



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

**Understanding the Framework, Data
Sources, and Methods**

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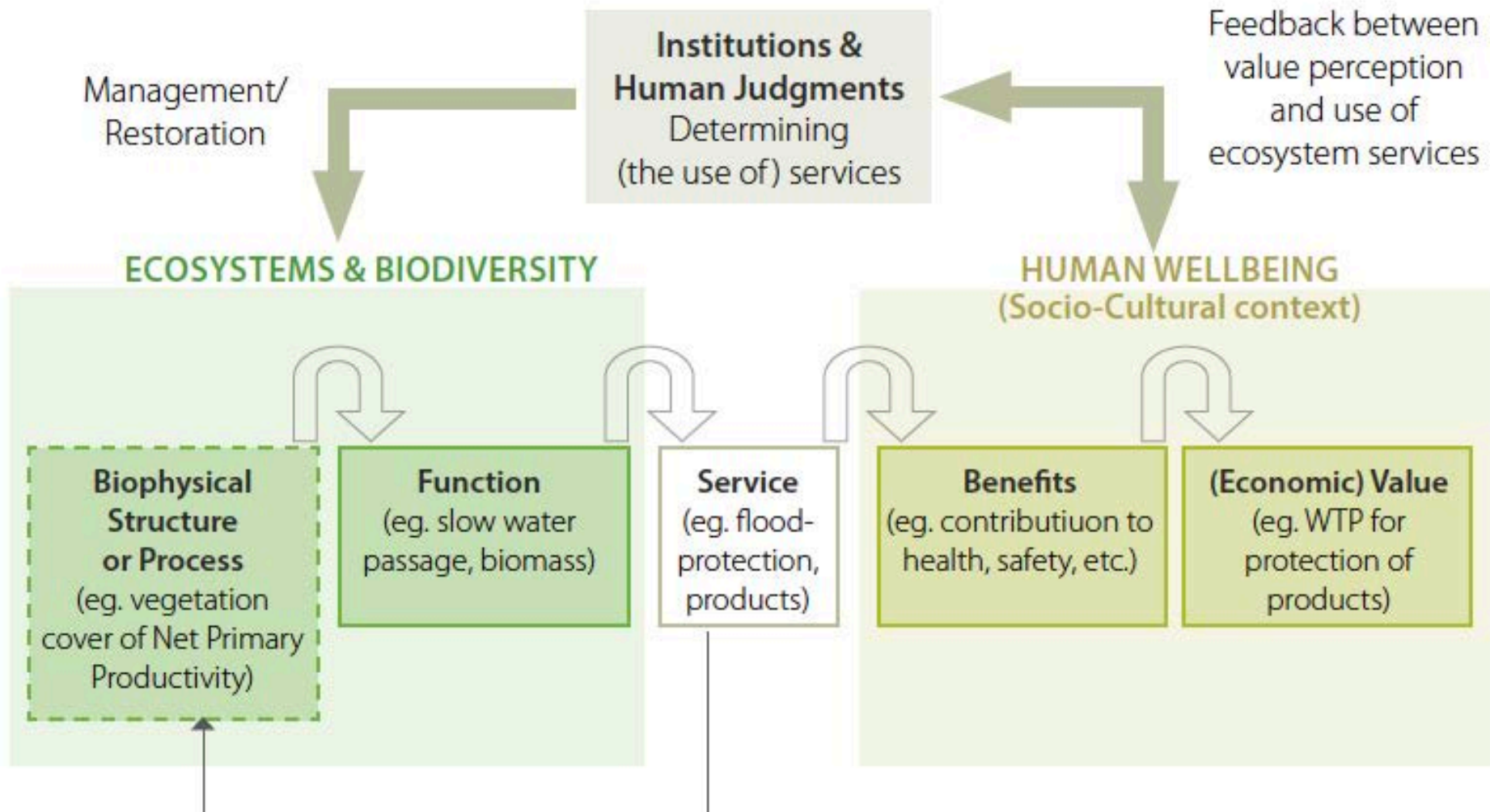
Agenda

- 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



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

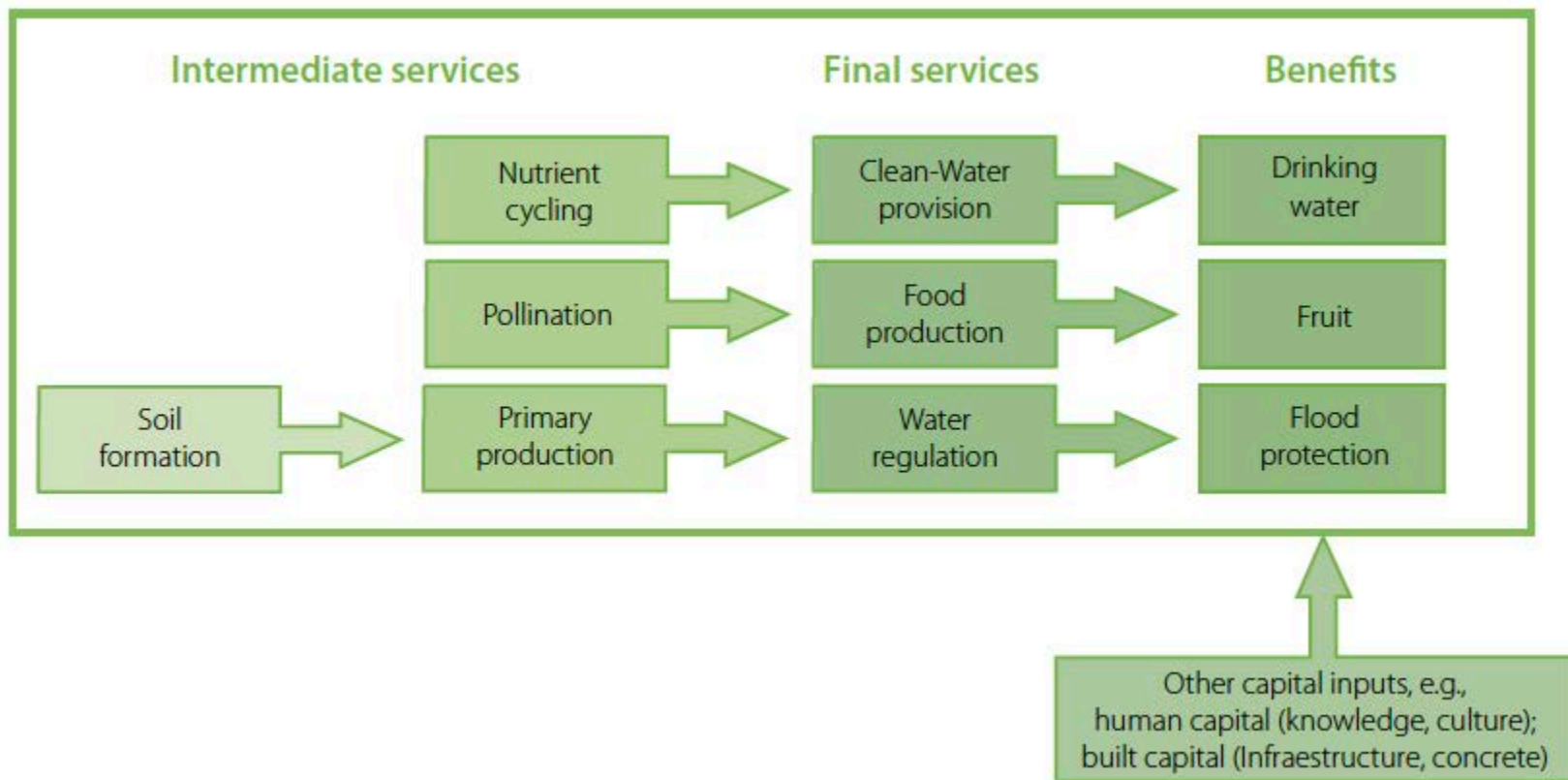


Figure Adapted from: Brendan Fisher, et al. (2008). Ecosystem Services and Economic Theory: Integration for Policy-Relevant Research. *Ecological Applications*.18 (8): 2050-2067.



Overview of the Analytical Process

Overview of Analytical Steps

1. 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

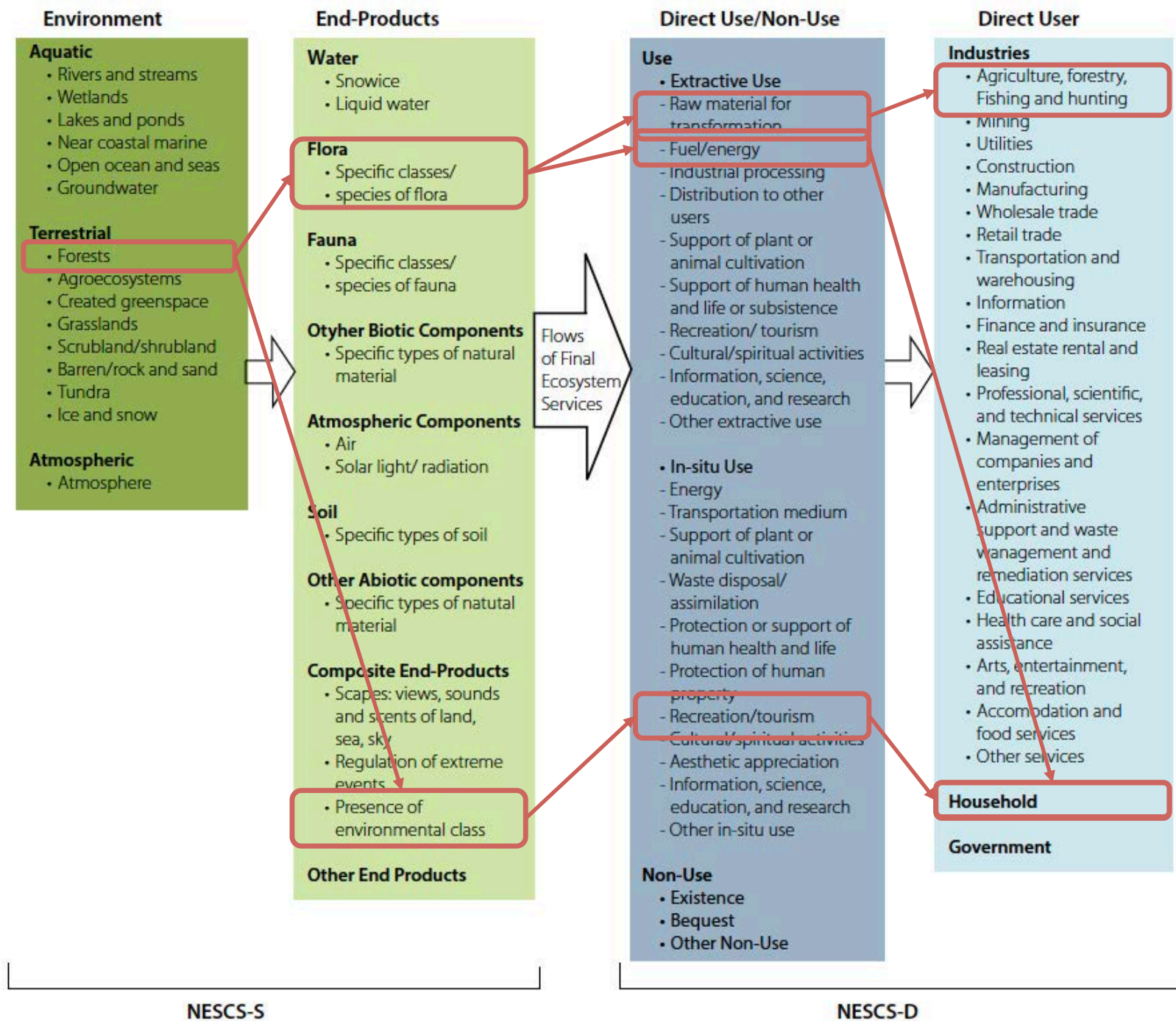


Quantification Steps

1. 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



Account	Environmental subclass	End-products	End-products subclass	Use / Non-use	Use / Non-use subclass	Detailed Use / Non-use	Beneficiary	Beneficiary subclass	Market / Non-market
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
T3	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
T7	Forest	Fauna	Birds	Non-use	Recreation/ tourism	Bird watching	Household	Birdwatchers	Non-market
T8	Forest	Fauna	Birds	Non-use	Existence and bequest		Household	People who care	Non-market
T9	Forest	Composite end-products	Forest landscape	In-situ use	Recreation/ tourism	Fall colour viewing	Industry	Tourism operators	Non-market
T10	Forest	Composite end-products	Forest landscape	In-situ use	Aesthetic appreciation	Scenic views	Household		Non-market
T11	Forest	Composite end-products	Forest landscape	In-situ use	Recreation/ tourism	Hiking	Household	Hikers	Non-market

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 know 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 needed 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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