Engaging People in Decisions that Affect our Water: Accounting for Nature’s Benefits

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WRRI Conference – Raleigh NC - 2016

Linking academic knowledge and decision makers to solve environmental challenges

Integrating Ecosystem Services into public and private decision making through improving methods, incentives and markets
NESP

- Quarterly newsletter
- Community of practice email list and webinars
- FRMES Online guidebook
  - nespguidebook.com
- Best Practice Guidance
  - nicholasinstitute.duke.edu/sites/default/files/publications/es_best_practices_fullpdf_0.pdf
- Policy and Methods Papers
- Workshops

NESP engages both public and private individuals and organizations to enhance collaboration within the ecosystem services community and to strengthen coordination of policy, market implementation, and research at the national level.

Online Guidebook

UNDERSTAND THE MOTIVATION for Ecosystem Services Approaches
History, definitions, benefits, limitations, FAQs

EXPLORE AGENCY USE of Ecosystem Services
Agency decision contexts and examples

THE ASSESSMENT FRAMEWORK for Ecosystem Services
Methods for connecting ecological and social analyses
We can use information about ES to tell a story about the benefits nature (in this case water) provides to people.

The stories we tell determines who cares and gets involved and also informs the policies and programs we design.


Local officials have traced carcinogen spikes in treated drinking water for the towns of Eden and Madison back to the coal ash ponds at Belews Creek. Over 360,000 people rely on drinking water intakes downstream from the Belews Creek coal ash ponds...

—Appalachian Voices

Missing?
- Recreation
- Property values
- Other water users
- Impacts to flora and fauna
What are ecosystem services related to water?

Types of Ecosystem Services

**Millennium Ecosystem Assessment**

<table>
<thead>
<tr>
<th>Provisioning</th>
<th>Regulating</th>
<th>Cultural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goods or products produced by ecosystems</td>
<td>Natural processes regulated by ecosystems</td>
<td>Non-material benefits obtained from ecosystems</td>
</tr>
</tbody>
</table>

Supporting

Functions that maintain all other services

Source of slide: Businesses for Social Responsibility
“As more land is developed and the watershed’s forest cover continues to shrink, water quality will suffer. “

“As of January 2016, the land trusts and other partners have protected 90 properties that include 85 miles of stream banks on 7,698 acres. Another 10 projects with 22 miles of stream banks on 2,482 acres are in the works.”

http://www.ctnc.org/assist/upper-neuse-clean-water-initiative/

What’s the story?

Falls lake is a drinking water source for Raleigh and other communities with population exceeding 450,000

It is a popular site for fishing and swimming for the local communities with increasing health risk from fecal coliform (dysentery and hepatitis)

Sprawl worsens water quality (impervious) but also increases costs of water supply and treatment and road maintenance services.

Other services?
- Aesthetics
- Local property values
- Existence value of affected species
- Flood management
- Other water users
Does talking about $ help?

<table>
<thead>
<tr>
<th>Benefits ($million)</th>
<th>Costs ($million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water treatment cost avoided</td>
<td>$115 (one time)</td>
</tr>
<tr>
<td>Recreational benefits (2011-2040)</td>
<td></td>
</tr>
<tr>
<td>Other (property value, aesthetic value, health outcomes)</td>
<td></td>
</tr>
<tr>
<td>Treatment costs (over 25 years)</td>
<td>$1500</td>
</tr>
<tr>
<td>Total</td>
<td>$1500</td>
</tr>
</tbody>
</table>

- Willingness to pay $139 per year per household (Kramer 2002)
- Current amount collected in water fees (less than $20/year)
- In 2012, fees collected more than $156 million.

Sources: von Haefen 2013; Hughes et al. EFC UNC 2014

How can better capturing nature’s benefits be helpful in decision making?

Improved communication and constructive engagement of stakeholders before decisions are made

Transparent and explicit consideration of trade-offs that involve ecosystem services

More systemic comparison of alternatives (such as greener vs grayer infrastructure options)

Including important but often undervalued benefits (left out if not monetized)

Avoid some unintended consequences

Better assess ROI
How does ecosystem services information get used?

Ecosystem services information or data can be used in a wide range of assessments (e.g. risk assessment, cumulative effects analysis, scenario analysis, cost-benefit analysis).

Connecting nature to people

1. Draw a picture connecting nature to people
2. Quantify the service (late season water) provide by nature (restored wetlands)
3. Quantify the potential demand/value for the service (how much irrigated cropping land with access could use water)
Benefit Relevant Indicators

- Water quantity (average late season water storage volume)
- Water storage (volume)
- Wetland area (acres)

Ecology
Ecosystem Services
Societal Benefit

Marginal crop value attributable to irrigation water

Increase in water available when needed
Increase in water available for irrigation

Conceptual map or diagram
BRIs in intuitive decision making

<table>
<thead>
<tr>
<th>Policy or Management Alternative – wetland restoration</th>
<th>Option A</th>
<th>Option B</th>
<th>Option C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ecosystem Service Benefit Relevant Indicator</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRI 1: Change in vegetation density in areas upstream of flood prone area with people or property of interest</td>
<td>100 acres of high density veg added above pop area</td>
<td>20 acres above same community</td>
<td>300 acres but not near flood prone people or property</td>
</tr>
<tr>
<td>BRI 2: Change in Aquifer volume accessible by households</td>
<td>Too small to detect</td>
<td>Too small to detect</td>
<td>5% increase to 150 household wells</td>
</tr>
<tr>
<td>BRI 3: Change in amount of fish landed commercially</td>
<td>0 to 10 more fish per month</td>
<td>0 to 50 more per month</td>
<td>10-100 more per month</td>
</tr>
<tr>
<td>BRI 4: Change in acres of wetland habitat supporting recreationally important bird or fish species</td>
<td>0 acres of habitat</td>
<td>20 acres of habitat</td>
<td>300 acres of habitat</td>
</tr>
</tbody>
</table>

Evaluating trade-offs with BRIs
Best Practices

Capture of ES Benefit

- Narrative ES
- Quantitative Ecological
- None

Time and Resources

- Benefits Assessment
- BRI

Overview of ES in decision processes

Do you want to assess changes in ecosystem services in addition to or instead of ecological condition?
- Yes: Use an ecosystem services assessment with BRIs
- No: Use an ecological assessment

Do you want to compare options intuitively or formally?
- Intuitively: Use BRIs in alternatives matrices to inform decision makers
- Formally: Use BRIs in an assessment of benefits

Do you want to use dollar values to assess changes in social benefits?
- No: Use non-monetary valuation methods, preferably multi-criteria analysis
- Yes: Use economic valuation methods and include non-market values
Best Practices for ES in decision making

1. Extend assessments beyond purely ecological measures using measures that are directly relevant to people.
   ◦ ES values or preferences if possible and necessary for decision
   ◦ Benefit Relevant Indicators if not

2. Use well-defined measures that go beyond narrative description.

3. Include all important services, even those that are difficult to quantify.
   ◦ For consideration if not assessment

Difficult to capture values...

Existence of species, habitats, cultural features, opportunities to use or recreate
- Future generations
- May visit or see it in future
- Just important that it exists in the world

Process/function that is difficult to quantify
- Can result in many changes that matter people
- Example – filtration to improve water quality
Difficult to capture values...

When does a focus on ES improve decisions?

When does it distract from the primary objectives?

Exciting time at the National Level...

- 2005: Millennium Ecosystem Assessment
- 2008: Establishment of USDA Office of Ecosystem Services and Markets
  Wetlands Compensatory Mitigation Rule
- 2010: Inter-agency dialogue on payments and markets for ecosystem services
- 2012: Forest Service Planning Rule
  International Platform on Biodiversity and Ecosystem Services
- 2013: CEQ Principles and Requirements for Federal Investments in Water Resources
  FEMA Incorporate ES values into BCA
  White House Memo on integrating ES
- 2015: White House Memo on mitigating natural resource impacts
  White House Research Agenda on ES and coastal green infrastructure
Early Federal Action on Ecosystem Services

Federal Emergency Management Agency (FEMA) began to incorporate a suite of ecosystem service values into their Benefit Cost Analysis for acquisition activities (permanent removal of at risk structures) in 2013.

Forest Services in the forefront

The US Forest Service’s (USFS) 2012 Planning Rule explicitly requests that planning activities consider ecosystem services.

Francis Marion – 1st one to the finish line

...assist the agency in providing a sustainable flow of benefits, services, and uses of NFS lands that provide jobs and contribute to the economic and social sustainability of communities.
EPA also leading the way

Office of air is incorporating ecosystem services impacts into the NOx & SOx and the Ozone secondary air standards.

Developing ways to incorporate ES into Ecological Risk Assessment methods

ORD developing the EnviroAtlas Classifications and other tools


Principles and Guidelines for Federal Water Resource Investment

In 2013, The White House Council on Environmental Quality released new Principles and Requirements for Federal Investments in Water Resources, which include specific guidance on using an ecosystem services framework for project evaluation.

Affected agencies include:
US Army Corps of Engineers (USACE) – kind of,
Tennessee Valley Authority (TVA),
Environmental Protection Agency (EPA),
Departments of Commerce (DOC),
Department of Interior (DOI),
US Department of Agriculture (USDA)
Homeland Security (DoHS).
Research Agenda – ES and Coastal Green Infrastructure

Proactive response to Hurricane Sandy rebuilding strategy to facilitate widespread adoption of coastal green infrastructure (CGI) strategies.

**Focuses on using assessments of ES to understand full benefits of GI (beyond risk and resilience)**

Research on:
- Metrics
- Assessing performance of GI across measures (including uncertainty and risk)
- Methods for valuation
- Socioeconomic and behavioral factors that affect delivery of ES
- Information for decision makers (best practices)

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EOP/OMB Memo: ES in Federal Decision Making

White House memorandum calling on Federal agencies to incorporate ecosystem services into Federal decision making requests:

- A description of current agency practice and work plans - March 30, 2016
- Implementation guidance to be developed in collaboration with the agencies by November 30th, 2016.
Presidential Memo: Mitigating Impacts

White House memorandum calling on a number of Federal agencies to avoid and then minimize harmful effects to land, water, wildlife, and other ecological resources (natural resources)

- Mitigation policies should establish a net benefit or, at a minimum, a no net loss goal for important, scarce or sensitive resources
- Irreplaceable resources
- Advanced restoration strategies – banking
- Measurable performance standards

USFS, DOI to update mitigation policies
NRDA consideration of advanced mitigation
FWS – protection in advance of listing – mechanism to credit avoidance, minimization and compensatory mitigation

What does this mean for NC?

Change in Federal Support?

- Targeting investments to increase ROI
  - NRCS, performance metrics
- Prioritization for funding may change
  - More support for green infrastructure
- More/different stakeholder engagement in NEPA planning decisions

Tools – Data - Models

- Benefit Transfer Toolkit
- EnviroAtlas
- Solves
- Ecological Production Function Library
- InVest
- ARIES
Telling the full story
Improving communication
Engaging the public and new partners
Better decisions and policies

NESPguidebook.com
Nicholasinstitute.duke.edu
Challenge 1: Data and modeling gaps

Ecosystem (BRI) Data

Ecological production functions

Use and value data

OMB approved survey - BT functions

Challenge 2: Difficult to quantify and value

Focus on difficult to quantify and value services (non-use, non-consumptive)

...like spiritual, cultural educational, existence values, as well as supporting and regulating services (water filtration and pollination, etc.)

If we can’t do these well, we are leaving out things that are very important to people
Challenge 3: when to and not to

When does a focus on ES improve decisions?

When does a focus on ES distract from the primary objectives?

What we need

Guidance on appropriate use

Methods for difficult to quantify and value

Generate and collate data and models into user friendly tools

Collect examples and assess them for consistency in use and for developing common indicators/metrics