Ecosystem Services Valuation at Dow

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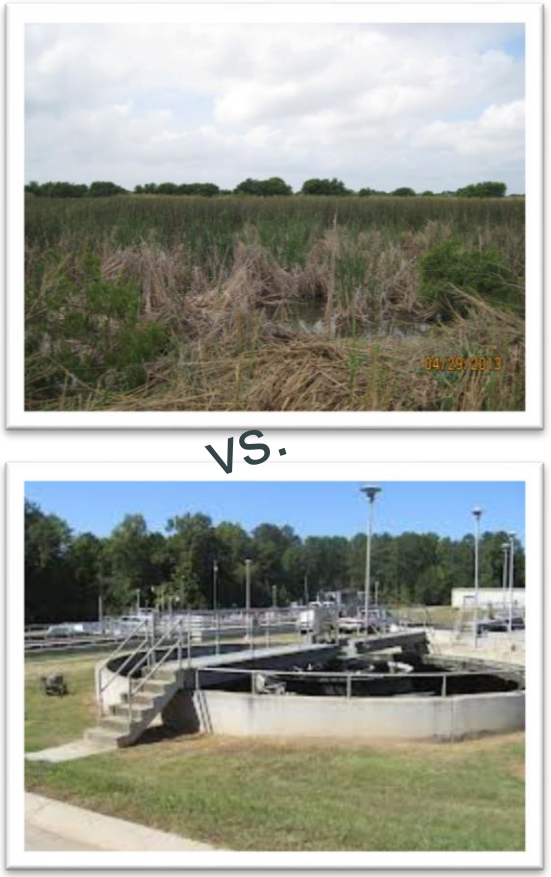
December 10, 2014

Seadrift: Our Introduction to Nature's Value

The problem: Dow's Seadrift site needed to increase the level of water treatment to meet EPA effluent guidelines for suspended solids.

The solution: Dow converted 110 acres of an existing treatment pond into a constructed wetlands for the purpose of naturally treating these suspended solids.

The benefits: Recently, Dow conducted an economic and full life cycle analysis. **The net present value of the savings totals more than $200 million** and the area serves as great habitat for fish, alligators, raccoons, bobcats, deer and a large number of birds. The wetland also requires no electricity, greatly reducing fossil fuel energy use.



http://onlinelibrary.wiley.com/doi/10.1111/jiec.12129/full

Ecosystem Services Valuation at Dow: From Seadrift to the present

Seadrift Constructed Wetland

- NPV of cost savings = $280MM

The Nature Conservancy

Nature is valuable

- Collaboration with TNC
- Revising business decision-making processes
- New tools
- Publications

Green Infrastructure Projects

Conservation Monetization

Triggers for action – why nature?

CEO level support

- *…By integrating the value of biodiversity and ecosystem services into their strategic plans, companies can incorporate sustainability as an adjective into everything they do, delivering positive growth for enterprise and planet alike.* – Andrew Liveris, Chairman and CEO, The Dow Chemical Company

Site Fit

- Ample land, right characteristics – reforestation in Freeport possible because of owned land in the right place

Co – Benefits

- Trees in the Houston area don't just help with air quality, they provide habitat for important species and shade to help with cooling and water retention

Cost Savings

- Seadrift NPV remarkable – what else is out there?

TNC-Dow Pilot Work – Freeport, Texas

The Freeport Pilot demonstrated ways that investing in nature could also help Dow reduce costs or avoid risk. It focused on:

- **Improving air quality through reforestation**
- **Mitigating coastal hazards with natural infrastructure**
- **Preventing disruption to freshwater supply**

Improving Air Quality

Canopy removes O_3 and NO_2 (and PM, SO_2, CO)

But is reforestation cost-competitive?

Can be cost-competitive with conventional control options

Has wide application potential across US

Provides co-benefits for people and nature that conventional controls do not

Peer reviewed paper published in PNAS in September, describing science behind concept

PNAS

Reforestation as a novel abatement and compliance measure for ground-level ozone

Timm Kroeger[a,1], Francisco J. Escobedo[b], José L. Hernandez[c,2], Sebastián Varela[b,3], Sonia Delphin[b], Jonathan R. B. Fisher[a], and Janice Waldron[d]

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Edited* by Peter M. Kareiva, Nature Conservancy, Seattle, WA, and approved August 14, 2014 (received for review May 27, 2014)

High ambient ozone (O_3) concentrations are a widespread and persistent problem globally. Although studies have documented the role of forests in removing O_3 and one of its precursors, nitro-

hospital admissions; and 3.7 (90% CI: 1.6–5.9) million school loss days could have been avoided per year on average during 2005–2007 if O_3 concentrations in those years had been reduced

http://www.pnas.org/content/111/40/E4204.full.pdf+html

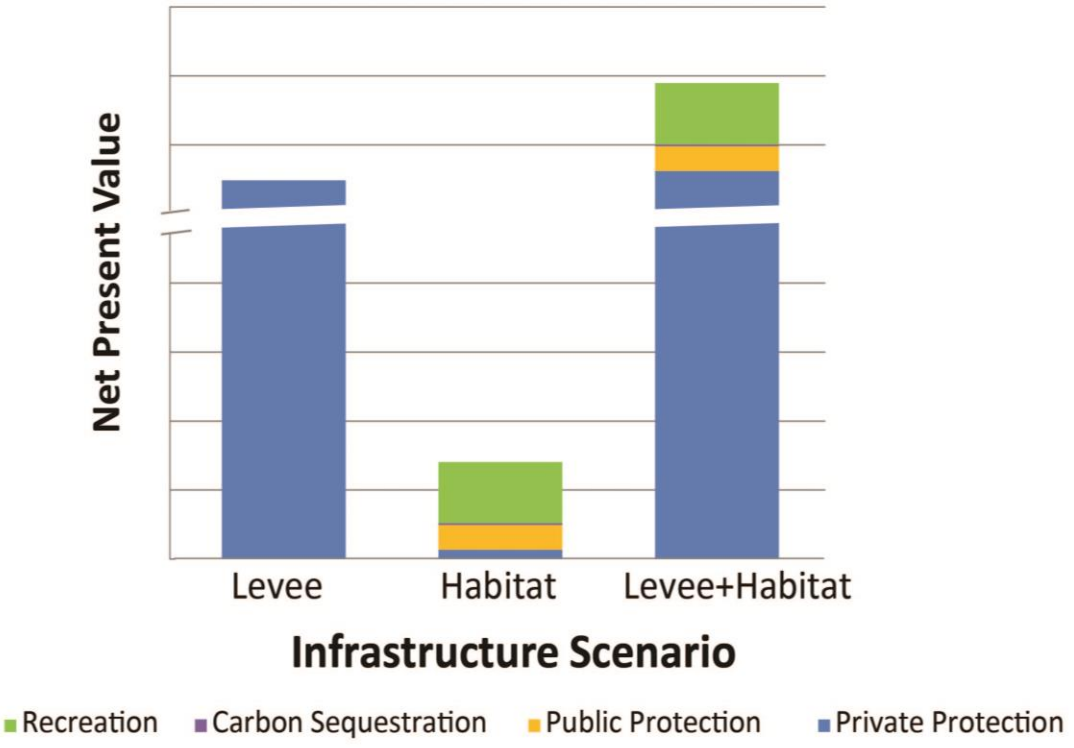
Mitigating Coastal Hazards

Which option will best prevent the costs associated with a strong storm?

Coastal Habitat

Levee

Or a **combined system:**



Preventing Freshwater Supply Disruption

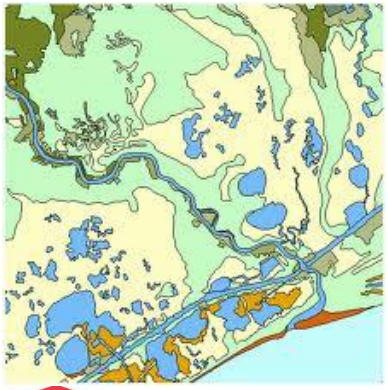
Floodplain Restoration-Reservoir Reallocation

(Sentra Woods 2009) (Dlanor Smada 2012)

Municipal Rebate Program

(Dan Hwoang Nguyen 2007)

Land Cover Management



Coastal Marsh Water Treatment

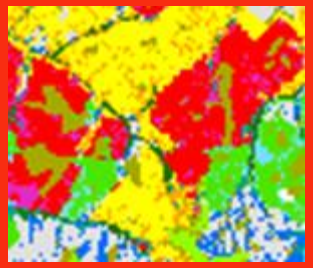
(Docent Joyce 2013)

Irrigation Efficiency Program

(CIMMT 2010)

Santa Vitória Açúcar e Álcool (SVAA), Brazil

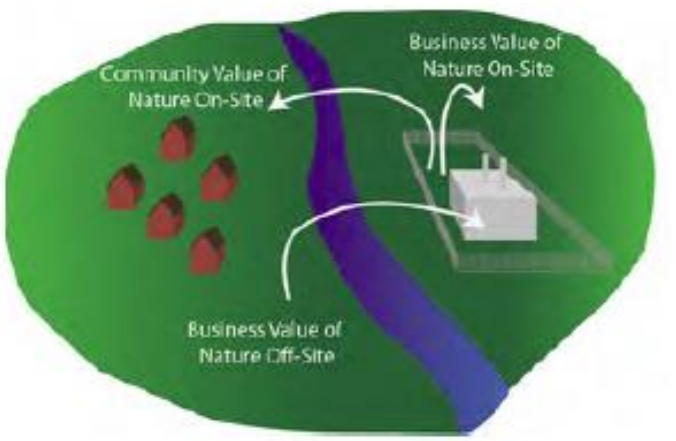
The SVAA pilot looked at how Dow can plan its agricultural land use to maximize profit while improving biodiversity and water quality.

Model inputs	Are used to derive scenarios	That will inform siting decisions
Agricultural Expansion Plan & Production Costs Forest Code Regulations Biodiversity (Habitat suitability, connectivity) Ecosystem Service Supply	Optimize Production (&meet legal req'ts) Optimize Production & Biodiversity Optimize Production & Ecosystem Services Optimize All of the Inputs	Production Priority Biodiversity Priority Water Qual Priority Trade-Offs 

Moving beyond the pilot sites: The Ecosystem Service Identification & Inventory Tool (ESII)

The ESII Tool:

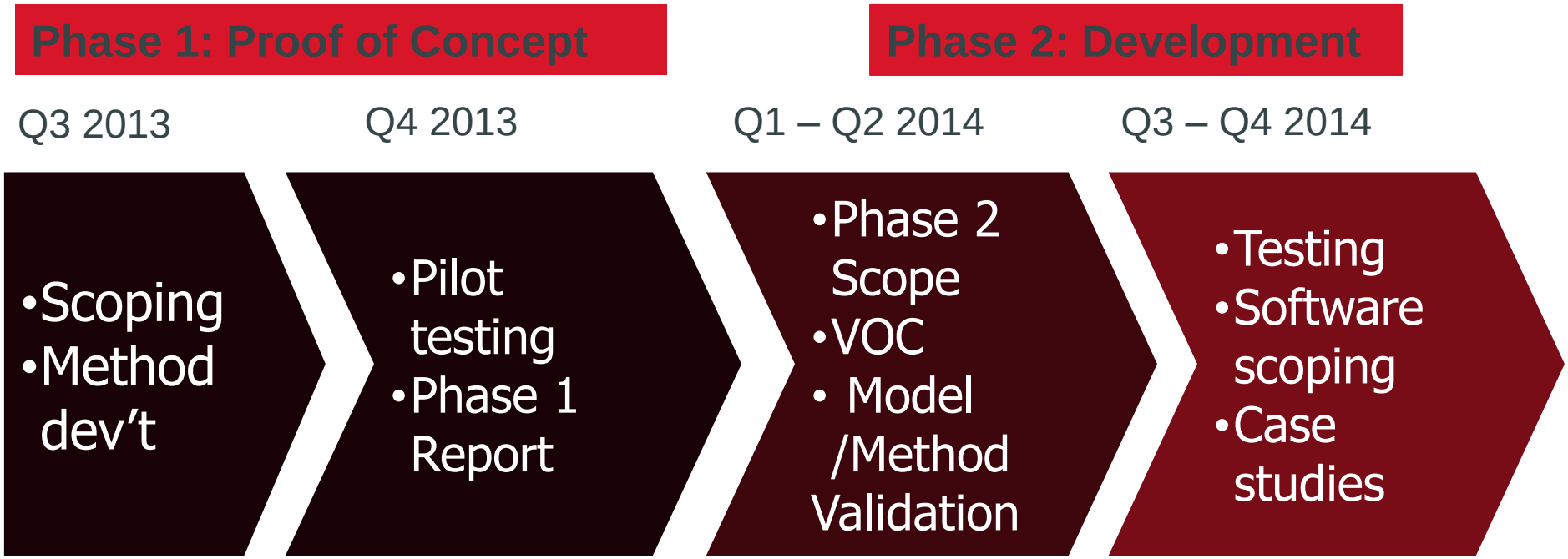
- designed by team comprised of Dow, TNC, and EcoMetrix Solutions Group (ESG) members
- uses ecological attributes to identify and quantify ecosystem services at a site.
- translates these services into **economic benefits** to the business by providing data in units of measure that engineers and finance staff can put into their own valuation models.



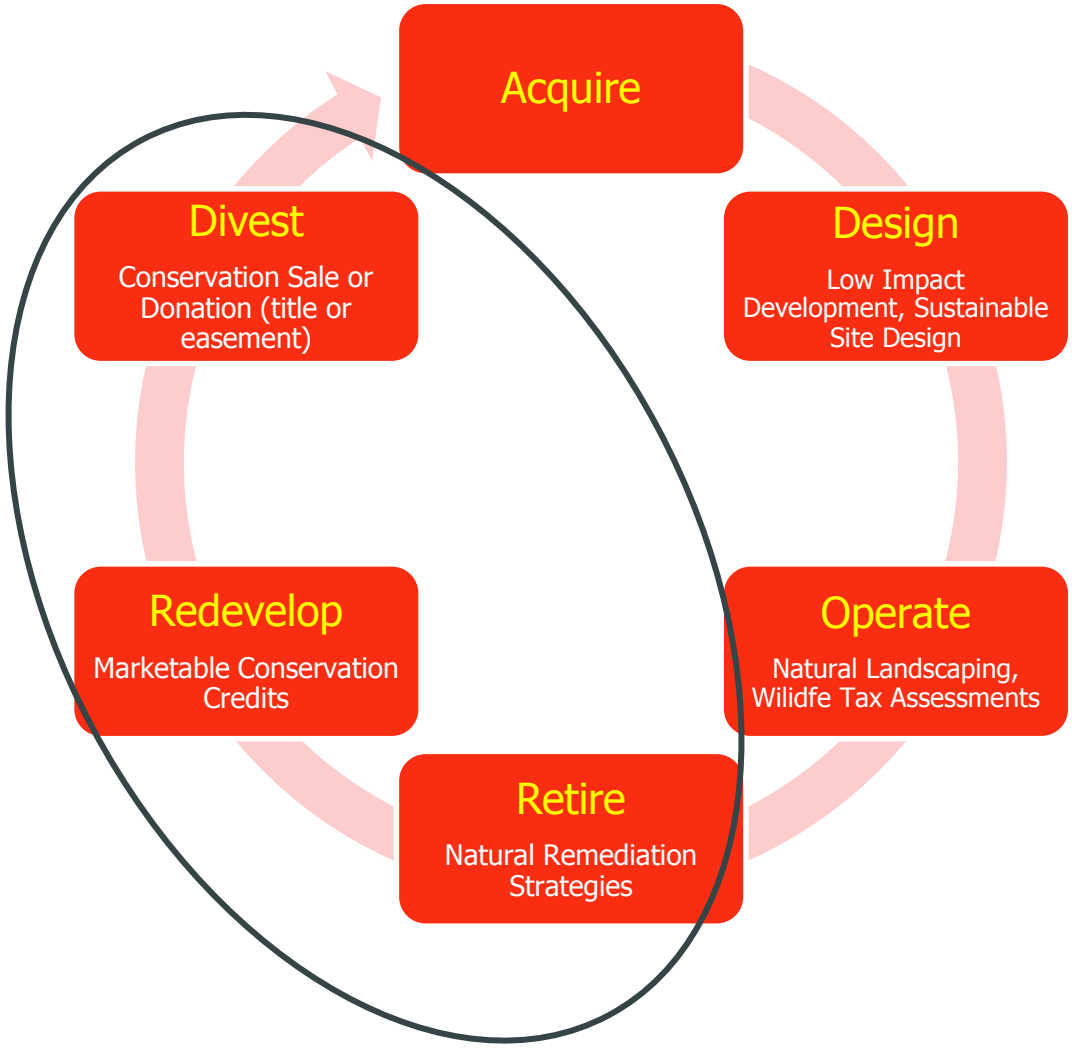
Eight Initial Ecosystem Services

- air quality regulation
- climate regulation
- erosion control
- flood hazard mitigation
- water quality control
- water quantity control
- water provisioning
- aesthetics

ESII Tool Progress to Date



Conservation Monetization: Deriving Value from a Natural Land Management Strategy



Several ways to derive economic value from conservation of property

Sale to a conservation organization or government agency

Sale to wetland or habitat banker

Sale to sustainable timber

Donation tax credits

An example project: Croydon Woods

- ~ 80 acres of wetland forest adjacent to our Bristol – Croydon manufacturing facility.
- Nearing finalization of proposed sale to local land trust (The Heritage Conservancy) for conservation in perpetuity.
- At least 7 rare and endangered species present.
- Conserved land will provide benefits to the site in the form of ecosystem services: valuation case study to come!