

# Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital

Understanding the Framework, Data Sources, and Methods

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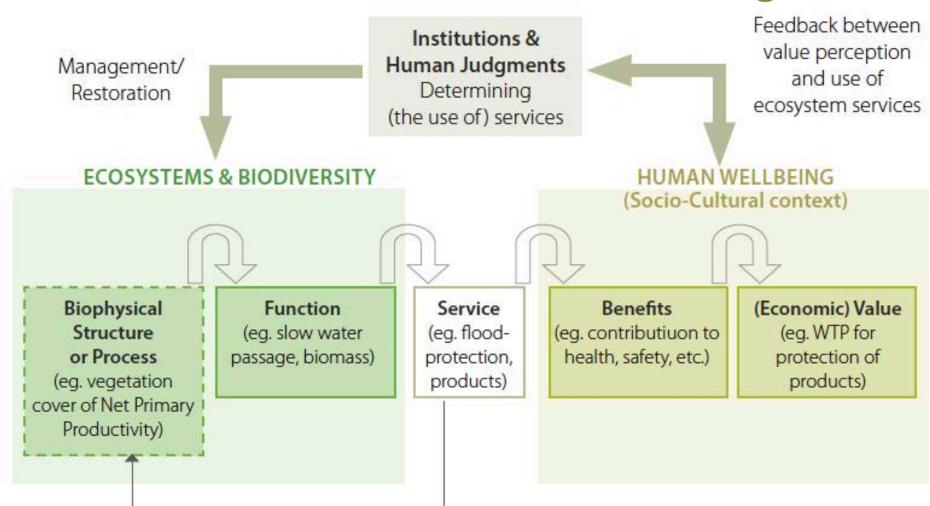
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### **Agenda**

- Understanding the Concepts
- Overview of the analytical process
- Framework
- Data needs
- How values are determined
  - Extractive Uses
  - Recreation
  - Human property protection (flood protection)
- Tips for how to get started

# **Understanding the Concepts**

# Pathway from Ecosystem Structure and Processes to Human Wellbeing



Adapted from TEEB (2010), The Economics of Ecosystems and Biodiversity Ecological and Economic Foundations. Edited by Pushpam Kumar. Earthscan, London and Washington.

### **Understanding Final Ecosystem Services**

- "... components of nature, directly enjoyed, consumed, or used to yield human wellbeing."
  - Boyd and Banzhaf (2007)

- "... aspects of ecosystems utilized (actively or passively) to produce human wellbeing."
  - Fisher et al. (2009)

### **Understanding Final Services**

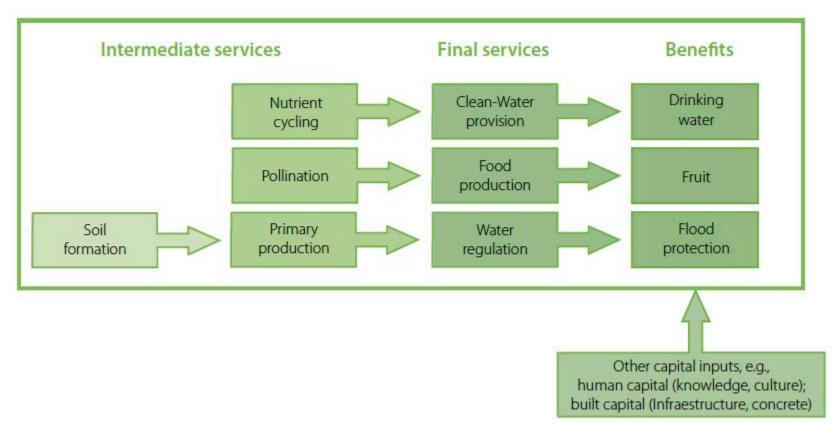


Figure Adapted from: Brendan Fisher, et al. (2008). Ecosystem Services and Economic Theory: Integration for Policy-Relevant Research. Ecological Applications. 18 (8): 2050-2067.



# Overview of the Analytical Process

### **Overview of Analytical Steps**

- Establish and codify final ecosystem service accounts
- 2. Identify and gather relevant data
- 3. Determine which accounts can be quantified with available data
- 4. Quantify natural capital

### **Quantification Steps**

- Assessing beneficiaries (end users of the ecosystem service flows) by considering the following questions:
  - Who are the beneficiaries?
  - Where they are located?
  - How many beneficiaries are there?
- 2. Determining the quantity of services being utilized by the beneficiaries, for example:
  - days of recreation
  - reduction in air pollution
  - volume of water used
- 3. Determine the value of final ecosystem service flows

# **Framework**

Environment	End-Products	Direct Use/Non-Use	Direct User		
Aquatic • Rivers and streams	Water • Snowice	Use • Extractive Use	Industries  • Agriculture, forestry,		
Wetlands     Lakes and ponds     Near coastal marine	Liquid water  Flora	- Raw material for transformation - Fuel/energy	Fishing and hunting • Mining • Utilities		
Open ocean and seas     Groundwater	Specific classes/     species of flora	- Fuervenergy - Industrial processing - Distribution to other	Construction     Manufacturing		
Terrestrial	Fauna	users - Support of plant or	Wholesale trade     Retail trade		
Forests     Agroecosystems     Created greenspace	Specific classes/     species of fauna	animal cultivation - Support of human health and life or subsistence	Transportation and warehousing     Information		
Grasslands     Scrubland/shrubland     Barren/rock and sand	Otyher Biotic Components  • Specific types of natural	Flows - Recreation/ tourism - Cultural/spiritual activities	Finance and insurance     Real estate rental and		
Tundra     Ice and snow	Material  Atmospheric Components	Ecosystem - Information, science, Services education, and research - Other extractive use	leasing Professional, scientific, and technical services		
Atmospheric - Atmosphere	Air     Solar light/ radiation	• In-situ Use - Energy	Management of companies and enterprises		
	Specific types of soil	- Transportation medium - Support of plant or animal cultivation	<ul> <li>Administrative support and waste</li> <li>vanagement and</li> </ul>		
	Other Abiotic components  - Specific types of natutal	- Waste disposal/ assimilation	remediation services • Educational services • Health care and social		
	material  Composite End-Products	<ul> <li>Protection or support of human health and life</li> <li>Protection of human</li> </ul>	assistance  • Arts, entertainment,		
	<ul> <li>Scapes: views, sounds and scents of land,</li> </ul>	- Recreation/tourism - Cultural/spiritual activities	and recreation  • Accompdation and food services		
	sea, sky Regulation of extreme	- Aesthetic appreciation - Information, science,	Other services		
	Presence of environmental class	education, and research - Other in-situ use	Household  Government		
	Other End Products	Non-Use • Existence			
		Bequest     Other Non-Use			

NESCS-D NESCS-D

T1	Forest	Flora	Wood fibre	Extractive use	Raw material for transformation	Timber	Industry	Forestry and logging	Market
T2	Forest	Flora	Wood fibre	Extractive use	Energy	Fire wood	Household	Homes using wood based heating	Market
ТЗ	Forest	Flora	Mushrooms / wild berries / nuts	Extractive use	Other extractive use		Household	People who care	Non- market
T4	Forest	Flora	Sugar maple trees	Extractive use	Raw material for transformation	Maple sap	Industry	Food manufacturing	Market
T5	Forest	Fauna	Mammals	Non-use	Existence and bequest		Household	People who care	Non- market
T6	Forest	Fauna	Mammals	Extractive use	Recreation/ tourism	Hunting	Household	Hunters	Non- market
77	Forest	Fauna	Birds	Non-use	Recreation/	Bird watching	Household	Birdwatchers	Non-

Non-use

In-situ use

In-situ use

In-situ use

Use / Non-use

subclass

tourism

bequest

tourism

Aesthetic

appreciation

Recreation/

tourism

Existence and

Recreation/

**Detailed Use** 

/ Non-use

Fall colour

Scenic views

viewing

Hiking

Beneficiary

Beneficiary

Household People who care

Tourism

Hikers

operators

Industry

Household

Household

subclass

Market /

Non-

market

market

Nonmarket

Non-

Non-

Non-

market

market

market

End-products Use / Non-use

subclass

Birds

Forest

Forest

Forest

landscape

landscape

landscape

End-products

Fauna

products

products

products

Composite end-

Composite end-

Environmental subclass

Forest

Forest

Forest

Forest Composite end-

Account

T8

T9

T10

T11

# Data Needs / Sources

# **General Data Needs and Possible Sources**

- Data needs and sources will vary depending on:
  - What accounts you want to capture
  - What your accounting objectives are
- Some key data sources:
  - Land cover / land use data
    - SOLRIS V2.0
    - AAFC annual crop inventory
  - Population data
    - Census of population

# **General Data Needs and Possible Sources**

- Other valuable data sources:
  - 2012 Canadian Nature Survey
  - EVRI value transfer database
  - Agricultural census data
  - Water permit data
  - National Forest Inventory (NFI) data
  - Wetlands spatial data

#### **Discussion Break**

- Consider the issues, policy questions, or other problems you face in your day to day work.
  - Do you see value in a framework like this to help you structure, organize, and present data?
  - What specific issues, questions, or problems could this type of framework help address?
  - How important would you say quantifying benefits in dollar terms is to address those issues?
    - In other words, what if we just started quantifying beneficiaries (where and how many)?

# Valuation Examples

### Extractive Uses – Analytical Challenges

- Spatial alignment of data sources with area of interest (i.e. Greenbelt)
- Permit to take water data doesn't include actual water use
  - only maximum daily withdrawal permitted

#### Extractive Uses – Data Sources Used

- Agricultural Census Data for the Greenbelt
  - Custom geographic tabulation provided by Statistics Canada, commissioned by Friends of the Greenbelt
    - Amount of irrigation reported
    - Number of maple taps
- Spatially referenced water permit data
  - Land Information Ontario

#### Extractive Uses – Valuation Measures

- Production function imputed water values:
  - Dupont, D. P., & Renzetti, S. (2008). Good to the last drop? An assessment of Canadian water value estimates. *Canadian Water Resources Journal*, 33(4), 369-380.
- Market values for non-timber forest products

### Recreation – Analytical Challenges

- We don't know the population of people who actually recreate in the Greenbelt
  - But we new the percent of the population that recreated within 20km from home
- Recreation data doesn't align with detailed disaggregated accounts
  - E.G. Hiking in forest areas vs hiking in grassland areas

#### Recreation – Data Sources Used

- Census
  - To establish relevant population
- 2012 Canadian Nature Survey
  - Ontario results:
    - Percent of population engaging in different recreational activities
    - Percent of population that recreate within 20km of home
    - Average number of days spent engaging in recreational activities
    - Reported expenditures for recreational activities

#### Recreation – Valuation Measures

- Used a travel cost based approach as a proxy for the value of recreation
  - Value is based on reported expenditures for specific recreational activities
  - We excluded expenditures on transportation, accommodation and food to capture activities near home

# Human Property Protection (e.g. flood control) – Analytical Challenges

- Region was too large to determine the number of properties within flood prone areas
  - New mapping is becoming available that will make this more readily accessible
- Hydrologic modelling is needing to fully understand the role wetlands play in mitigating flood risk given specific spatial context

# Human Property Protection (e.g. flood control) – Valuation Measure

- Value function transfer:
  - meta-analysis specifically looking at wetland within agricultural landscapes across North America
  - Statistically assessed 66 wetland value estimates
  - Function adjusts wetland value based on:
    - Area of a wetland
    - Abundance of wetlands in the surrounding area (e.g. substitutes sites)
    - Population of surrounding area
    - Amount of economic activity in the surrounding area
  - Surrounding area = 50 km radius from each wetland

# Human Property Protection (e.g. flood control) – Data Sources Used

- Wetlands
  - Spatial data from Land Information Ontario
- Census data by CSD to determine relevant population
- Gross Cell Product, as measure of Gross Domestic Product spatially referenced to a grid 1 degree latitude by 1 degree longitude

# Tips for how to start accounting for natural capital

- Establish a locally relevant list of accounts and use it as guiding framework
- Don't get hung up on the valuation
  - Identifying who is benefiting and how much "natural capital" is being used is a great first step
- Use this Greenbelt study as a guide, or reference point:
  - If you have better, more relevant data, for your region use it.



**Questions / Discussion** 

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