



Communicating Ecosystem Services in a Municipal Context

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Outline

- Introduction to GIO
- Ecosystem Services: origins and key terminology
- Global to local applications
- Uses and outcomes
 - Case study 1: NYC Cost-benefit analysis
 - Case study 2: Awareness raising
 - Case study 3: Spatial planning
 - Case study 4: Natural capital accounting

Green Infrastructure Ontario Coalition

GIO Steering Committee:



Members:

Over 40 general members

- Businesses
- Industry and professional associations
- Municipal and Regional governments
- Conservation Authorities
- ENGOS

Legislation, Plans & Policies: Successes

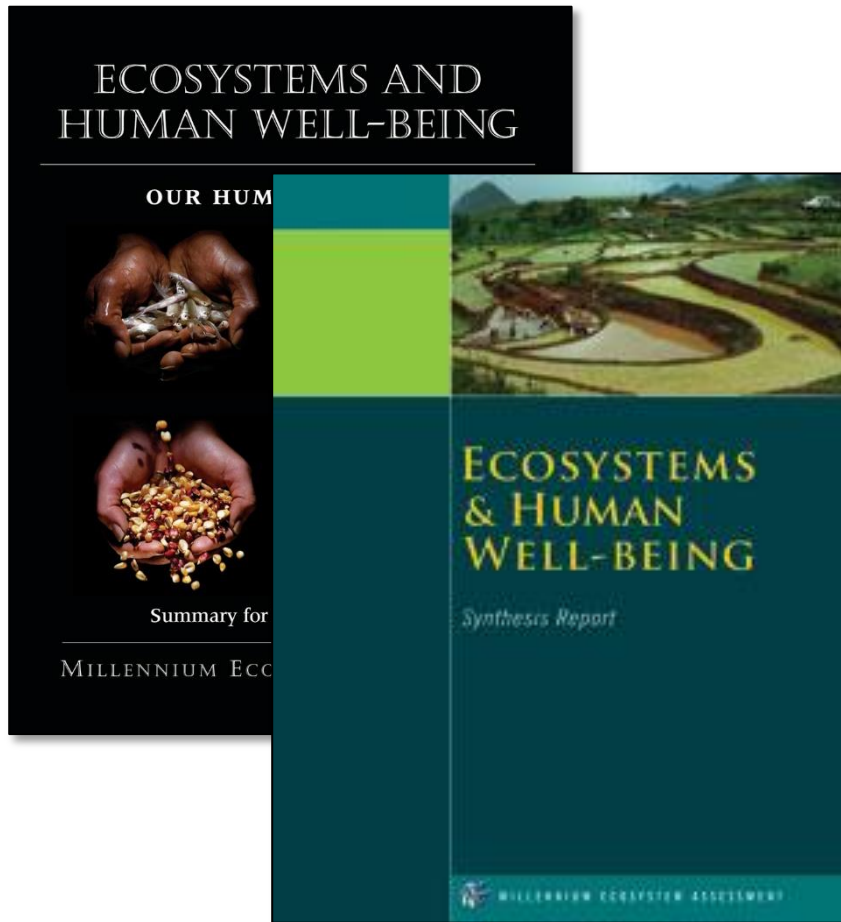
Since 2014, *green infrastructure* has been included in:

- Provincial Policy Statement (2014)
- 2017 Ontario Asset Management Planning Regulation
- Pan Canadian Framework on Clean Growth and Climate Change
- Federal Infrastructure Clean Water and Waste Water Fund
- Ontario Growth Plan and Greenbelt Plan
- MOECC Stormwater LID Guidelines
- *Municipal Act*
- *Great Lakes Protection Act*
- Ontario's Climate Change Strategy

Communications & Other Activities

- Recent publications:
 - State of the Urban Forest in the GTA (2016)
 - A Green Infrastructure Guide for Small Cities, Towns, and Rural Communities (2017)
- Workshops and sponsored conferences:
 - Soak it Up: Green Stormwater Infrastructure Toolkit
 - Green Infrastructure Asset Management
 - Grey to Green Conference
- Bimonthly newsletter highlighting green infrastructure policy progress and initiatives in Ontario and around the world

Millennium Ecosystem Assessment



“approximately 60% of the ecosystem services evaluated are being degraded or used unsustainably”



“degradation of ecosystem services often causes significant harm to human well-being and represents a loss of a natural asset or wealth of a country”

Millennium Ecosystem Assessment

- **Ecosystem services:** the benefits people obtain from ecosystems.
- **Provisioning services:** The products obtained from ecosystems, including genetic resources, food and fiber, and fresh water.
- **Regulating services:** The benefits obtained from the regulation of ecosystem processes, including the regulation of climate, water, and some human diseases.
- **Cultural services:** The non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience, including knowledge systems, social relations, and aesthetic values.
- **Supporting services:** Ecosystem services that are necessary for the production of all other ecosystem services.

ECOSYSTEM SERVICES

Supporting

- NUTRIENT CYCLING
- SOIL FORMATION
- PRIMARY PRODUCTION
- ...

Provisioning

- FOOD
- FRESH WATER
- WOOD AND FIBER
- FUEL
- ...

Regulating

- CLIMATE REGULATION
- FLOOD REGULATION
- DISEASE REGULATION
- WATER PURIFICATION
- ...

Cultural

- AESTHETIC
- SPIRITUAL
- EDUCATIONAL
- RECREATIONAL
- ...

LIFE ON EARTH - BIODIVERSITY

CONSTITUENTS OF WELL-BEING

Security

- PERSONAL SAFETY
- SECURE RESOURCE ACCESS
- SECURITY FROM DISASTERS

Basic material for good life

- ADEQUATE LIVELIHOODS
- SUFFICIENT NUTRITIOUS FOOD
- SHELTER
- ACCESS TO GOODS

Health

- STRENGTH
- FEELING WELL
- ACCESS TO CLEAN AIR AND WATER

Good social relations

- SOCIAL COHESION
- MUTUAL RESPECT
- ABILITY TO HELP OTHERS

Freedom of choice and action

OPPORTUNITY TO BE ABLE TO ACHIEVE WHAT AN INDIVIDUAL VALUES DOING AND BEING

Source: Millennium Ecosystem Assessment

ARROW'S COLOR

Potential for mediation by socioeconomic factors

Low

Medium

High

ARROW'S WIDTH

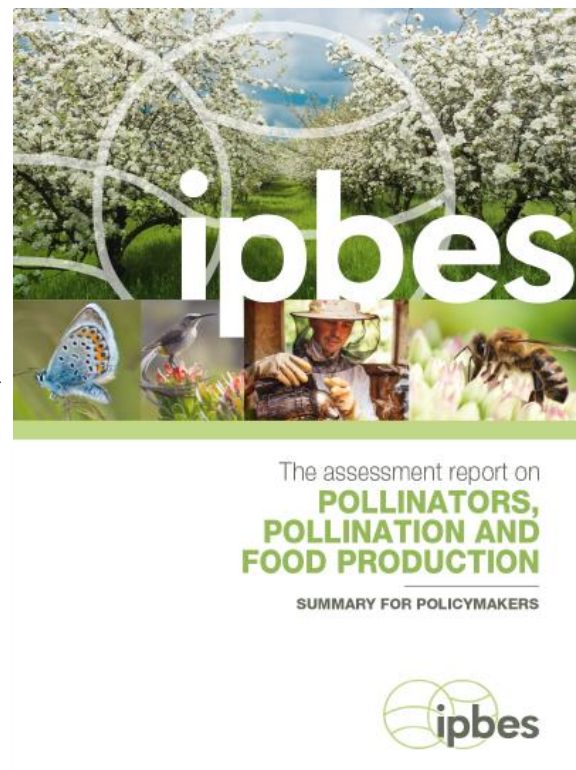
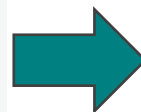
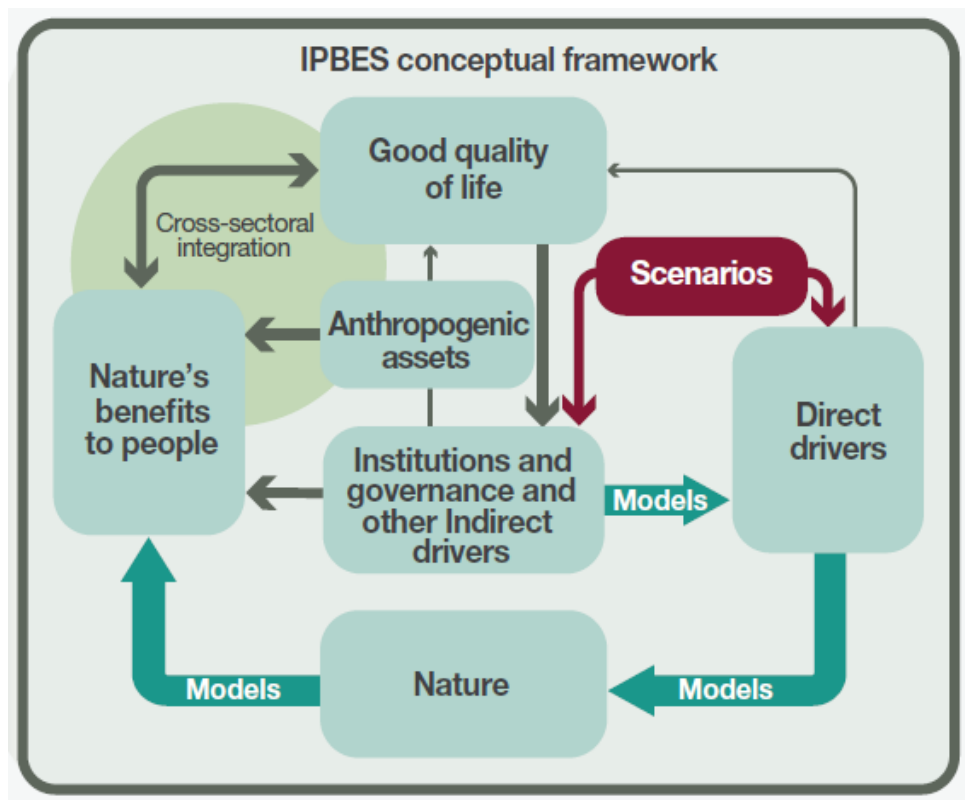
Intensity of linkages between ecosystem services and human well-being

Weak

Medium

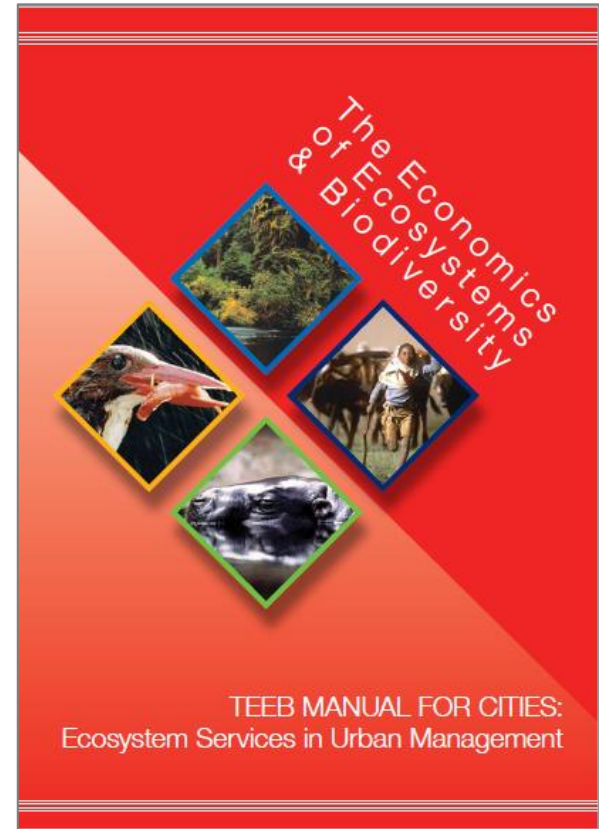
Strong

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)



The Economics of Ecosystems and Biodiversity (TEEB)

- Focused on “making nature’s value visible”
- rethink today’s subsidies to reflect tomorrow’s priorities
- reward currently unrecognized ecosystem services and make sure that the costs of ecosystem damage are accounted for, by creating new markets and promoting appropriate policy instruments
- measure the costs and benefits of ecosystem services



Global Initiatives

- Wealth Accounting and the Valuation of Ecosystem Services (WAVES)
<http://www.wavespartnership.org/>
- System of Environmental Economic Accounting (SEEA) <https://seea.un.org/>
- Natural Capital Project
<https://www.naturalcapitalproject.org/>

Environment

The Social and Economic System

Supporting or intermediate services

Final services

Goods and Benefits

Biophysical structure or process
(e.g. woodland habitat or net primary productivity)

Function

(e.g. slow passage of water, or biomass)

Service

(e.g. flood protection or harvestable products)

Benefit

(e.g. contribution to aspects of well-being such as health and safety)

Value

(e.g. willingness to pay for woodland protection or for more woodland, or harvestable products)

Limit pressures via policy action?

Σ Pressures

The 'production boundary'

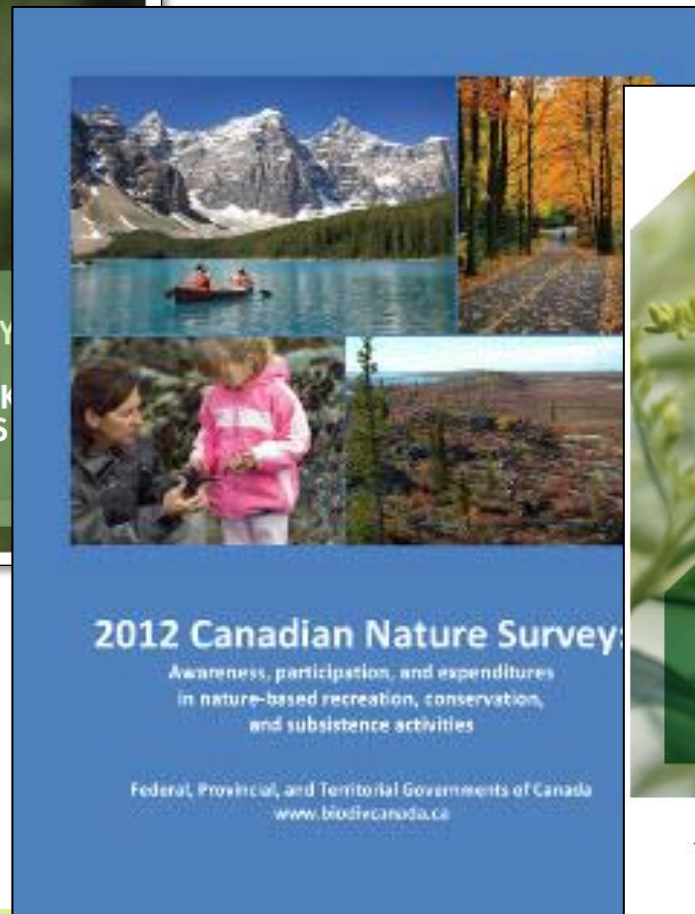
CICES

Source: Common International Classification of Ecosystem Services (CICES), adapted from Potschin and Haines-Young (2011)

Canadian Actions and Frameworks



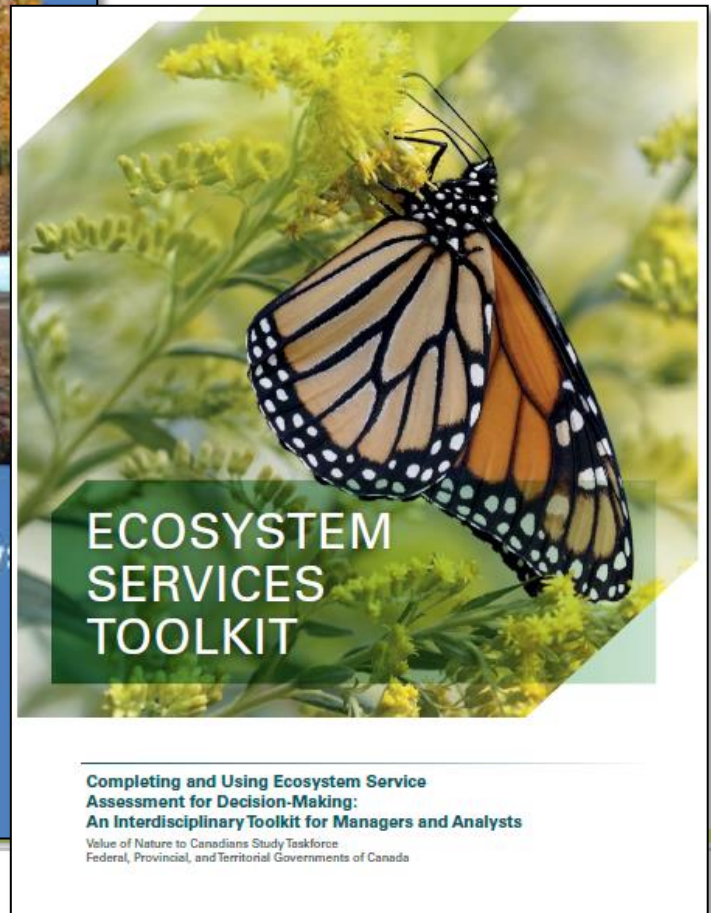
CANADA'S BIODIVERSITY OUTCOMES FRAMEWORK 2020 GOALS TARGETS



2012 Canadian Nature Survey

Awareness, participation, and expenditures
in nature-based recreation, conservation,
and subsistence activities

Federal, Provincial, and Territorial Governments of Canada
www.biodivcanada.ca

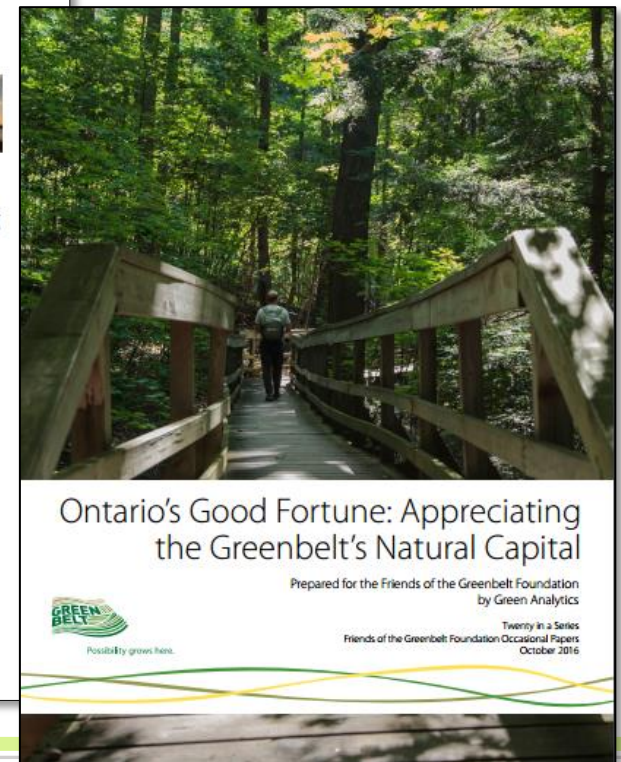
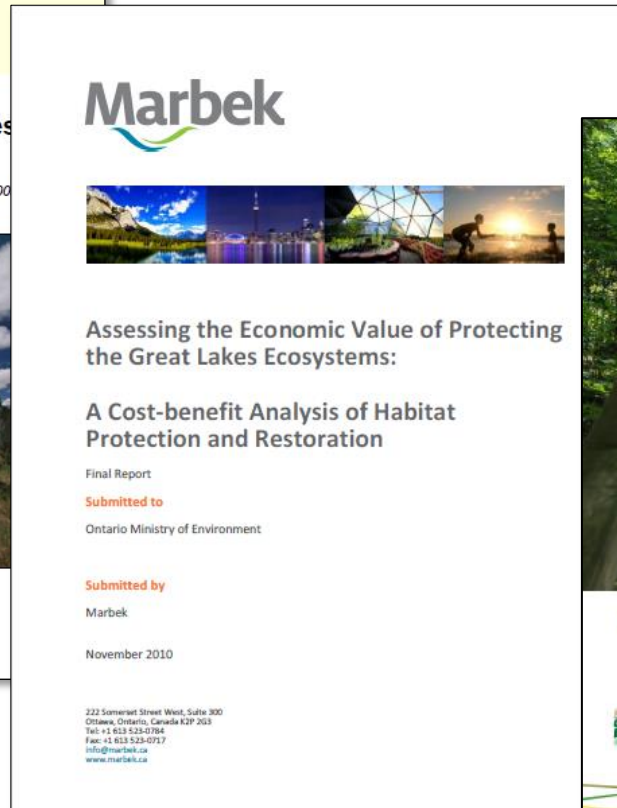
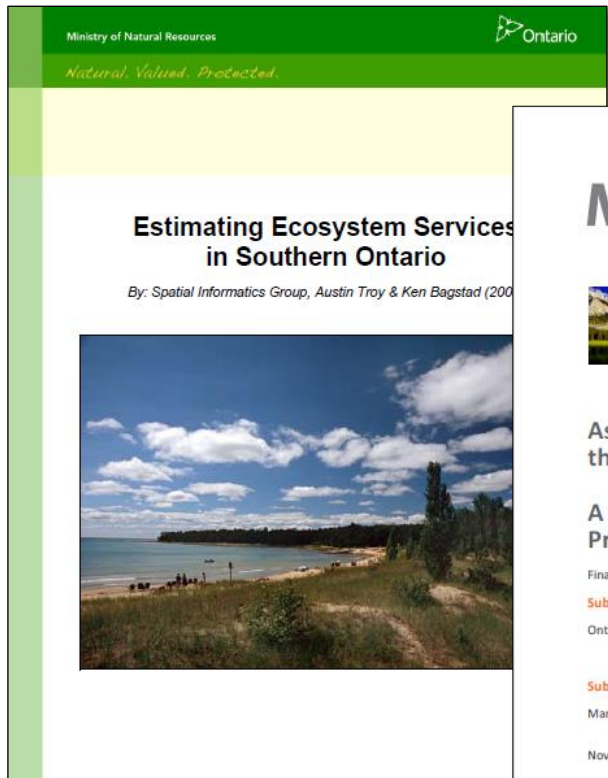


ECOSYSTEM SERVICES TOOLKIT

**Completing and Using Ecosystem Service
Assessment for Decision-Making:
An Interdisciplinary Toolkit for Managers and Analysts**

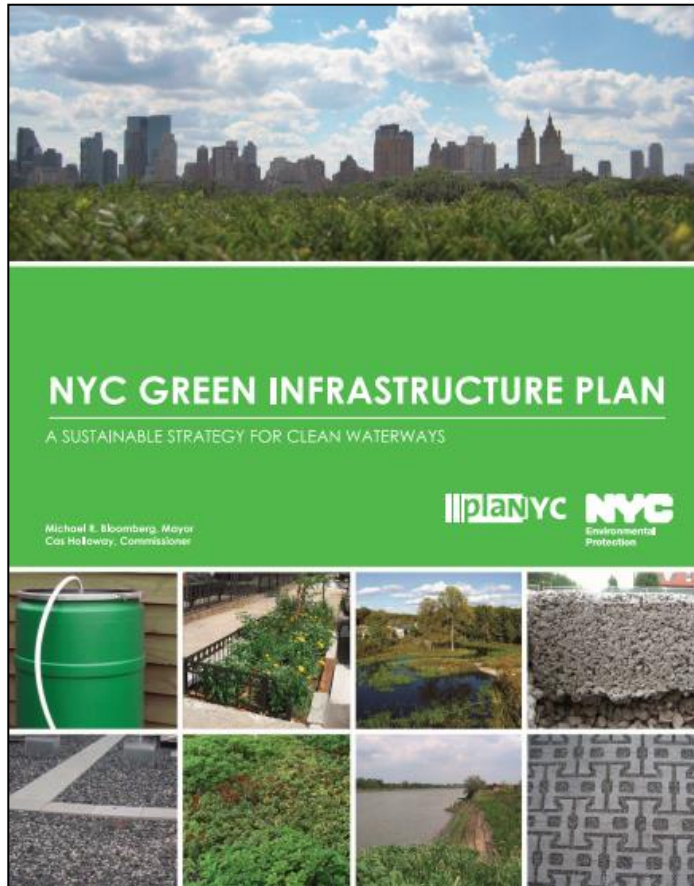
Value of Nature to Canadians Study Taskforce
Federal, Provincial, and Territorial Governments of Canada

Regional Assessments



Case Study 1: New York City

Cost benefit analysis for green vs. grey



NYC is using green infrastructure to reduce discharges into combined sewer system and achieve their 20 year stormwater objectives. Projected avoided costs are \$1.5 billion.

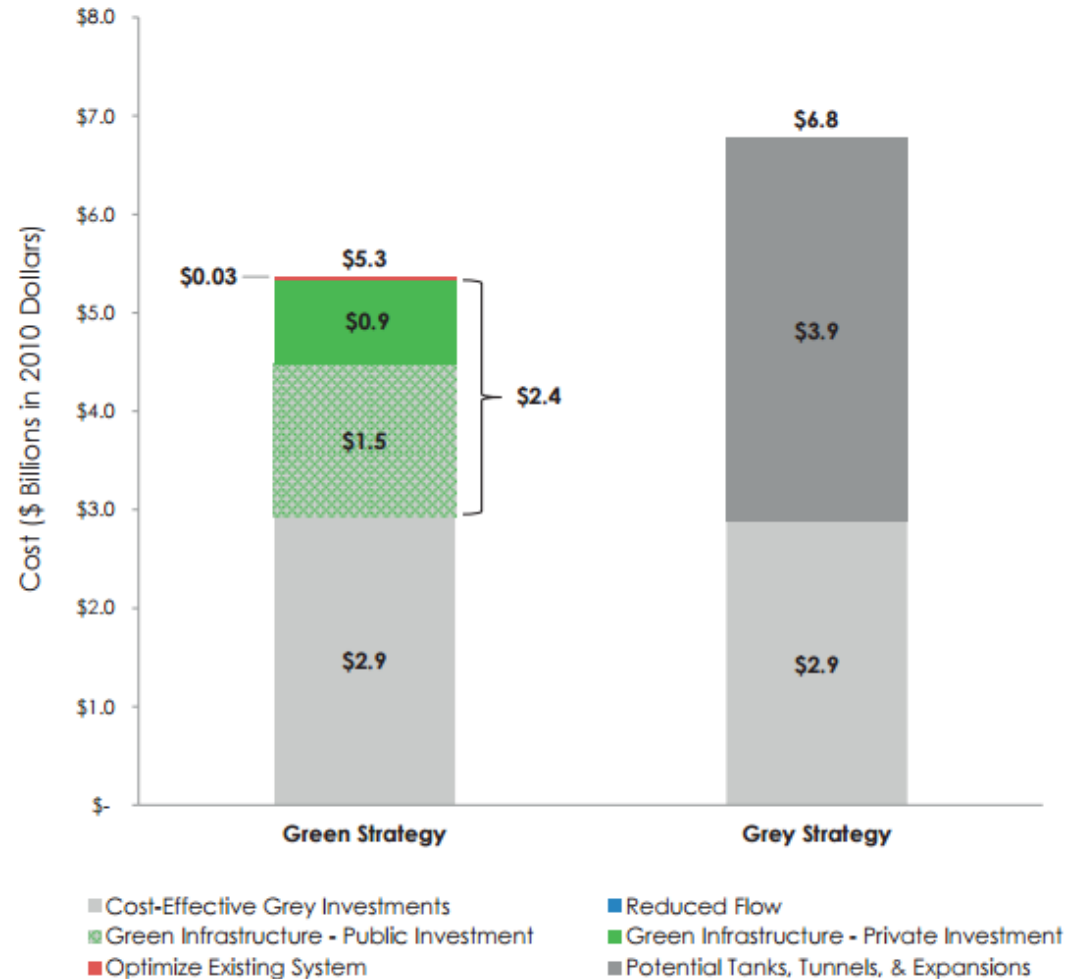


Figure 1: Costs of CSO control scenarios (after 20 years)

Case Study 2: Greenbelt Foundation

Raising awareness

1. Identify the relevant ecosystem service accounts
2. Identify and assess the beneficiaries associated with each account
3. Determine the quantity of services being utilized by the beneficiaries (e.g. days of recreation, reduction in air pollution)
4. Determine the value of ecosystem service flows using a value transfer technique

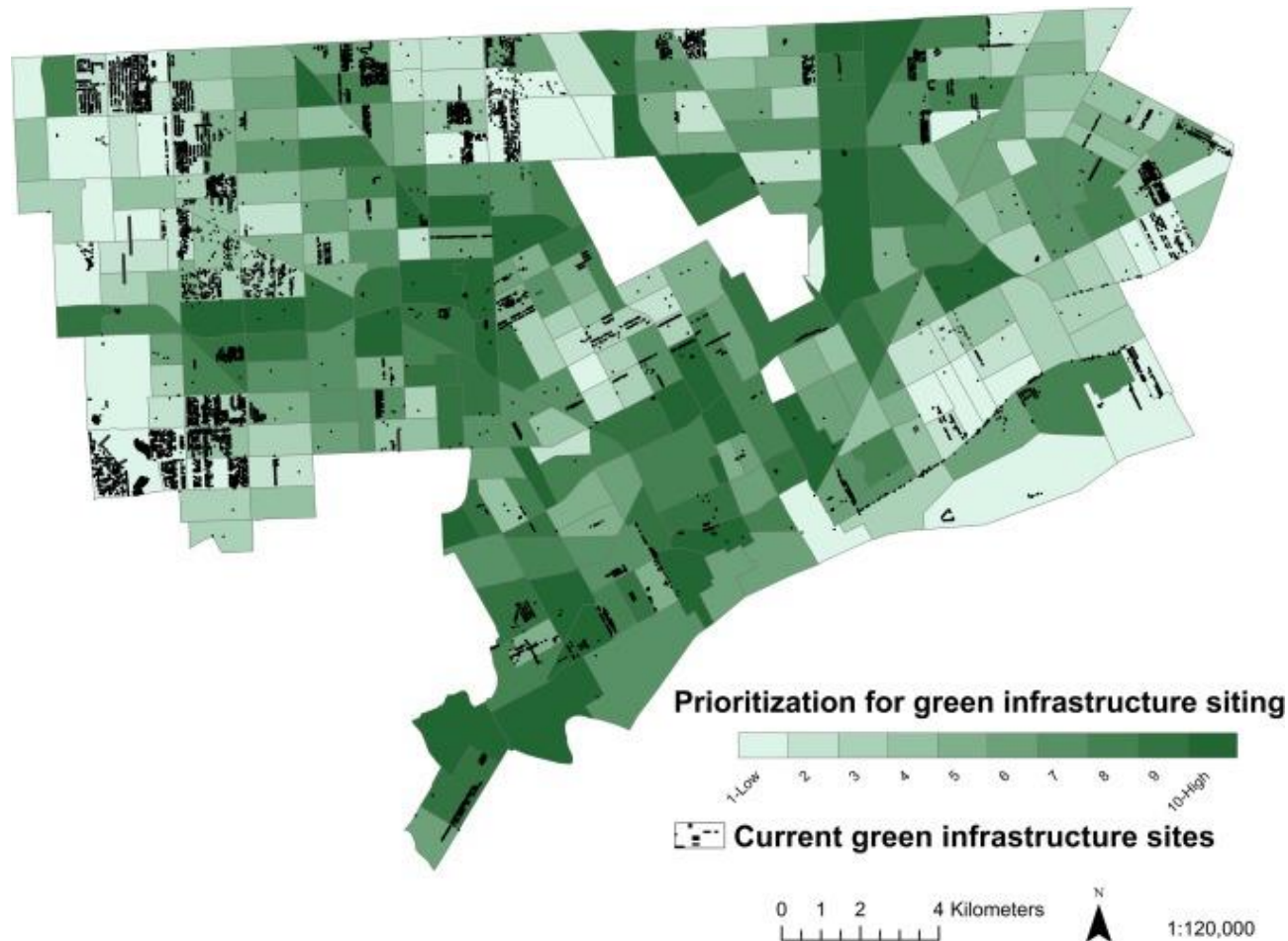
Ecosystem services provided annually by the Greenbelt were valued at \$3.2 B

Recreation accounts for 2/3 of the value of ecosystem services in the Greenbelt - \$2.1 B annually

http://www.greenbelt.ca/ontarios_good_fortune_greenbelt_natural_capital

Case Study 3: Detroit

Matching supply with demand



Managing stormwater



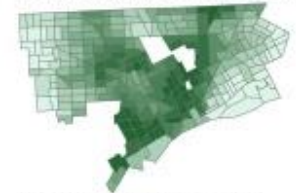
Reducing social vulnerability



Increasing access to green space



Reducing the urban heat island



Improving air quality



Increasing landscape connectivity



Figure 8. Green infrastructure project locations (black) and GISP model combined criteria scores (green) using stakeholder pairwise comparison weights (Meerow & Newell, 2017)

Case Study 3: Detroit

Matching supply with demand

Green Infrastructure Spatial Planning (GISP) Model Detroit

Sara Meerow - Urban Sustainability Research Group

Green infrastructure is emerging as a popular strategy to make our cities more livable, healthy and resilient. When siting future green infrastructure, it is important to try to maximize different benefits to the community and to distribute these benefits fairly across neighborhoods. This Green Infrastructure Spatial Planning (GISP) model was developed as a tool for identifying priority areas (census tracts)



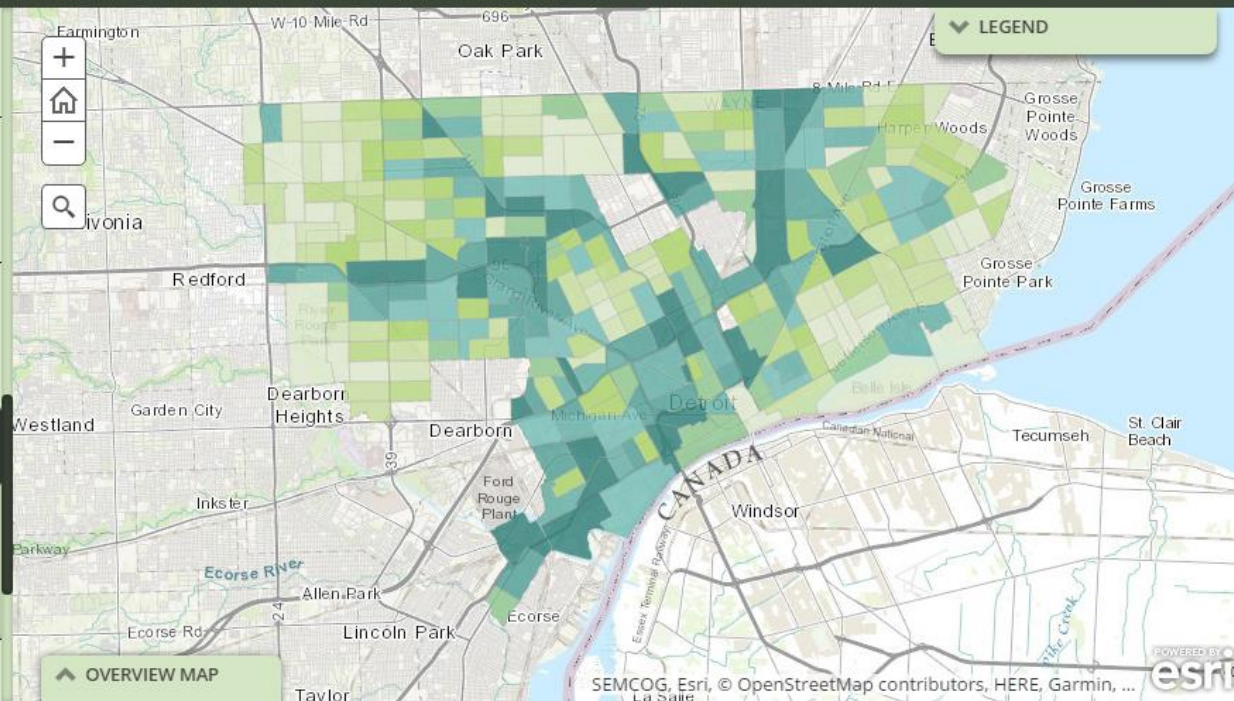
Hotspots (Equal Weights & Raw Scores)

Hotspots (Stakeholder Ranking Weights & Quantiles)

Hotspots (Stakeholder Pair-wise Comparison Weights & Quantiles)

The six benefit criteria can be combined to identify 'hotspots' where the multiple benefits of green infrastructure may be maximized. The criteria can also be weighted to reflect local priorities.

On the map, darker green tracts (with higher 'combined' scores) are those areas with the highest combined score. Criteria are weighted based on a survey that asked local stakeholders to do pair-wise comparisons of the criteria.



<http://umich.maps.arcgis.com/apps/MapSeries/index.html?appid=4b257ce673ed4a178d11b4a267a9967e>

Case Study 4: London Borough of Barnet

Natural capital accounting

Natural capital balance sheet for 200 open spaces in LB Barnet (2015-2016)

	Private Value (PV £m)	External Value (PV £m)	Total Value (PV £m)
Assets			
Baseline Value		1,944	1,944
Cumulative Gains/(Losses)			
Additions/(Disposals or Consumption)			
Revaluations and Adjustments			
Gross Asset Value	-	1,944	1,944
Liabilities			
Legal Provisions	-		
Other Maintenance Provisions	(134)	nil	(134)
Total Net Maintenance Provisions	(134)		(134)
Total Net Natural Capital Assets	-	1,944	1,810

Includes value of recreational visits, physical health benefits, commercial property rental premiums, and climate regulation

Includes all maintenance costs incurred to the local government

Final Thoughts

- Ecosystem services concepts and valuation practices are now widely used at the global to local scale
- Valuation methodologies are evolving, and should be applied carefully
- We must also have regard for justice
 - Services for whom?
 - Who decides?
 - What are the tradeoffs?



www.greeninfrastructureontario.org

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