Why Ecosystem Services?

Lydia Olander, Duke University, National Ecosystem Services Partnership & Nicholas Institute for Environmental Policy Solutions
(AAAS Congressional Fellow 2004-2005)
AAAS Symposium May 19, 2017
NICHOLAS INSTITUTE
Linking academic knowledge and decision makers to solve environmental challenges

ECOSYSTEM SERVICES PROGRAM
Integrating Ecosystem Services into public and private decision making through improving methods, incentives and markets

NATIONAL ECOSYSTEM SERVICES PARTNERSHIP (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
1. What are ecosystem services (ES)?
2. What is their history and trajectory in the federal government?
3. Examples of how use of ES informs decision making?
4. How do we measure ES?
5. What’s next for ES?
People keep talking about opening more wilderness for development.

We seem to understand the value of oil, timber, minerals, and housing, but not the value of unspoiled beauty, wildlife, solitude, and spiritual renewal.

We need to start putting prices on the priceless.

Yeah, if our woods are worth a zillion jillion bagillion, think what Alaska is worth.
### Millennium Ecosystem Assessment

<table>
<thead>
<tr>
<th><strong>Provisioning</strong></th>
<th><strong>Regulating</strong></th>
<th><strong>Cultural</strong></th>
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<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>
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**Supporting**

Functions that maintain all other services

Source of slide: Businesses for Social Responsibility
How is it **different** from what we do now?

Goes beyond ecological measures to describe benefits or harms to people
How is it better than what we do now?
Can also help assess who wins and who loses

Who has access and benefits from changes in services (or who will be harmed)

Basis for understanding distributional or equity implications

Alex Chuman 2014
How are Ecosystem Services useful?

Communicating about the benefits ecosystems provide to people
Constructive engagement of stakeholders before decisions are made
Explicit consideration of trade-offs
More complete comparison of alternatives (such as greener vs grayer infrastructure options)
Fuller consideration of important but often undervalued benefits
Identification of new partners (e.g. PWS)
“Integrating ecosystem services into planning and decision-making can lead to better outcomes, fewer unintended consequences, and more efficient use of taxpayer dollars and other resources.”

White House BLOG Oct 7, 2015

How?
By...
• Making the business case for investment through federal programs (e.g., conservation programs) or private markets (e.g., payments for watershed services).
• Targeting investment to areas with greatest demand or value
• Providing a fuller assessment of return on investment
• Improving communication with and engagement of stakeholders and reducing legal conflict
The concept of ecosystem services is not new. “Conservation means the wise use of the earth and its resources for the lasting good of men.” - Gifford Pinchot

We need both “nature for natures sake” and “nature for people” – NATURE AND PEOPLE

• What is new?
  • More services – regulating, cultural and supporting services.
  • Quantification and valuation for decision making
Biosphere 2
Finished in 2005
Growing Use of Ecosystem Services
Research on natural capital linking ecology with economics, sociology and information science.

Next generation of National Biological Information Infrastructure to become part of the national accounting system.

Quadrennial Ecosystems Services Trends Assessment

Support and provide leadership for IPBES

Improve ROI for biodiversity and conservation programs

Improve capabilities of incorporating ecosystem services valuation into decision making
National Ecosystem Services Partnership (NESP)

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.

First version released Dec 2014
Over 150 people participated in its development
It continues to be updated with new content and resources

Played a key role, showing that there was sufficient:
• consensus from experts on how to do this
• interest from agencies in trying it
• knowledge on how to integrate ES into practice
US government exploration and use of ecosystem services has been progressing over the last decade.

- **2008 Mitigation Rule**
  - Called for compensation for lost services.

- **National Academies 2004**
  - USGS/BLM and USACE reports.

- **2012-2013**
  - 2009 GSA regarding government facilities and property.

- **USFS 2012**
  - Planning rule.

- **2013 Principles and Guidelines for Federal Water Resource Investment**

- **2013 FEMA adds ES to BC analysis**

- **2014 EPA includes ES in secondary air standards**

- Executive Office of the President under Obama research, mitigation, and Federal decision making.
White House memorandum calling on Federal agencies to incorporate ecosystem services into Federal decision making requests:

1. a description of **current agency practice and work plans** were submitted to the Council on Environmental Quality (CEQ) - *These documents comprise reports from 48 departments, offices, units, or bureaus within federal agencies.* NEPA is mentioned as a way to integrate ecosystem services information into decisions by ~70% of reports.

2. plans for **implementation guidance** to be developed in collaboration with the agencies – *The guidance has recently completed peer review and is back with the EOP.*
Ecosystem services being considered in...

1. Forest-level planning (2012 Planning Rule)
2. Project-level NEPA decisions to compare management alternatives
3. Helping states value the ecosystem services provided by their forests
4. Exploring public-private partnerships
5. Quantifying ES benefits of conservation programs
Overview of valuation of ecosystem services generated through USDA Conservation programs plus three examples:

Ecosystem services benefits from improved pollinator habitat
- returns to production, outdoor recreation, aesthetics, existence values

Ecosystem services benefits from improved water quality
- property value, aquatic habitat condition, sport fishing, reservoir water supply, water based recreation, harbor or channel affects on shipping.

Value of carbon sequestration from forest management
Other agencies using ES

FWS – for improving refuge planning, enhance support for conservation related actions and identify non-traditional sources of funding

BLM – for land use planning and permitting and leasing conditions

NOAA – assess broader benefits of fisheries and enhancing holistic management of coastal resources

USACE – assessing how ES can integrate into corps projects - restoration, operations and maintenance, engineering with nature

EPA & USGS – developing and testing tools and resources to support the use of ES in decision making

NPS & EPA – assessing the ecosystem mediated affects of air pollution on people
How can use of ecosystem services inform decision making

Cost Benefit Analysis
Prioritization
Return on Investment
Risk Assessment
Performance Metrics
Status and trends to assess performance and resilience

How can use of ecosystem services inform decision making
## Economic Value of Klamath Dam Removals

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| NET BENEFITS (use values only)                     | -$1,590.5  |

### Sources
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| Non Use Value                                           | $15,645.0  |

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**NET BENEFITS (use values only)**                       **-$1,590.5**

**NET BENEFITS (use & non-use values)**                  **14,054.5**

Nonuse values were estimated using a stated preference (SP) survey. The majority of respondents are concerned about declines of Chinook salmon and steelhead trout and the extinction of fish species in the Klamath Basin.

Conservative methodology only included the benefit of decreasing the risk of coho salmon extinction --identified $15.6 billion in nonuse benefits nationwide.

Sources:
In Oregon, managers used ecosystem services to help prioritize wetland conservation, mitigation and restoration (Oregon Wetland Rapid Assessment Protocol, Adamus et al. 2010).

Wetlands ranked by:

a) phosphorus capture capacity and downstream water use and 303(d) impaired stream listing;

b) water holding capacity and downstream vulnerable property.

The most important wetland services included property damage protection (due to flood risk reduction), late season water provision and temperature control, and support for recreational via provisioning of habitat, food, water, and refugia.

From Jimmy Kagan, in forthcoming paper, Olander et al. So you want your research to be relevant? Building the bridge between ecosystem services research and practice.
How do we incorporate ecosystem services?

Ecosystem services can be used in existing planning and decision processes.

ES can be incorporated into existing tools and methods (e.g., cost benefit analysis, risk assessment etc...).

When done well, it requires significant consideration or engagement of stakeholders.
Incorporating ES means going beyond ecological measures.
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Ecological Measures

- Wetland Impact
- Wetland area (acres)
- Water storage (volume)

Ecology  Ecosystem Services  Societal Benefit

NESP
The linkages to ES can be made using conceptual models.


Figure 2a. Pollinator habitat: Linking forb-rich habitat on agricultural conservation lands to ecological processes, ecosystem services, and potential human values.
Characteristics of a good assessment of ES

• Ecosystem changes are connected to changes in human well-being
  – Quantifies something relevant to and of value to people
• All relevant/important ecosystem services affected by the decision are considered
  – Not just those with market or use value
  – Not just those that we can quantify or value
• Changes in the well-being of different communities (stakeholders) are considered and compared.
  – Quantifies who wins and who loses to make inclusive equitable decisions

How do we measure ecosystem services?

- Benefit Relevant Indicators (BRIs) – non-monetary measures of what is valued
- Values – monetary ($) or non-monetary (rank)

**Ecology**

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<th>Wetland Impact</th>
<th>Wetland area (acres)</th>
<th>Water storage (volume)</th>
<th>Water quantity (average late season water storage volume)</th>
<th>Change in acre feet of water available when needed</th>
<th>Change in acre feet of water accessible by irrigators</th>
<th>Water quantity available for irrigation (late season water flows to irrigation outtakes)</th>
<th>Valuation</th>
<th>Marginal crop value attributable to irrigation water</th>
<th>Change in crop revenue</th>
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**Need to know what changes**

**Who that change affects and how**

(What is valued)

**How important that change is to them**

(Its value)
Challenges – Deciding when to use ES

• When does a focus on ES improve decisions?
  – Lots of people
  – Trade-offs

• When can a focus on ES distract from the primary objectives?
  – Remote locations
  – Endangered species
Challenges – Difficult to quantify and value

- Insufficient data or knowledge to predict how an action/policy will change an ecosystem and production of services
- Difficult to quantify and value services...like spiritual connection, educational benefit, existence values

If we can’t quantify these well, what do we do?
- We can’t leave them out, because then they have no value in the decision, but they can have very high value to people.
- Use expert/local knowledge; consider a wide range of possible outcomes; sensitivity analysis; be open to stated preference approaches
WHAT’S NEXT FOR ECOSYSTEM SERVICES ?
Trump orders agencies to assess relevance

Robin Bravender, E&E News reporter

Published: Monday, March 13, 2017

President Trump wants agencies across government to prove their worth.

Trump is scheduled to sign an executive order this afternoon to require a "thorough review of every executive department and agency," White House spokesman Sean Spicer said today. The president will sign the order, titled "Comprehensive Plan for Reorganizing Executive Branch," at 4:30 p.m. in the Oval Office, according to his schedule.

The order directs agencies to "identify where money is being wasted and how services can be improved and whether or not programs are truly serving the American people," Spicer said. He called the order "the beginning of a long-overdue reorganization of the federal government and another significant step towards the president's often-stated goal of making it more efficient, effective and accountable to the American people."

Trump's plans to root out ineffective or irrelevant programs and offices come as the administration is proposing significant budget cuts to domestic spending — including cash for energy and environmental agencies. The White House is expected to send its broad budget proposal for fiscal 2018 to Congress on Thursday.

Many programs at agencies including U.S. EPA and the Energy and Interior departments are expected to be on the chopping block in that budget request, and the new White House review effort could identify additional areas for cuts within those agencies.
National Ecosystem Services Partnership (NESP)

- NESP Community of Practice
- Quarterly newsletter
- Webinars
- FRMES Online guidebook
- Best Practice Guidance & Workshops
- Engaged Expert Network

https://nicholasinstitute.duke.edu/focal-areas/national-ecosystem-services-partnership
This section of the Federal Resource Management and Ecosystem Services Guidebook provides brief descriptions and links to a number of online resources relevant to implementing an ecosystem services approach. It is updated as new resources become available. The resources highlighted here either complement or supplement the guidebook and the Best Practices for Integrating Ecosystem Services into Federal Resource Management paper. This list should not be considered an endorsement of any one tool or resource, but rather a curated collection of available resources.

1. Federal Action on Ecosystem Services
2. Data and Model/Infra Structure for National Integration of Ecosystem Services into Decision Making: Expert Summaries
5. Ecosystem Services Toolkit from Canada
6. Ecosystem Services Valuation
7. State Level Ecosystem Services Assessments
8. NESG Meetings and Webinars
9. Ecosystem Service Tools and Methods
CONTENTS

• Ecological data and models for biodiversity, water quality, water quantity, coastal, and urban related services

• Data and models for ecosystem services that regulate and reduce risks related to fire, flooding and climate change

• Social and economic data and models for wildlife, biodiversity, terrestrial and freshwater recreation, water supply, water quality, coastal and marine, urban and climate related services

• Current efforts and challenges with data and modeling infrastructure
National Capital Accounting

Track status and trends in ecosystems and provision of services over time at national and subnational levels

Similar efforts underway around the world
Now exploring this for the US

How is it useful?
1. Weighing tradeoff on resource use
2. Prioritizing investments in resources and protected areas
3. Considering national resource policies
4. Gathering evidence about policy and program outcomes
5. Developing indicators of sustainable development to complement economic indicators
Regional & Global Assessments

Strengthen the science-policy interface on biodiversity and ecosystem services at and across subregional, regional and global levels

Natural capital assessments used to inform policy in China
Questions?
Contact: Lydia.olander@duke.edu
https://nespguidebook.com/

If you are interested in joining the NESP e-mail list, please e-mail nesp@duke.edu.