Communicating Ecosystem Services in a Municipal Context

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Toronto and Region Conservation Authority
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
“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.
CONSTITUENTS OF WELL-BEING

<table>
<thead>
<tr>
<th>Security</th>
<th>Basic material for good life</th>
<th>Freedom of choice and action</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERSONAL SAFETY</td>
<td>ADEQUATE LIVELIHOODS</td>
<td>OPPORTUNITY TO BE ABLE TO ACHIEVE WHAT AN INDIVIDUAL VALUES DOING AND BEING</td>
</tr>
<tr>
<td>SECURE RESOURCE ACCESS</td>
<td>SUFFICIENT NUTRITIOUS FOOD</td>
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<tr>
<td>SECURITY FROM DISASTERS</td>
<td>SHELTER</td>
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<td></td>
<td>ACCESS TO GOODS</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Health</th>
<th>Good social relations</th>
<th>Source: Millennium Ecosystem Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRENGTH</td>
<td>SOCIAL COHESION</td>
<td></td>
</tr>
<tr>
<td>FEELING WELL</td>
<td>MUTUAL RESPECT</td>
<td></td>
</tr>
<tr>
<td>ACCESS TO CLEAN AIR AND WATER</td>
<td>ABILITY TO HELP OTHERS</td>
<td></td>
</tr>
</tbody>
</table>

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

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/
Source: Common International Classification of Ecosystem Services (CICES), adapted from Potschin and Haines-Young (2011)
Canadian Actions and Frameworks
Regional Assessments
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.

Case Study 1: New York City
Cost benefit analysis for green vs. grey

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

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

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 Barnett

Natural capital accounting

<table>
<thead>
<tr>
<th>Natural capital balance sheet for 200 open spaces in LB Barnet (2015-2016)</th>
<th>Private Value (PV £m)</th>
<th>External Value (PV £m)</th>
<th>Total Value (PV £m)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline Value</td>
<td></td>
<td>1,944</td>
<td>1,944</td>
</tr>
<tr>
<td>Cumulative Gains/(Losses)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Additions/(Disposals or Consumption)</td>
<td></td>
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<tr>
<td>Revaluations and Adjustments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Asset Value</td>
<td>-</td>
<td>1,944</td>
<td>1,944</td>
</tr>
<tr>
<td><strong>Liabilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legal Provisions</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Maintenance Provisions</td>
<td>(134)</td>
<td>nil</td>
<td>(134)</td>
</tr>
<tr>
<td>Total Net Maintenance Provisions</td>
<td>(134)</td>
<td></td>
<td>(134)</td>
</tr>
<tr>
<td><strong>Total Net Natural Capital Assets</strong></td>
<td>-</td>
<td>1,944</td>
<td>1,810</td>
</tr>
</tbody>
</table>

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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