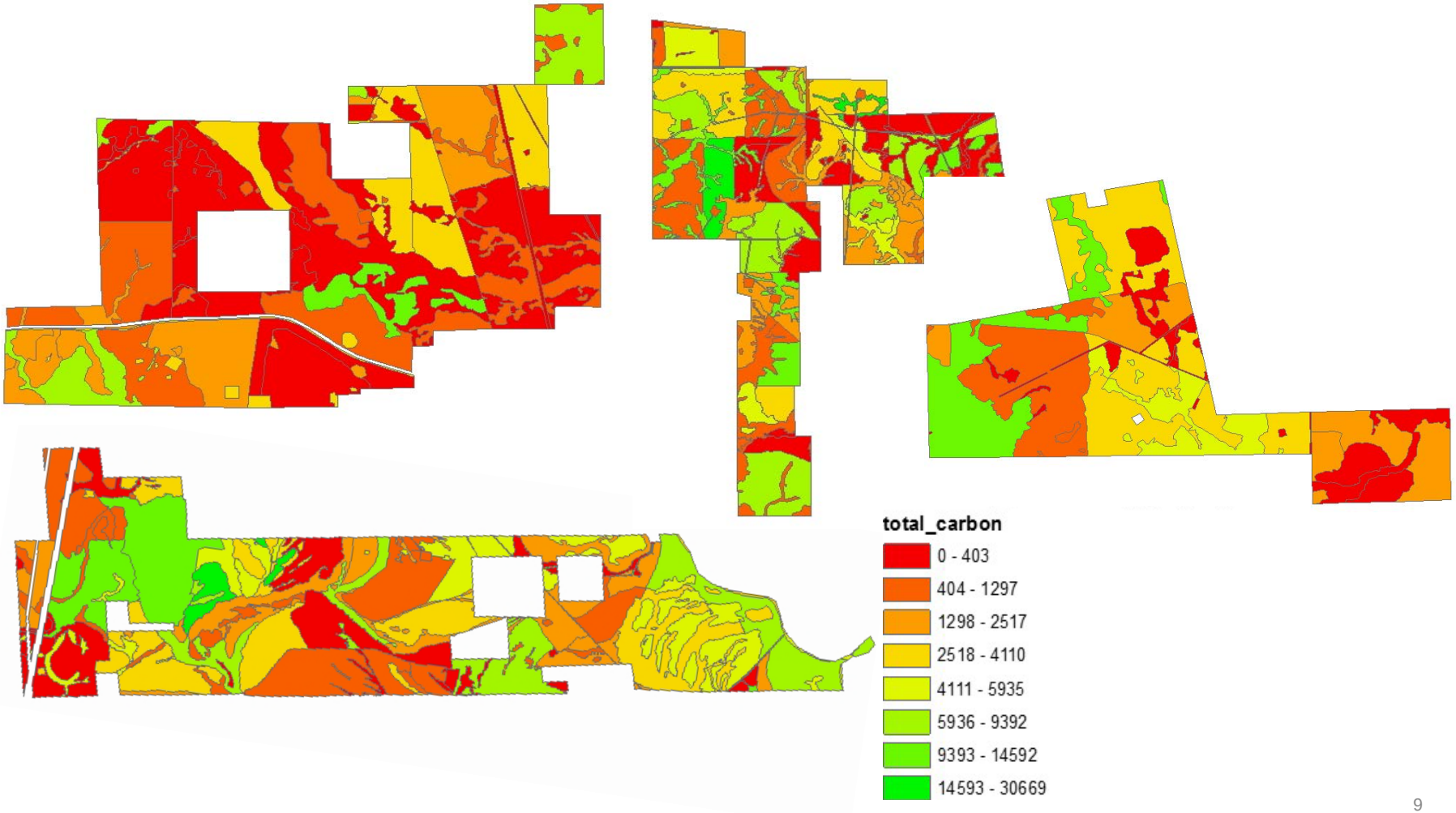
Source: InVEST user guide v2.0

Sources for carbon data:

- (IPCC) 2006 methodology for determining greenhouse gas inventories in the Agriculture, Forestry and Other Land Use (AFOLU) sector
- Smith, James E., and Linda S. Heath. 2008. Carbon stocks and stock changes in U.S. forests, and Appendix C. P. 65-80, C-1-C-7 in: U.S. Department of Agriculture. U.S. Agriculture and Forestry Greenhouse Gas Inventory: 1990-2005. Technical Bulletin No. 1921. Washington, DC: Office of the Chief Economist.
- Shoch, D. T., G. Kaster, et al. (In review). Carbon sequestration potential of bottomland hardwood afforestation in the Lower Mississippi Valley, U.S.A. Wetlands.

Economic Value: the estimated value of the forests is $8.7 Million

Assuming a $10/tonne price for carbon, the forests are valued at **CDN$8,699,640** with aged hardwood trees and natural forests providing the greatest carbon storage capacity and value.



Decision useful information

The biophysical and economic results can allow the company to make decisions on land use (e.g., conserving older forests) and timber management (e.g., maintain or increase hardwoods) to maximize carbon storage potential.

Additional findings:

- Hardwood has a higher carbon storage capacity than pine or softwood.
  - The total average carbon storage for pine, based on the sample, is 2,891 tonnes and hardwood has an average 4614 tonnes. Hardwood has approximately 1.6 times the carbon storage capacity than pine or softwood.

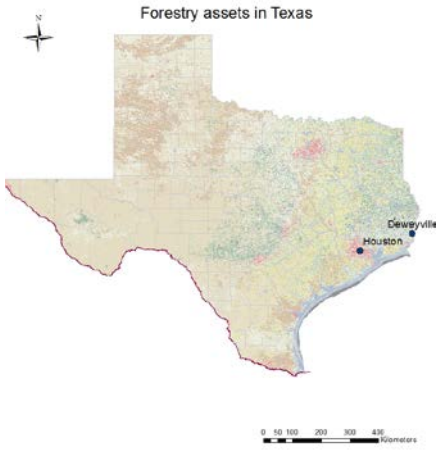
- Older* forests have a higher carbon storage capacity than younger forests (Stephenson et al., 2014).
  - The total average carbon storage of older forests (30+ years), based on the sample, is 4,058 and younger forests have an average of 2,706 tonnes. Older forests have approximately 1.5 times the carbon storage capacity than younger forests.

- Natural forests have a higher carbon storage capacity than plantations.
  - The total average carbon storage of natural forests, based on the sample, is 3,731 and plantations have an average of 2,183 tonnes. Natural forests have approximately 1.7 times the carbon storage capacity than younger forests.

Sources:
- Stephenson, N. L. et al., 2014. Rate of tree carbon accumulation increases continuously with tree size. Nature 507, 90–93.

Executive summary

Deloitte conducted a snapshot analysis using the InVEST (Integrated Valuation of Ecosystem Services and Trade-offs) methodology to map and value the natural capital for forestry assets of an insurance company in Texas. The natural capital value for these forestry assets includes **CDN$8.7 Million** in carbon storage potential, excluding the value of market goods that can be derived from the forestry products.



869,964 total tonnes of carbon

- 16,114 tonnes above ground biomass
- 4,939 tonnes below ground biomass
- 11,497 tonnes within the soil
- 2,624 tonnes in dead organic matter

The results can allow the company to make decisions on land use (e.g., conserving older forests) and tree species management (e.g., maintain or increase hardwoods) to maximize carbon storage potential. For example, Hardwood has a higher carbon storage capacity than pine or softwood. And, older forests have a higher carbon storage capacity than younger forests.

Tools

Natural capital drivers

The quality and abundance of natural capital is declining; stakeholders – regulators, customers, investors, etc. – expect companies to assess and improve sustainability performance and effectively manage the resulting risks such as resource scarcity and increasing costs.

Challenges

Anticipation of tighter environmental regulations	Product differentiation as key competitive means	Stakeholder expectations for sustainability reporting
Considerations of climate change issues on business model	Pressure from customers to improve environmental performance	Banks and asset managers increasingly understanding portfolio risks
	Board expectations to manage material risks	Lack of quality and available resources in the supply chain

Solution

Natural capital accounting and management

Natural capital accounting – systematically recording natural capital assets, liabilities, impacts, and dependencies in a consistent and comparable manner

Natural capital management – processes, systems, practices, and tools to incorporate natural capital into decision making and to improve performance

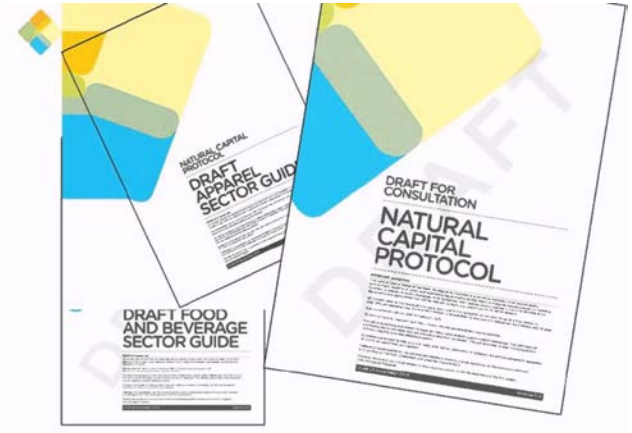
Harmonization

There are many different approaches to natural capital and a lot of work has been carried out already. The Natural Capital Protocol standardizes this into a single global framework

Natural Capital Protocol

Companies need a consistent and standardized approach to understand their impacts and dependencies on natural capital to produce decision-useful and comparable results. In response, a consortium of governmental agencies, businesses, academics, standards agencies, and accounting firms developed a harmonized framework – the Natural Capital Protocol - for measuring and valuing natural capital built on leading methodologies and approaches, and piloted with over 60 companies.

Deloitte worked with the World Business Council for Sustainable Development-led team to create the protocol released July 2016. Example organizations involved in the protocol development and pilot implementation projects include:



Walmart
TATA
AkzoNobel
KPMG
cutting through complexity
The Coca-Cola Company
ACCA
Cardno
IFAC
International Federation of Accountants
LafargeHolcim
M&S
EST. 1884
TD
EY
Building a better working world
H&M
eni
THE WORLD BANK
Working for a World Free of Poverty
Deloitte.
DOW
Nestlé
Good Food, Good Life
NOVARTIS
European Commission
pwc

Manitoba – ahead of the game…

Protecting soil: shelterbelts and reduced tillage

- **Shelterbelts or Windbreaks** = rows of trees or other tall, perennial plants that are planted along the edges of fields to slow the wind
  - **Alley cropping** = shelterbelts + intercropping
- **Reduced Tillage** = furrows are cut in the soil, a seed is dropped in and the furrow is closed
  - **No-till farming** disturbs the soil even less

(e) Shelterbelts

(f) No-till farming

To provide protection from these floods, four types of permanent structures have been constructed:
1. Dikes beside the river or around communities and property.
2. Dams that can hold back the flood peak and release the water later in the year.
3. Diversions that can convey water away from flood-prone regions.
4. Channel enlargements.
5. Flood-proofing individual properties

Why does this matter to you?

Next Steps:

Climate Change Adaptation:

- A key component of adapting to climate change is investing in natural capital
  - the structure and function of ecosystems and watersheds, or “green infrastructure” (forests; wetlands; and natural landscapes).
  - Rely upon this green infrastructure just as they depend on “grey infrastructure” (roads; harbors; and other aspects of built environments).

Benefits of natural capital accrue to municipalities and local governments

  - Flood retention / Water quality benefits
  - Risk management / Lower costs
  - Climate adaptation and resilience benefits etc.

Federal government is making a new commitment to funding “green” infrastructure and natural capital

- Bi-lateral agreements / Canadian Infrastructure Bank / The Federal of Canadian municipalities

What to do now?

- Understand what ecosystem services your natural and green infrastructure is providing you
- Inventory it
- Listen and participate in the rest of the day