RETURN ON INVESTMENT:
Online Tool Calculates The Benefits Of Green Infrastructure

21st Annual Public Works Roundup
Kate Zielke, North Central Texas Council of Governments
September 17, 2020
The challenge

“We look at environmental programs as the right thing to do, but we look at them as a cost. How do we measure the return on investment of this work?”
Goals for developing Economic & Environmental Benefits of Stewardship (EEBS) tool

Create a user-friendly, preliminary tool for decision-making and policy

Encourage infrastructure decision-makers to consider the benefits of incorporating environmental stewardship, including qualitative and quantitative benefits

Overcome the view that environmental stewardship is only a cost
Detention Ponds

Detention ponds capture and store stormwater in a pond year-round, or during or after a storm event. The stormwater is then released at a controlled rate and location. Depending on the type of pond, stormwater pollutants may be filtered, settled, infiltrated, or otherwise reduced before it is released.

Annualized ROI of 1 Acre Detention Pond

Low Value
- Stormwater Management Savings: 1000
- Sediment Removal: 6
- Nitrogen Removal: 27
- Phosphorus Removal: 0
- Recreation Value: 3500
- Installation Cost Estimate: 15500

High Value

Cost / Value

<table>
<thead>
<tr>
<th>Low Value</th>
<th>High Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>$30,000</td>
</tr>
<tr>
<td>$10,000</td>
<td>$50,000</td>
</tr>
<tr>
<td>$20,000</td>
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<tr>
<td>$30,000</td>
<td>$90,000</td>
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<tr>
<td>$40,000</td>
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<tr>
<td>$50,000</td>
<td>$130,000</td>
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<tr>
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<td>$70,000</td>
<td>$170,000</td>
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<tr>
<td>$80,000</td>
<td>$190,000</td>
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<tr>
<td>$90,000</td>
<td>$210,000</td>
</tr>
<tr>
<td>$100,000</td>
<td>$230,000</td>
</tr>
</tbody>
</table>

Your project may affect a resource that may require regulatory compliance. Stewardship options provided may not meet the necessary requirements. Further coordination with regulatory agencies and mitigation may be required.
EEBS was many steps in the making
Engaging stakeholders and experts

**Stakeholder interviews**
- Tarrant Regional Water District
- Cities of Denton, Fort Worth, Cedar Hill
- Texas Parks & Wildlife Department
- NCTCOG

**Project review committee**
- Texas Parks & Wildlife Department urban biologist
- City of Dallas Trinity Watershed Management
- NCTCOG National Environmental Policy Act practitioner

**Consultant**
- Highland Economics, LLC
Sample of stakeholder comments

Barriers to green infrastructure
City ordinances
Resistance to change may lead to belief that cost is higher
Lack of experience in implementing green infrastructure

Need for financial data
Metric that will most influence policy makers is money
Cost savings typically are not tracked for existing green infrastructure
Because of budgetary constraints, the bare minimum may be implemented

Need for public education
Education could lead the public to influence policy makers to support green infrastructure
The public likes the look of green infrastructure, and they like the environmental benefit once they are educated about this benefit

Need to include green infrastructure in planning phase
There is a need for a holistic, basin-wide vision in managing stormwater
We need to institutionalize the value of open space at the policy level
Push-back occurs after growth because people realize green space preservation was forgotten
Input from project review committee

Cleared up terminology discrepancies between city staff, NCTCOG staff, regulatory agencies

Provided feedback on impacts created by infrastructure, relevant green infrastructure to address impacts, and ecosystem services generated by green infrastructure

Discussed ecosystem services that ultimately the data and tool could not address, such as value of animal species, increase in neighboring property value
## Economic and Social Benefits of Mitigating Environmental Impacts of Transportation Projects

### Table 1-1: Quantified Costs: Tool Inputs on Economic Benefit

<table>
<thead>
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<th>Environmental Benefit</th>
<th>Economic Value</th>
<th>Unit</th>
<th>Source</th>
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<tr>
<td>Stormwater Management</td>
<td>$1,000 - $1,100</td>
<td>$/Acre Inundation / Year</td>
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</tr>
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<td>Water Quality (Nitrogen)</td>
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</tr>
<tr>
<td>Water Quality (TN)</td>
<td>$0</td>
<td>$/Ton</td>
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<tr>
<td>Recreation</td>
<td>$3 - $25</td>
<td>Per Visit Benefit to Recreator</td>
<td></td>
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<tr>
<td>Energy Savings</td>
<td>$0.1165</td>
<td>$/KWH</td>
<td></td>
</tr>
<tr>
<td>Aesthetics</td>
<td>$300 - $900</td>
<td>$/Street Tree / Year</td>
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<tr>
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**Note:** Health benefits from air quality are included in the air quality values.

1/ Derived from the residential stormwater fees in Fort Worth and Dallas
3/ Sources: (Hassan, Mills, Stoll, Freeman, & Hancock, 1996; Bergstrom & Cardell, 1991; Loarn, 2005). All values were adjusted for inflation to 2018 dollars using the Consumer Price Index.
4/ Based on the average marginal charge for electricity in Dallas in July 2018 (TexasElectricityRatings.com, 2018)
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Tool concept map

* If data was available
What are ecosystem services?

The services humans derive from the environment

- Food
- Flood control
- Recreation
- Many more...

- Public goods
- Value hard to quantify in decision making
- Protecting ecosystems and their services seen as a cost
## Stewardship Type

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<th>Bioretention/Bioswales</th>
<th>Detention Pond</th>
<th>Riparian Plantings/Wetland Restoration</th>
<th>Wildlife Corridor Measures</th>
<th>Preservation of Open Space</th>
<th>Pervious Pavement</th>
<th>Artificial Light Measures</th>
<th>Stream Function Restoration</th>
<th>Native Tree Plantings</th>
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## Natural Resources Layer

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<th>Aquatic Resources/Habitat</th>
<th>Terrestrial Habitat</th>
<th>Tree Canopy</th>
<th>Streams</th>
<th>Wetlands</th>
<th>Altered Hydrology</th>
<th>Streambank/Shoreline Erosion</th>
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## Environmental Effect

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<th>Heat Island Effect</th>
<th>Water Quantity/Quality</th>
<th>Aquatic Habitat</th>
<th>Terrestrial Habitat</th>
<th>Vehicle Collisions</th>
<th>Vegetation Removal</th>
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Case studies

Green infrastructure

Open space

Pervious pavement

Green Infrastructure in Grand Rapids, MI

North Central Texas Council of Governments

Green Infrastructure Net Economic Benefits in Grand Rapids, Michigan

Cities in North Central Texas

Key Program Benefits

- Green infrastructure mitigation measures are estimated to provide a higher net economic benefit than gray infrastructure. Specifically, the additional net benefits are:
  - Conserved natural areas: $3.10/ft²
  - Street Trees: $1.48/ft²
  - Rain gardens: $1.12/ft²
  - Permeable asphalt: $0.68/ft²

Net benefits were estimated to be positive over the life of the GI measure (measured as net present value).
User guide

Video or PDF versions

Evaluate My Project

1. Draw Your Project Boundaries

Navigate to the location of your project by typing in an address, clicking and dragging on the map, and/or using the + and – tools.
Tool demo

Economic & Environmental Benefits of Stewardship

User Guide
Step by step guide for how to use the project evaluation tool

Project Evaluation Tool
The Economic & Environmental Benefits of Stewardship tool can estimate the return on investment of implementing environmental stewardship to reduce the environmental effects of transportation projects. The tool can educate decision-makers about the value of environmental stewardship.

Evaluate My Project

Stewardship Information
Browse our library of stewardship options and download or print informational files.
Really excited about EEBS?

If you would like to promote EEBS, NCTCOG staff would be happy to speak at your event. We also can provide flyers to distribute or email.

**Economic & Environmental Benefits of Stewardship Tool**

The Economic & Environmental Benefits of Stewardship tool estimates the potential return on investment of implementing environmental stewardship to reduce the environmental effects created by transportation projects. The tool can educate decision makers about the financial value of environmental stewardship. Use the tool at [eebs.nctcog.org](http://eebs.nctcog.org).

- Draw and describe project boundaries
- Prioritize environmental effects
- Select stewardship options
- Compile report on benefits and costs
Environmental Matchmaking Tools

Webinar
September 30
1:30 p.m.

Learn about free tools to help identify your best stewardship options and mitigation locations for your transportation or development projects.

www.nctcog.org/envir/events
Contacts

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