Michigan Wetlands Association 2017 Annual Conference

Ecosystem Service Valuation for Wetland Restoration

What It Is, How To Do It & Best Practice Recommendations

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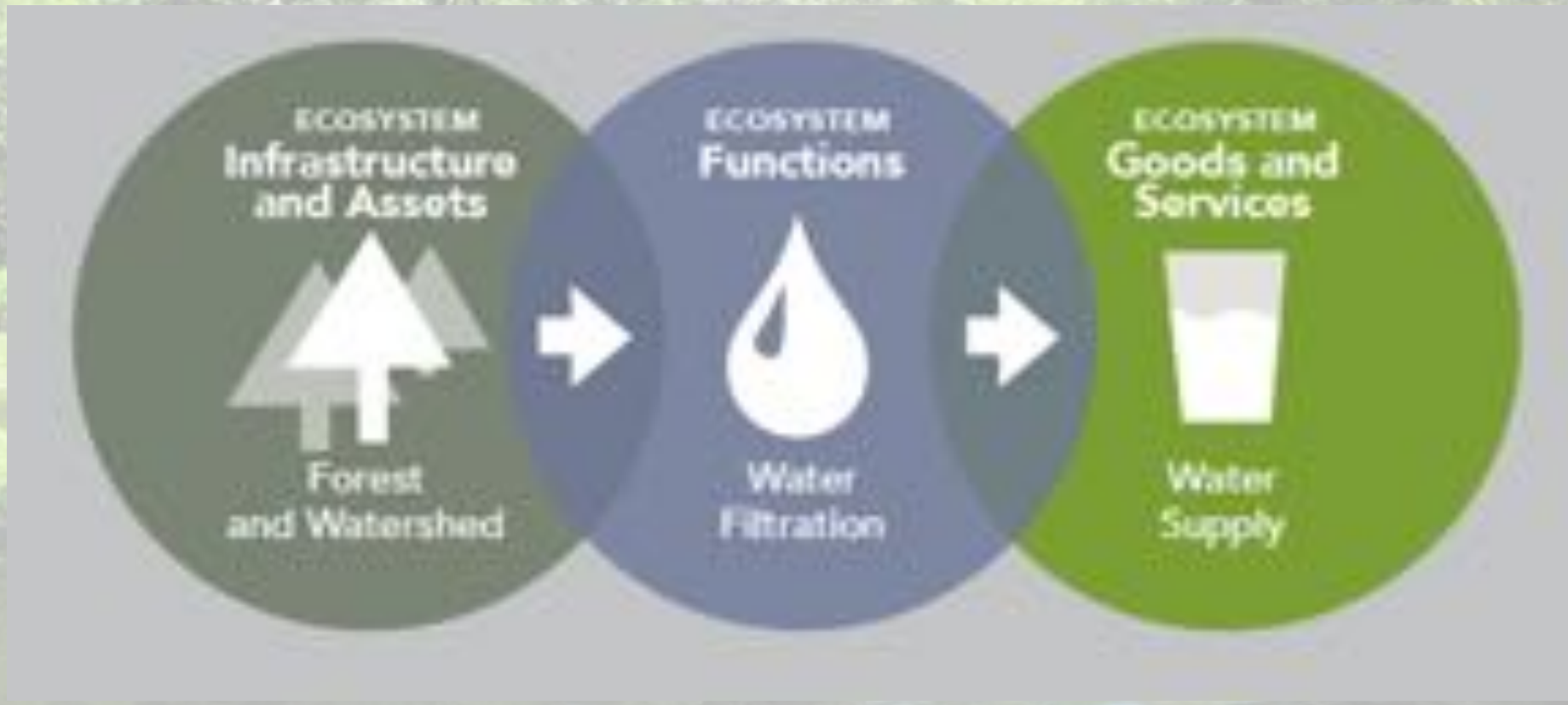
What Are Your Values?

- Ecological?
- Economic?
- Cultural?
- Spiritual?
- Recreational?
- Equity?
- Public health?
- Aesthetic?
- Bequest?
- Intrinsic?

Generic terms like “value” create barriers to effective communication and meanings get LOST IN TRANSLATION.

A Decision-Making Tool

Functions, Goods, Services, Benefits…What??



Source: Earth Economics

Rapid Benefit Indicators (RBI) Approach
Process For Assessing Social Benefits Of Ecological Restoration

https://www.epa.gov/water-research/rapid-benefit-indicators-rbi-approach

How are Benefits from Wetlands Produced?

Function	Service	Benefits
Retaining or slowing water	Storm water regulation (affects surface runoff and flood waters, and downstream water quality)	Reduced flood risks to people Valued uses of improved downstream water quality
Characteristics of the system (multiple functions)	Scenic landscapes	Aesthetic enjoyment
Characteristics of the system (multiple functions)	Learning opportunities	Nature study, connection to nature
Bird habitat	Birds that people enjoy	Bird watching, hearing birds
Characteristics of the system (multiple functions)	Recreational opportunities	Recreational activities
Support for rare species or habitats	Rare or unique species or habitats	Value of knowing these exist

Ecosystem services:
Exploring a geographical perspective

Marion B. Potschin, Roy H. Haines-Young, 2011

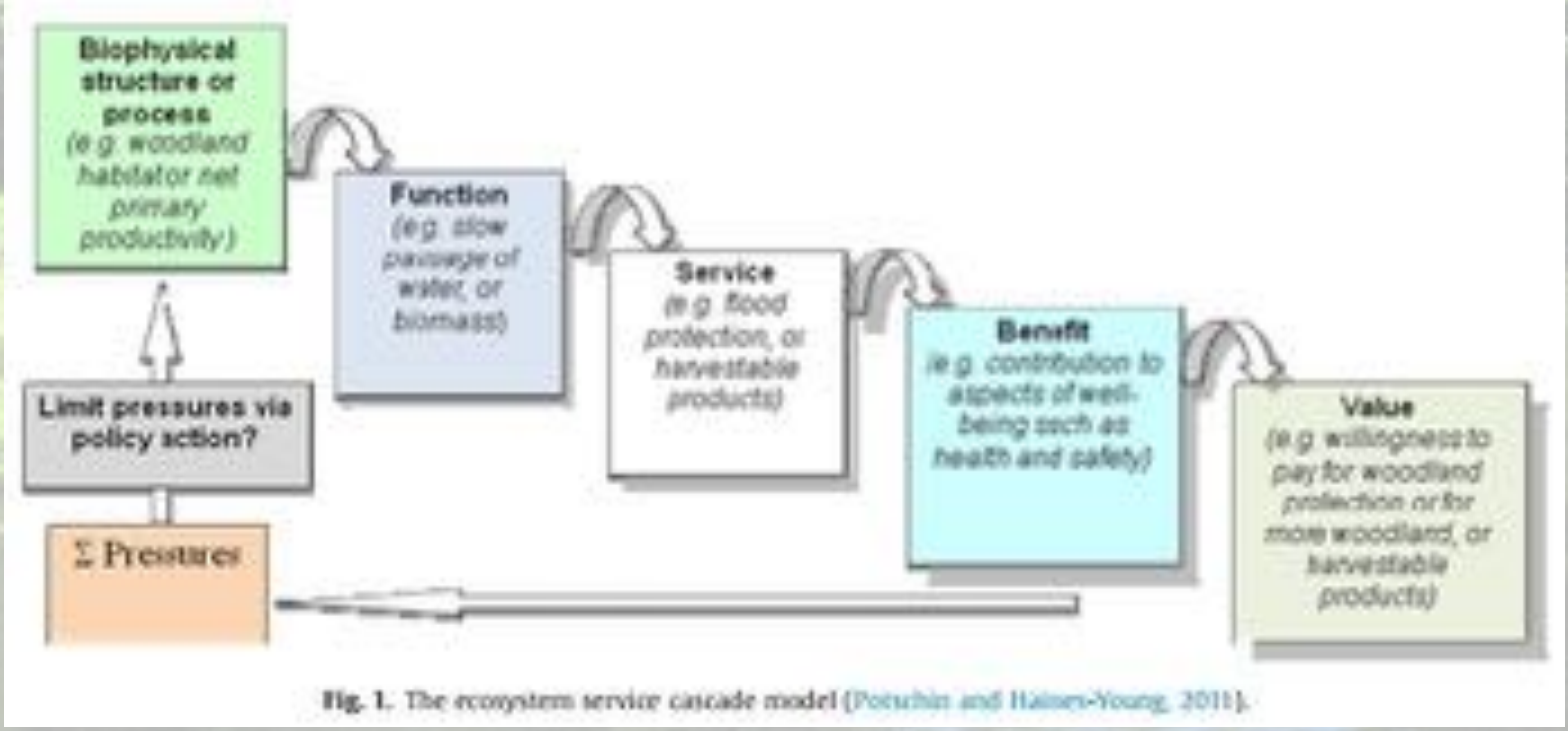


Fig. 1. The ecosystem service cascade model (Potschin and Haines-Young, 2011).

http://journals.sagepub.com/doi/10.1177/0309133311423172

Ecosystem Service Valuation Process

1. Identify the Context

Photo credit: Jeanne Christie

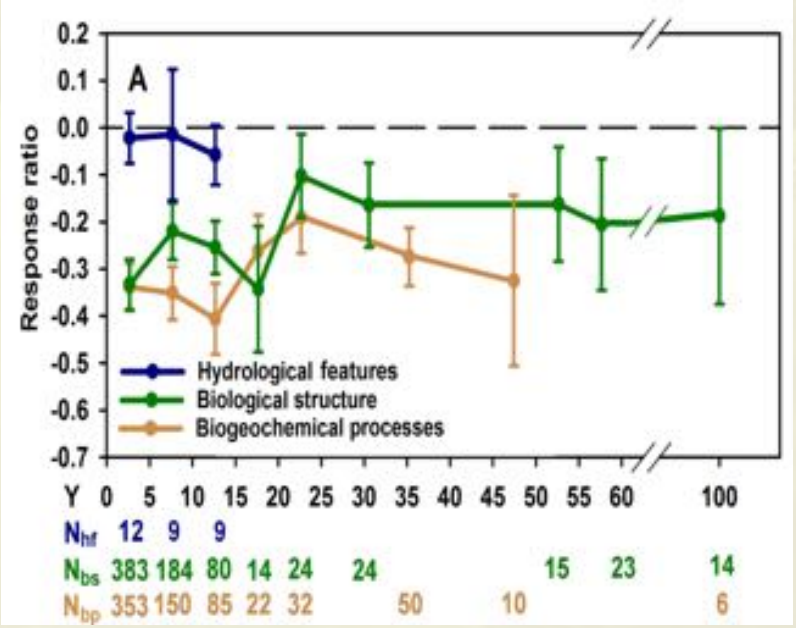
2. Define the Boundaries

Source: USFWS

Ecosystem Service Valuation Process

3. Identify Stakeholders

4. Develop Functional Analysis & Baseline



Source: "Structural and Functional Loss in Restored Wetland Ecosystems"

Ecosystem Service Valuation Process

5. Perform an Ecosystem Service Valuation

6. Develop a Trade-off Analysis

Ecosystem Service Valuation Process

7. Communicate results

Ecosystem Service Valuation Methods

Market Based Techniques

Market Price Method

Photo Credit: Marla Stelk

Productivity Method

Source: USDA NRCS/ Author: Lynn Betts

Ecosystem Service Valuation Methods

Revealed Preference Techniques

Avoided Cost Method (aka "damage costing")

Source: EPA/ Hurricane Katrina aftermath in Plaquemines Parish

Substitution/Replacement Cost Method

USFWS Mountain-Prairie/ Photo Credit: Jerry Leggatte / USBR

Ecosystem Service Valuation Methods

Revealed Preference Techniques

Travel Cost Method

Source: U.S. Fish and Wildlife Service/ Author: Tina Shaw

Hedonic Pricing Method

Photo credit: Pam Brophy

Ecosystem Service Valuation Methods

Stated Preference Techniques

Contingent Valuation Method

Photo credit: USGS Sirenia Project

Conjoint Analysis Method

Ecosystem Service Valuation Methods

Benefit Transfer

Photo credit: Abhijit Tembhekar

Photo credit: Piccolo Namek

The Value of Wetlands in Southeast Louisiana

Study: *The Value of Wetlands in Protecting Southeast Louisiana from Hurricane Storm Surges* (Edward B. Barbier, Ionnis Y. Georgiou, Brian Enchelmeyer, and Denise J. Reed), 2013.

Objective:

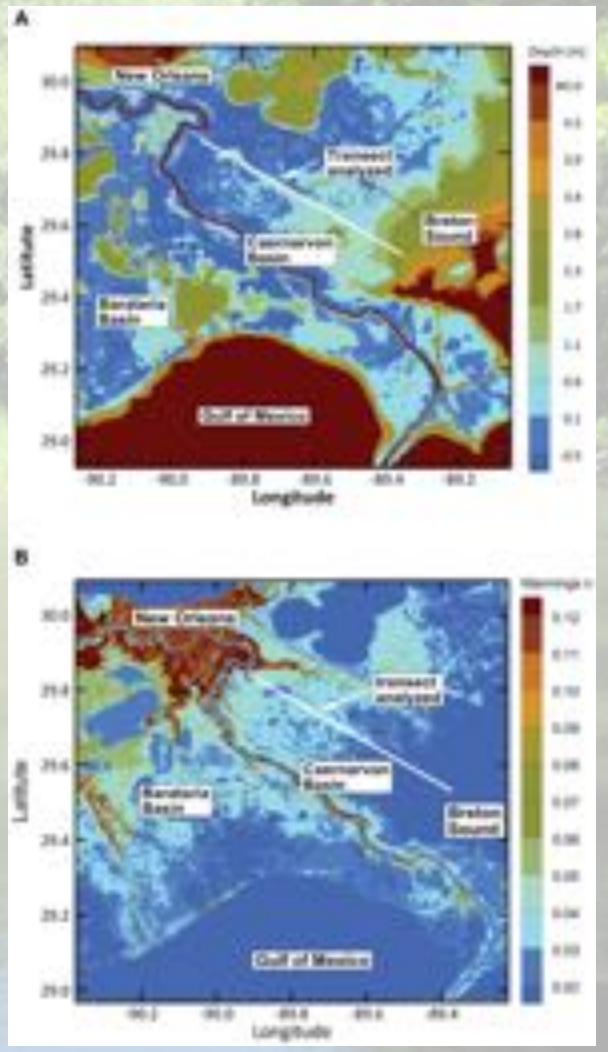
To estimate the storm protection benefits of wetlands to southeastern Louisiana.

Source: FEMA

Valuation Method Used: Damage Cost Avoided

Southeast Louisiana Study Findings

Results of hurricane storm surge simulations were combined with an economic analysis of the expected damage to residential properties from storm surge floods across 312 potentially affected sub-planning units across 15 Southeastern Louisiana parishes.



Southeast Louisiana Study Findings

Estimated storm surge impacts & marginal values of changes in wetland continuity (W_L) and roughness (W_R)			
Estimated wetland impacts on attenuating maximum storm surge levels		Estimated marginal values of wetlands in terms of avoiding damages to residential property	
	Change in storm surge		Marginal value
1% change in W_L per segment	- 8.4% to – 11.2%	0.1 increase in W_L per m	$99.29 to $132.87
1% change in W_R per segment	- 15.4% to – 28.1%	0.001 increase in W_R per m	$23.72 to $43.24
9.4 to 12.6 km change in W_A	- 1m	0.1 increase in W_L per segment*	$591,886 to $792,082
		0.001 increase in W_R per segment*	$141,399 to $257,762
*Each segment has an average length of 6km			

Economic Benefits of Saginaw Bay Coastal Marsh

Study: Whitehead, John C., Peter A. Groothuis, Rob Southwick and Pat Foster-Turley (2009) **Measuring the Economic Benefits of Saginaw Bay Coastal Marsh with Revealed and Stated Preference Methods**, Journal of Great Lakes Research 35(3):430-437.

Objective:

To "generate data for use in developing economic values to inform coastal marsh policy."

Valuation Methods Used: Travel Cost and Contingent Valuation

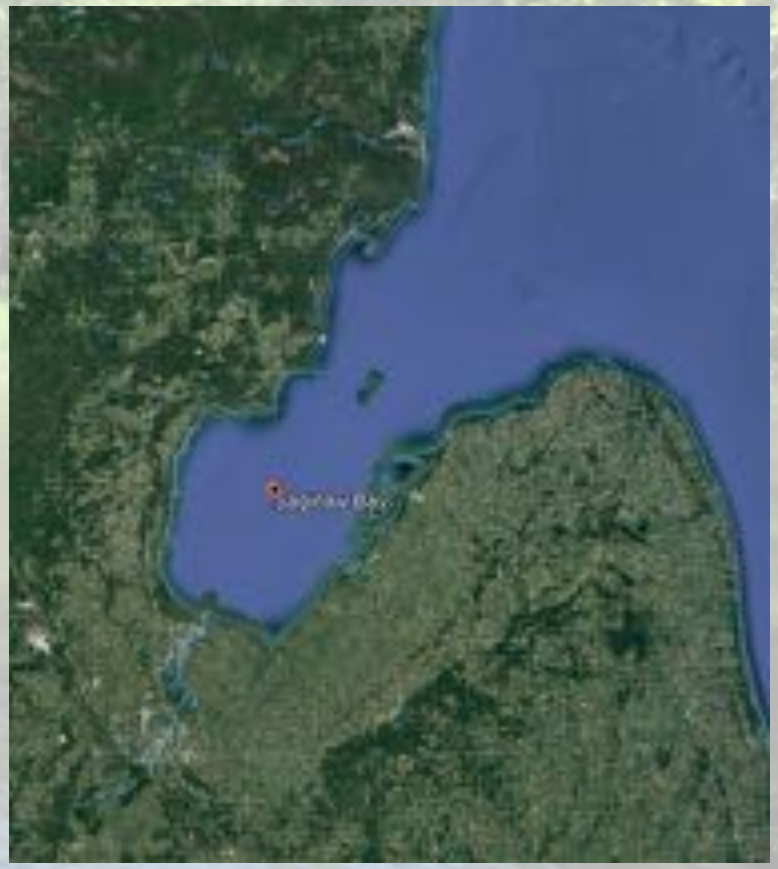


Image source: Google Earth Pro

Saginaw Bay: continued

Process:

- Surveys
- Data collection
- Revealed Preference Statistical Analysis
- State Preference Statistical Analysis
- T-tests
- Adjust for sample bias
- Discount rates

Image source: Michigan DNR

Saginaw Bay Findings

- **Recreation Value:**
  - Present value of each acre of coastal marsh to recreation users = $1870
- **Nonuse Value:**
  - Present value of each acre of coastal marsh to nonusers = $551/acre
- **Total Value:**
  - Sum of use value and nonuse value = $2421/acre

Image Source: Michigan DNR

Available Tools & Resources

A COMPARATIVE ANALYSIS OF ECOSYSTEM SERVICE VALUATION DECISION SUPPORT TOOLS FOR WETLAND RESTORATION

Prepared for the Association of State Wetland Managers

By Mark Healy and Dr. Silvia Secchi

Southern Illinois University

InVEST

integrated valuation of ecosystem services and tradeoffs

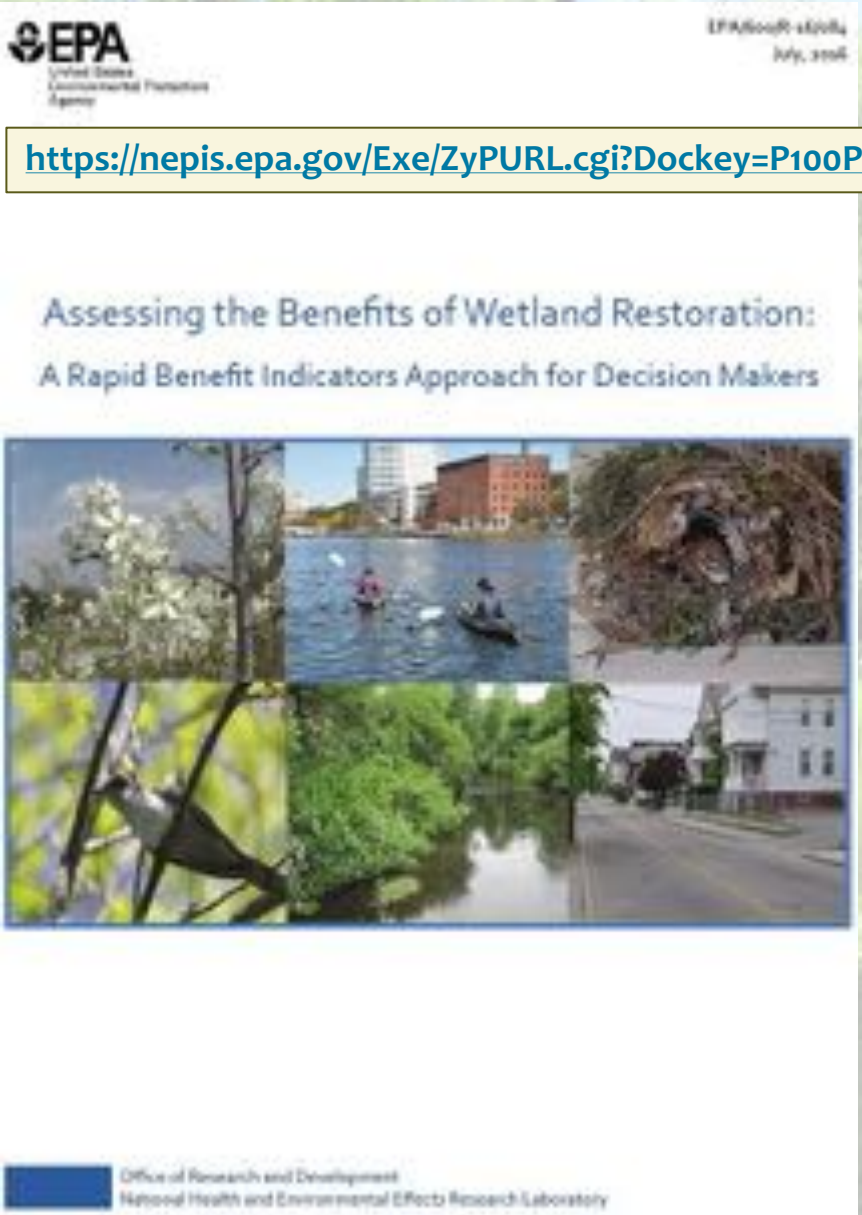
https://www.naturalcapitalproject.org/invest/

Ecosystem Services Identification & Inventory

ESII tool

www.esiitool.com

https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100P70P.txt



https://www.epa.gov/enviroatlas

Rapid Benefit Indicator (RBI) Checklist Tool – Quick Start Manual

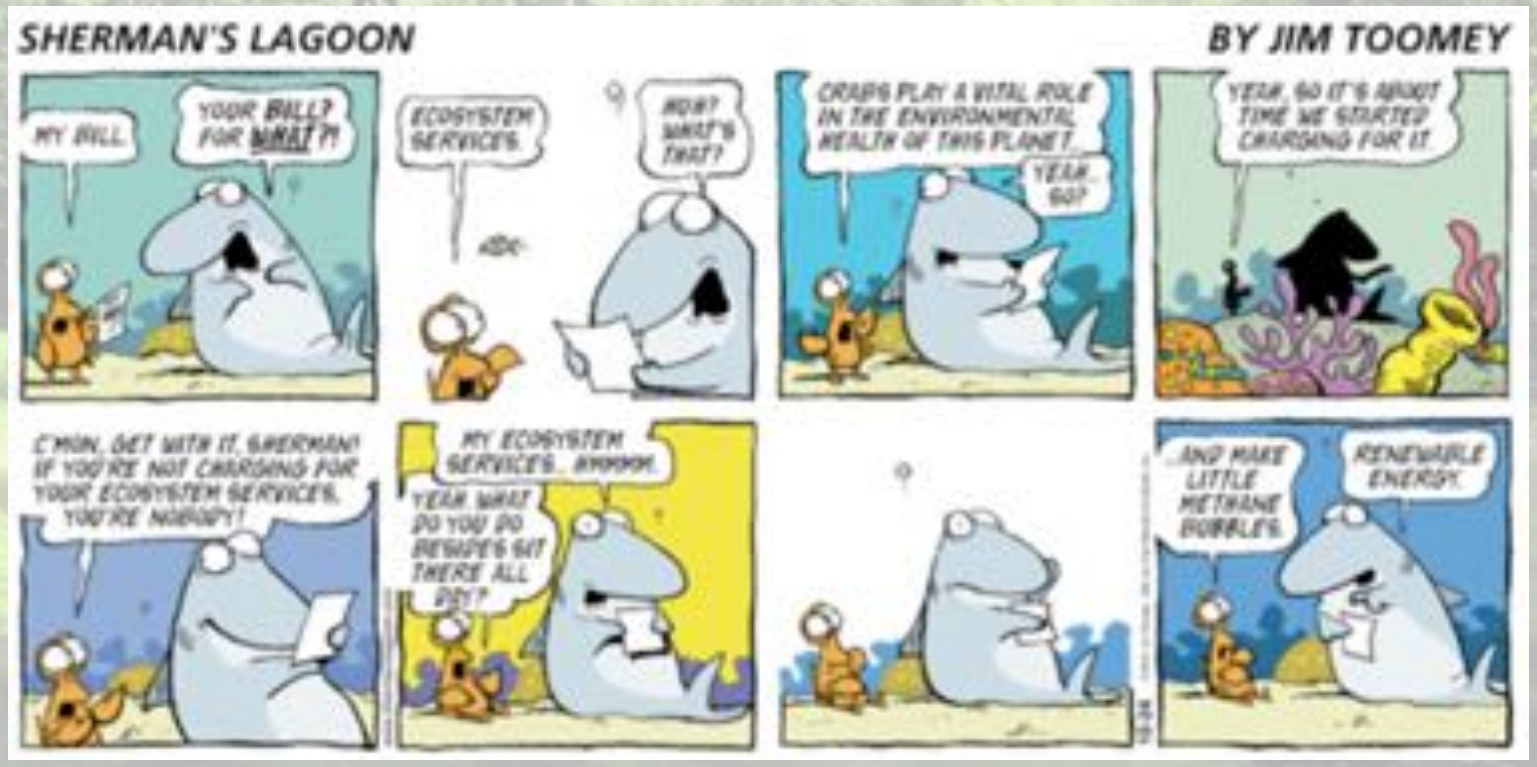
Best Practice Recommendations

- Include Threshold Effects
- Consider Bundling Benefits
- Avoid Double Counting
- Account for Diverse Values
- Provide a High & Low Range of Values
- Clearly and Transparently Communicate Assumptions, Uncertainties and Findings

Summary

Ecosystem service valuation and benefit indicators are tools that can be used to insert the monetary, ecological and intrinsic/cultural values of wetland restoration into decision-making contexts and policy.

QUESTIONS?



Used with permission from the artist.

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https://www.aswm.org/state_meeting/2014/ecosystem_service_valuation_for_wetland_restoration.pdf