SUPPORTING BUSINESSES TO VALUE NATURE AT A SITE

ESII Tool (Ecosystem Services Identification & Inventory Tool)

The Dow-TNC Collaboration & ESG

Sheila Walsh Reddy[1], *Rebecca Currie*[2], *France Guertin*[2], *Morgan Erhardt*[3], *Jim Koloszar*[3], *Paul Manson*[3], *Kevin Halsey*[3], *Kenna Halsey*[3], *Elizabeth Uhlhorn*[2], *Jennifer Molnar*[1], *Jeffrey North*[1], *Jim South*[1]

[1] The Nature Conservancy, Arlington, Virginia, USA, [2]The Dow Chemical Company, Midland, Michigan, USA , [3]EcoMetrix Solutions Group, Polebridge, Montana, USA

Motivation

- Businesses recognize the value of nature, but do not have the tools to value nature.
- The ESII Tool was developed to identify and quantify services on and around sites.
- The ESII Tool could support managers to value nature and make more informed decisions.

Business Case

Site Decision:

The Industrial Park in Institute, West Virginia, USA is in the process of removing a tank farm and wanted to re-develop the area as a greenbelt that delivers rainwater to streams via sheet flow. The Industrial Park's managers were also interested in controlling erosion and improving aesthetics for neighbors.

Fig. 1b. Tank farm area planned for re-development.

Fig. 1a. Industrial Park, Institute, West Virginia, USA. The site is located on the Kanawha River and next to West Virginia State University.

Options for Analysis:

We developed two sustainable landscaping options. Option A is a basic restoration plan with native grasses. Option B is a full restoration plan with stream restoration and trees. Baseline is the tank farm with containment berms, seep, vegetation.

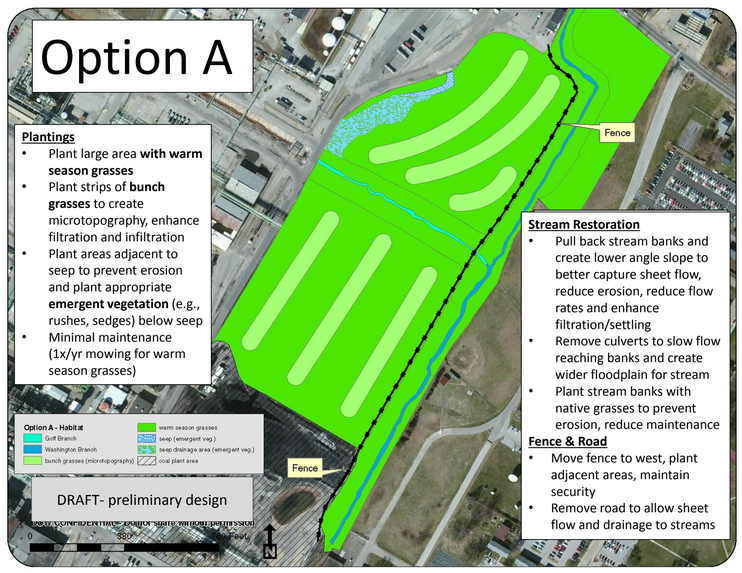

Fig. 2. Sustainable landscaping options for re-development at the Industrial Park, Institute, West Virginia, USA site. *Figure shows subset of area for restoration.

Key Findings

Outputs from the ESII Tool can support businesses to value nature and inform actionable decisions.

Businesses can use their own cost models to estimate business values and established valuation methods to estimate public values.

Business Case with Dow at the Industrial Park, Institute, West Virginia, USA:

- Generated re-development options that use sustainable landscaping,
- Quantified ecosystem services to business, public, and habitat area for nature,
- Compared cost-effectiveness for service provisioning,
- Identified new areas for cost-savings by understanding ecosystem function (e.g., reduced fill costs ($100,000, one time construction cost)), reduced mowing costs ($80,000, 30 yr NPV)),
- Advanced engineering capacity and technology for greenbelt design.

Methods

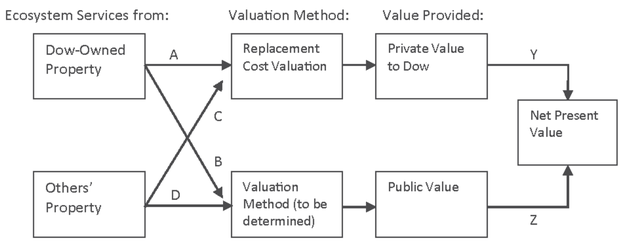

Fig. 3. Conceptual diagram for valuation of business and public benefits from nature (DiMuro et al. 2014 *Industrial Ecology*).

Ecosystem Service Quantification

We developed the ESII Tool to identify and quantify ecosystem services on a site in terms of percent performance and units of measures that engineers can use. *See Anatomy of the ESII Tool Poster, presented by Kevin Halsey, ESG.*

Ecosystem Service Valuation

Business Value: We defined the service to the business in units of measure that are relevant to engineers and we identified potential replacement technologies for each service. This ensured that the ESII Tool data could be used in business cost models and provided guidance in applying replacement cost methods. As a result, engineers can use ESII Tool data to compare the cost-effectiveness of service provision or the value of the services to the business.

Community Value: We identified valuation models and data that are widely accepted and can be tailored to different locations across the USA.

Case Study Application

We collected site attribute data at the Industrial Park, Institute, West Virginia, to establish a baseline. We created re-development options using sustainable landscaping principles. Services for all three scenarios were estimated using the ESII Tool. The cost estimates for the options were provided by a Dow engineer and a TNC habitat restoration expert.

Results

Sustainable landscaping provides higher performance across 10 of 12 ecosystem services, with the greatest uplift for control of particulate matter in air and nitrates in water.

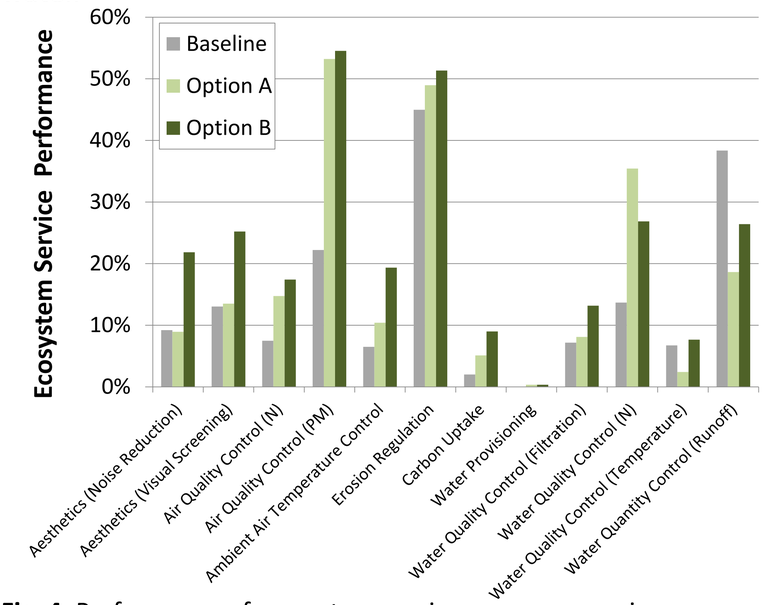

Fig. 4. Performance of ecosystem services across scenarios: baseline, basic sustainable landscaping (Option A), complete sustainable landscaping (Option B).

Services in units of measure that are relevant to engineers can help evaluate options and can be input into cost models.

Table 1. Services across each option in engineers' units of measure.

Ecosystem Service Production	Baseline	Option A	Option B
Air NOx Removal (lbs/year)	1	1	30
Air PM Removal (lbs/year)	2	2	80
BTU Reduction (Shade) (BTU/hr)	8,258,000	8,248,000	20,572,000
Erosion Regulation (acres)+	6	0	0
Water Provisioning (gallons)*	2,014,000	614,000	2,864,000
Water Quality TSS Removal (mg/l)	10	32	34
Water Quality NOx Removal (mg/l)	0.1	0.26	0.29
Water Quantity Control (Runoff) (gallons)**	4,281,000	3,657,000	3,512,000

Note: due to differences in modeling for percent performance and units of measure, trends across scenarios are not always the same for results in terms of percent performance as they are for units of measure. + Defined as areas performing below a benchmark of 35%. *Baseline performs better than Option A due to berms in baseline. **Modeling of percent performance accounts for storage capacity and modeling steps used to translate to units of measure do not account for storage capacity. Storage capacity in Option A is lower than in Baseline, resulting in lower percent performance relative to Baseline (Fig. 4).

Option A costs $1.0 million, Option B costs $1.4 million, and standard landscaping (not shown) costs $0.8 million (30 yr NPV). Option B is cost-competitive with Option A in providing services to Dow, the public, and nature.

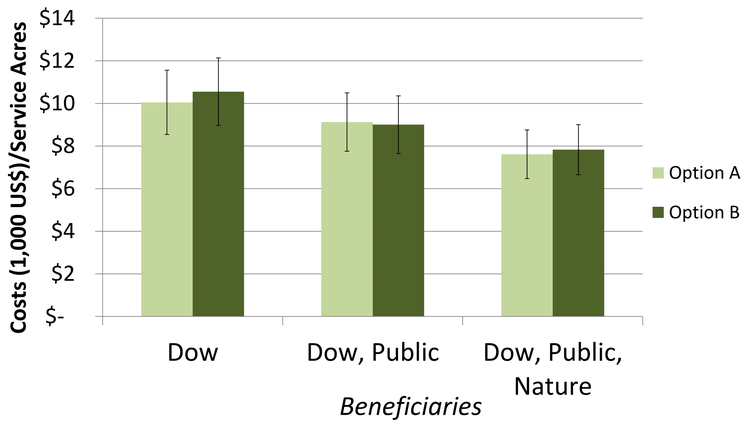

Fig. 5. Cost per unit of ecosystem service to Dow; Dow and the public; and Dow, the public, and nature. Service acres are a calculated as percent performance x acres of land providing the service. All services shown in Fig. 4 provide benefit to Dow. We assume the public also benefits from aesthetic services. We account for benefits to nature as the acres of natural areas.

Next Steps:

- Estimate services from standard landscaping option
- Estimate public value of aesthetics in terms of increased property values and erosion control in terms of avoided maintenance cost to adjacent neighbors

Learn more: nature.org/dow

Contact: Sheila Walsh Reddy, sreddy@tnc.org; Elizabeth Uhlhorn, emuhlhorn@dow.com