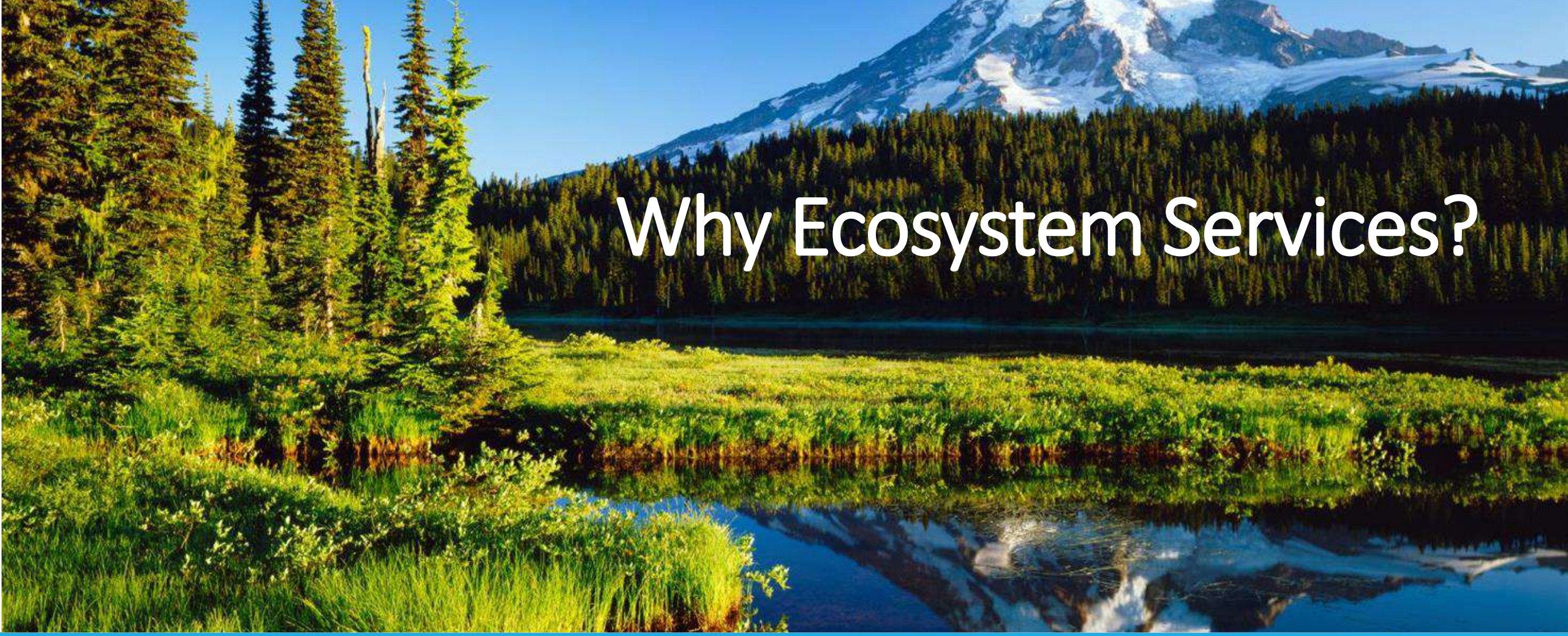


Why Ecosystem Services?

***Lydia Olander**, Duke University, National Ecosystem Services Partnership & Nicholas Institute for Environmental Policy Solutions*

(AAAS Congressional Fellow 2004-2005)

AAAS Symposium May 19, 2017

Duke
NICHOLAS INSTITUTE
FOR ENVIRONMENTAL POLICY SOLUTIONS

Duke
NICHOLAS INSTITUTE
FOR ENVIRONMENTAL POLICY SOLUTIONS

NICHOLAS INSTITUTE

Linking academic knowledge and decision makers to solve environmental challenges

ECOSYSTEM SERVICES PROGRAM

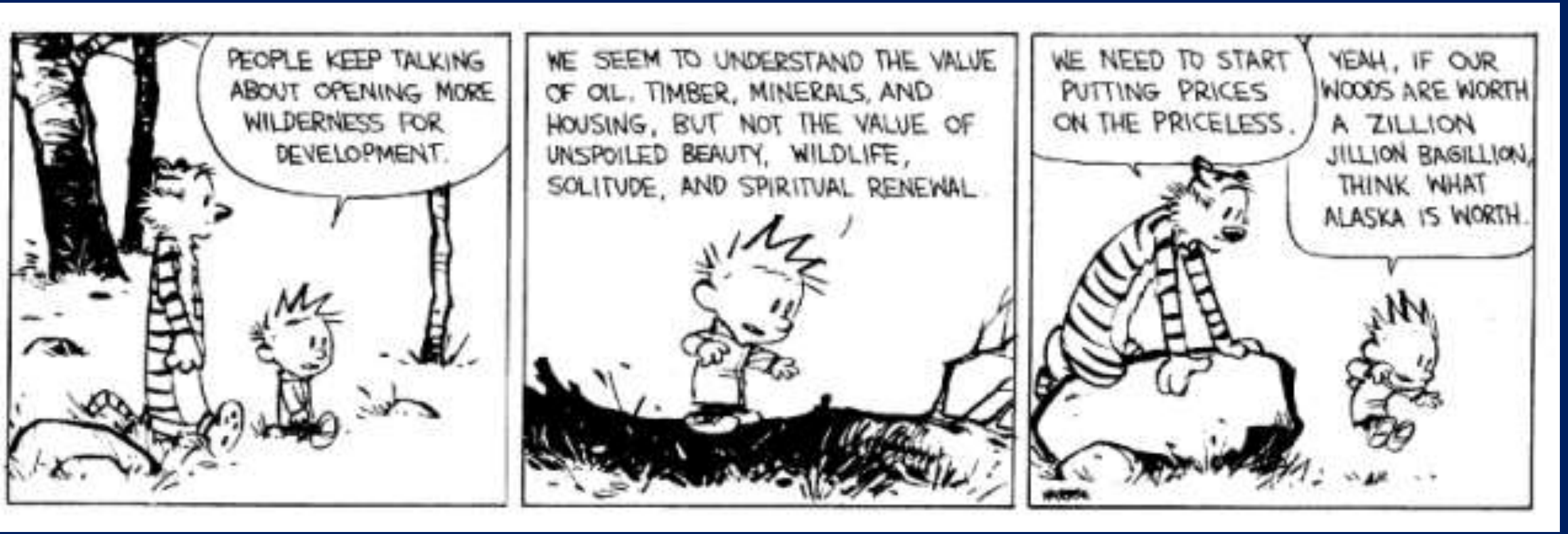
Integrating Ecosystem Services into public and private decision making through improving methods, incentives and markets

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

OUTLINE

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.

What are Ecosystem Services?

Millennium Ecosystem Assessment

Provisioning
Goods or products produced by ecosystems



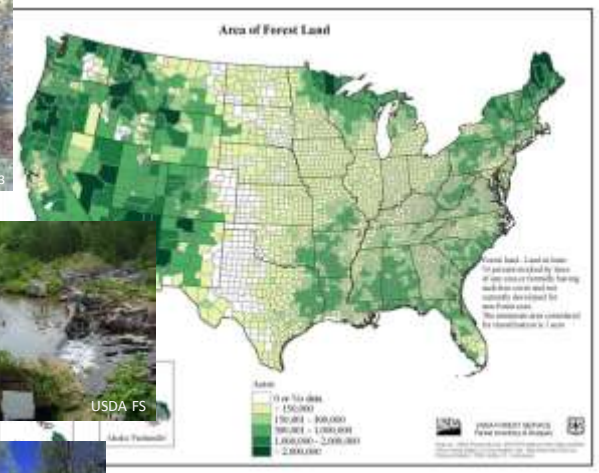
Regulating
Natural processes regulated by ecosystems

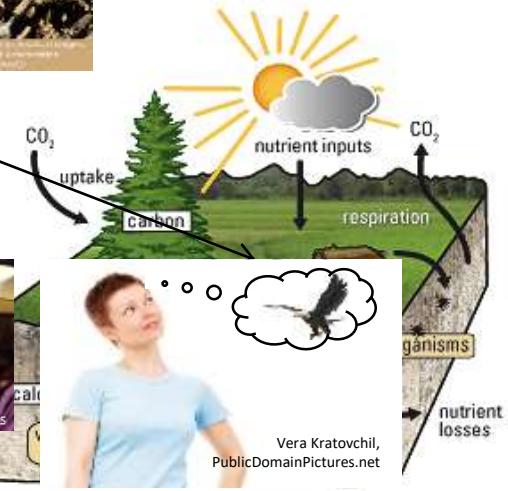

Cultural
Non-material benefits obtained from ecosystems


Supporting
Functions that maintain all other services


Source of slide: Businesses for Social Responsibility

How is it different from what we do now?





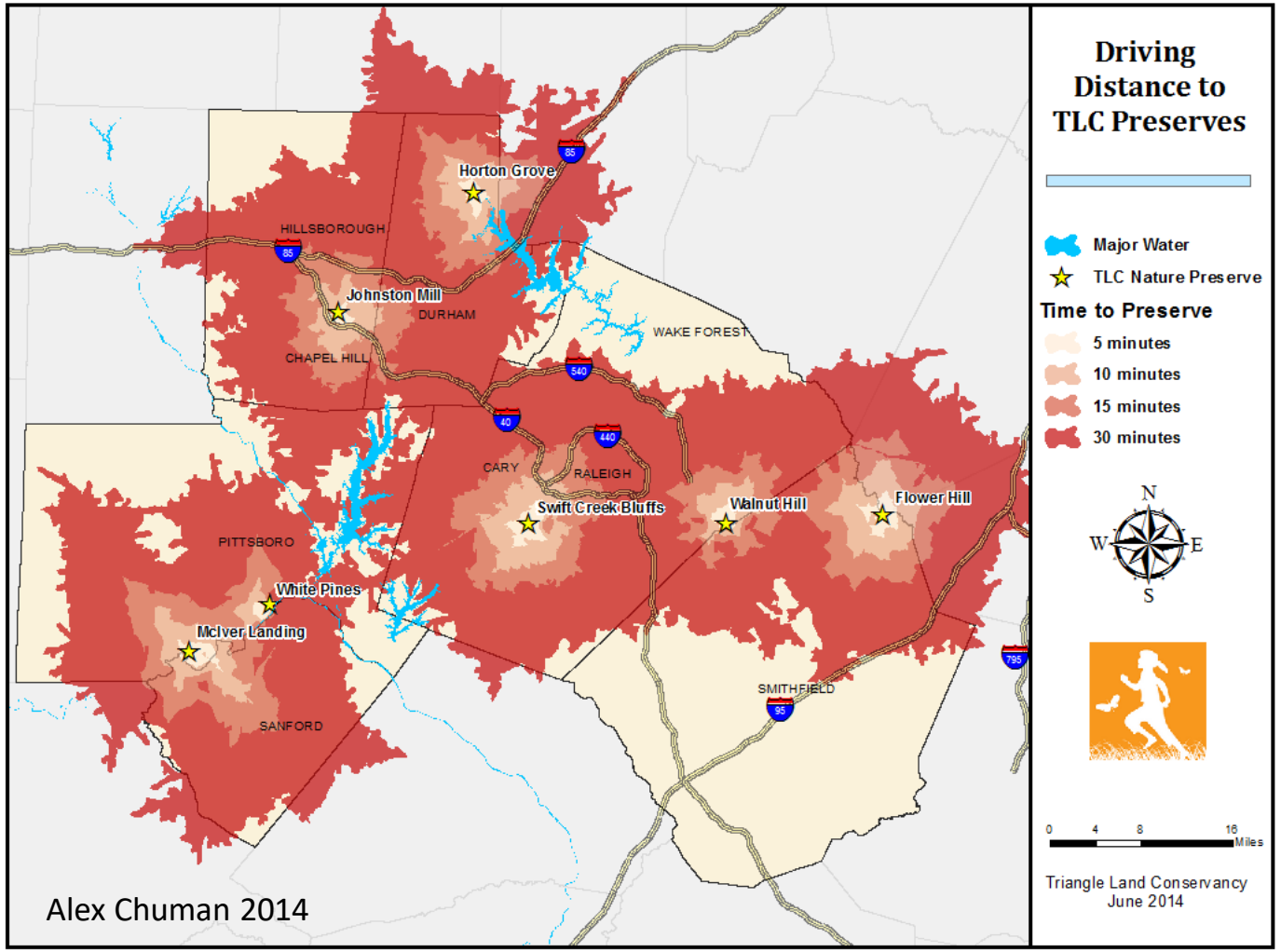
Goes beyond ecological measures to describe benefits or harms to people

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



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

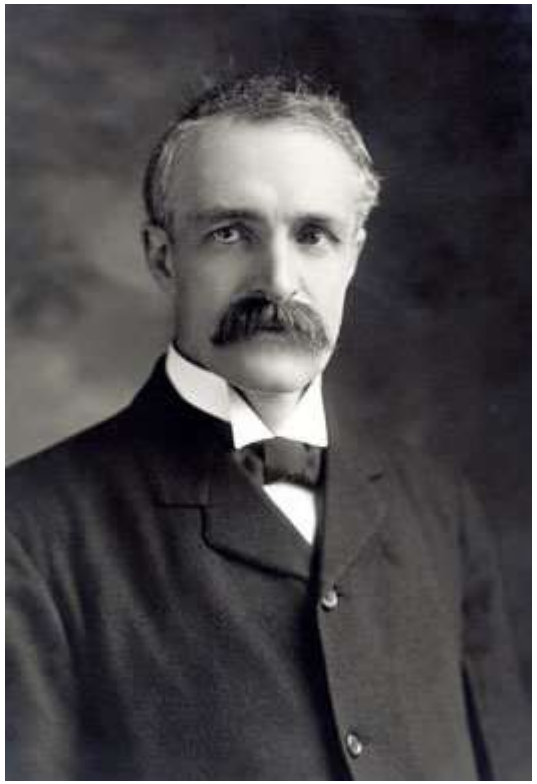
How?

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

History of Ecosystem Services

John Muir
Conservationist
Founder of Sierra Club
Father of the National Parks



Gifford Pinchot
First Chief of the Forest Service
Established the Society for American Foresters

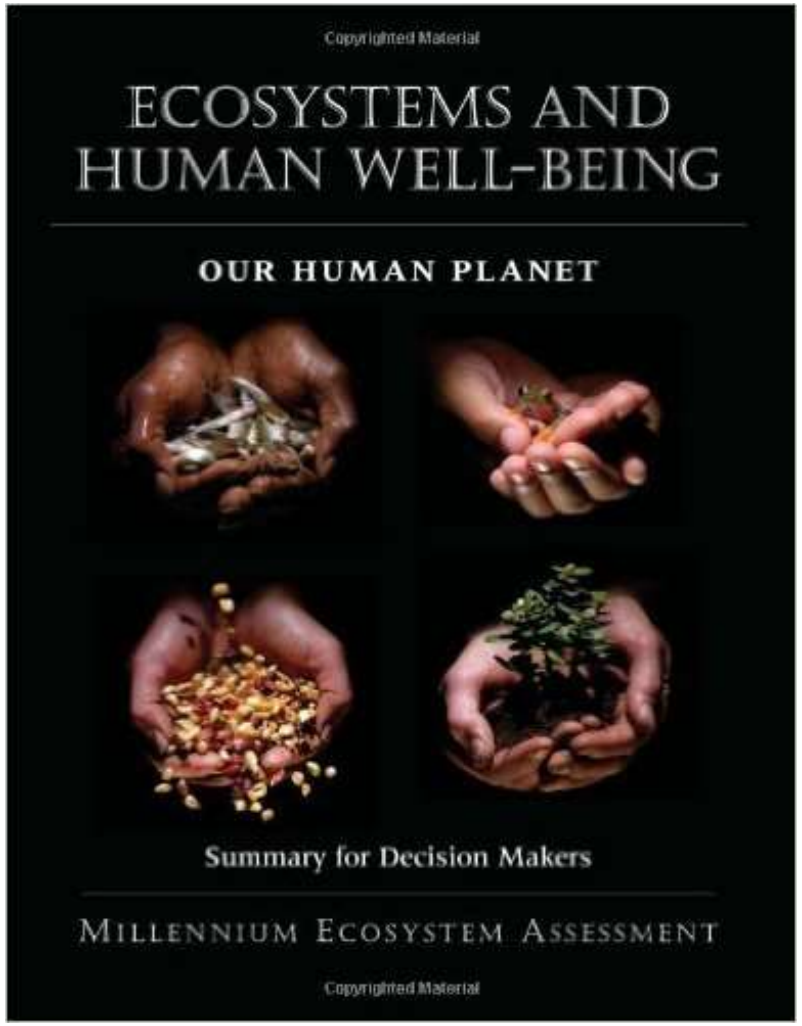
The concept of ecosystem services is not new

"Conservation means the wise use of the earth and its resources for the lasting good of men." -Gifford Pinchot

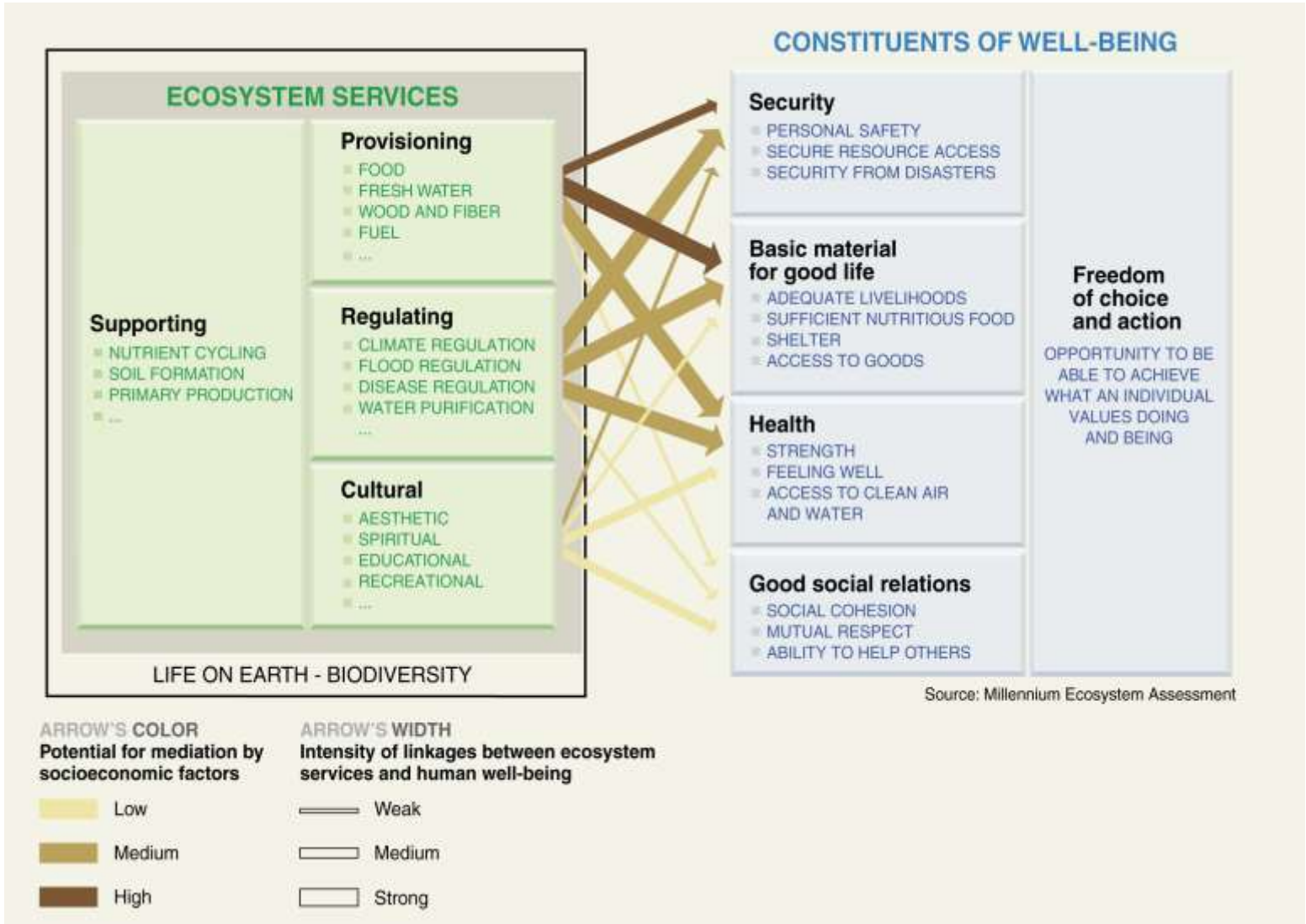
We need both "nature for natures sake" and "nature for people" – NATURE AND PEOPLE

- What is new?
  - More services – regulating, cultural and supporting services.
  - Quantification and valuation for decision making

Biosphere 2

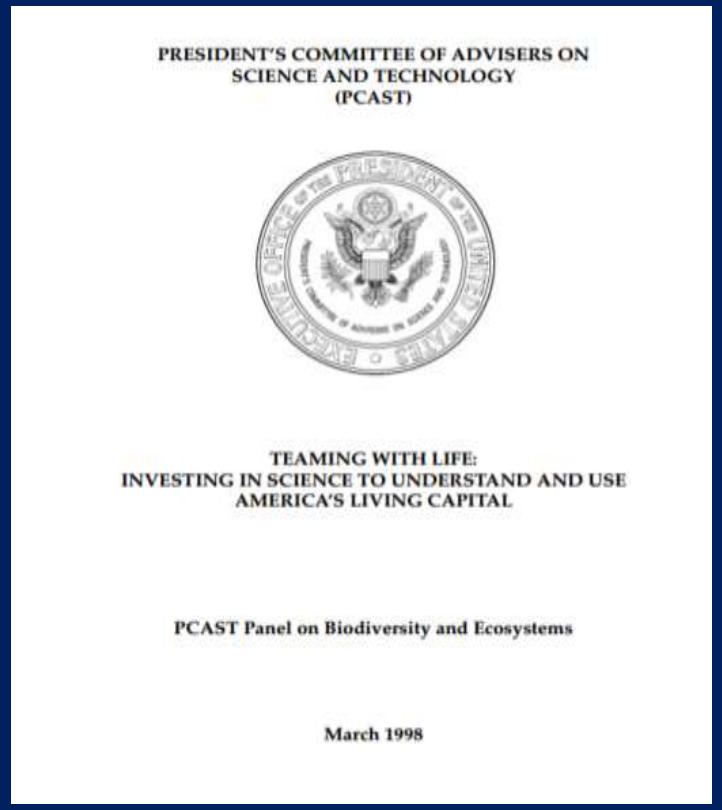


Finished in 2005



Growing Use of Ecosystem Services

President's Committee of Advisers on Science and Technology (PCAST) Reports in 1998 and 2011


PRESIDENT'S COMMITTEE OF ADVISERS ON SCIENCE AND TECHNOLOGY (PCAST)

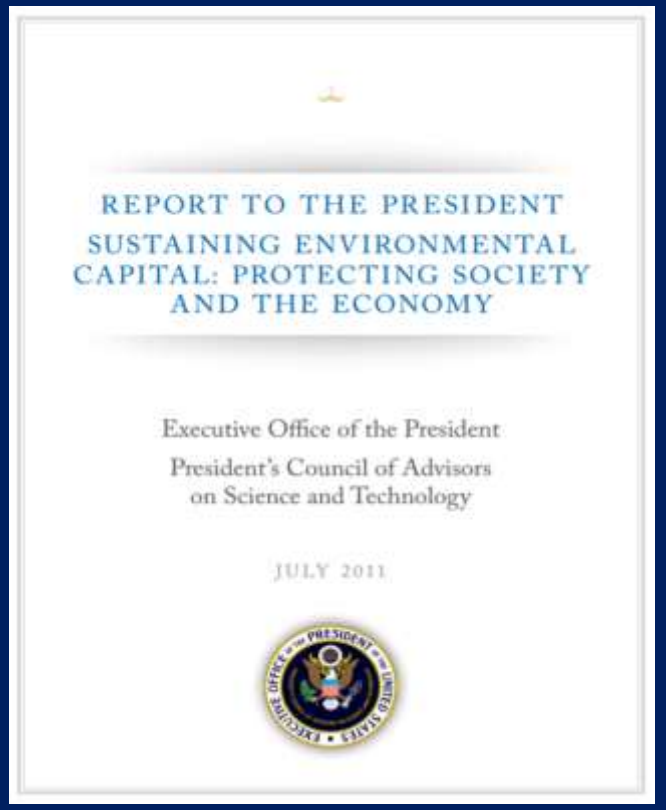
TEAMING WITH LIFE: INVESTING IN SCIENCE TO UNDERSTAND AND USE AMERICA'S LIVING CAPITAL

PCAST Panel on Biodiversity and Ecosystems

March 1998

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.


REPORT TO THE PRESIDENT

SUSTAINING ENVIRONMENTAL CAPITAL: PROTECTING SOCIETY AND THE ECONOMY

Executive Office of the President
President's Council of Advisors on Science and Technology

JULY 2011

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

Duke
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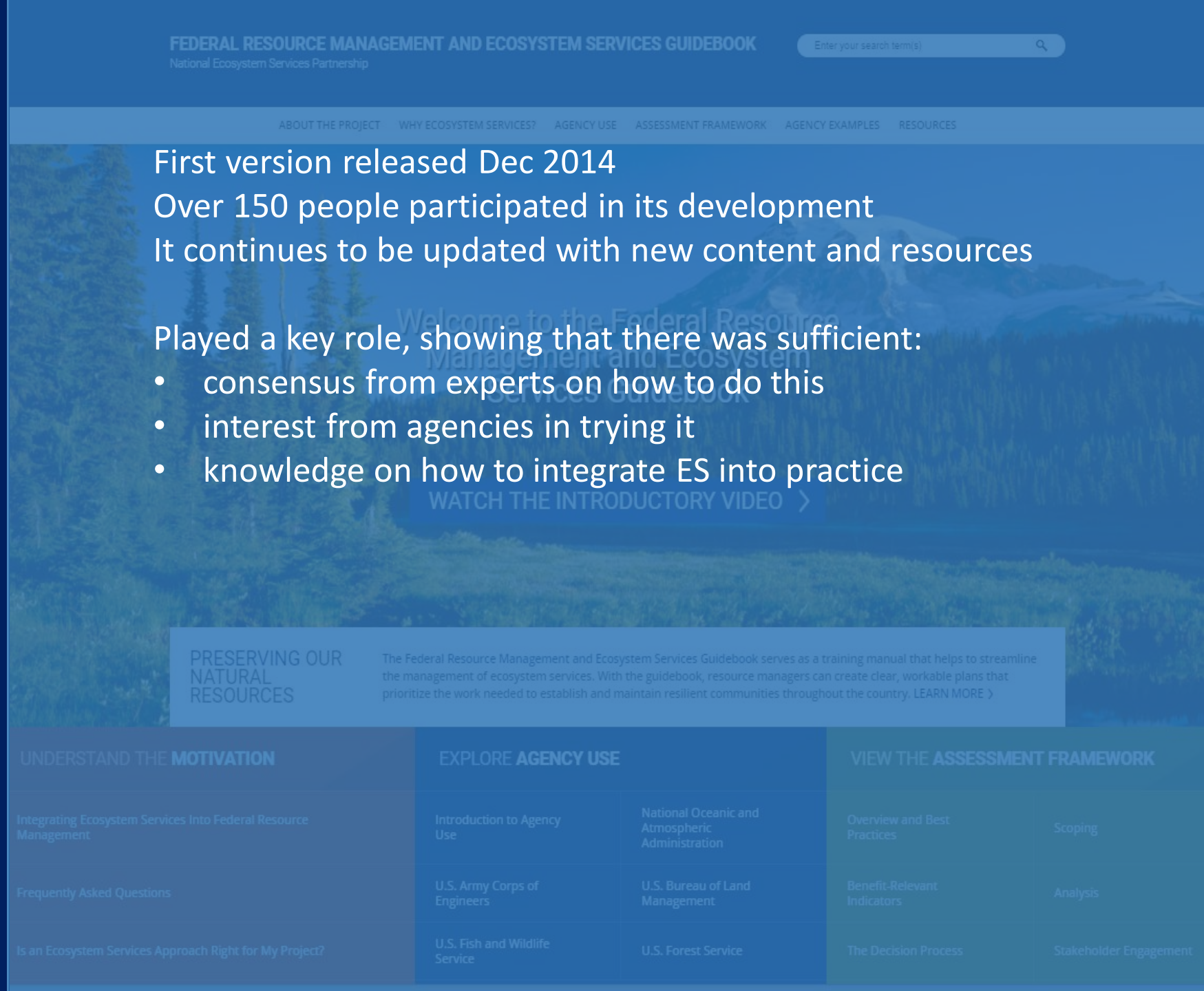
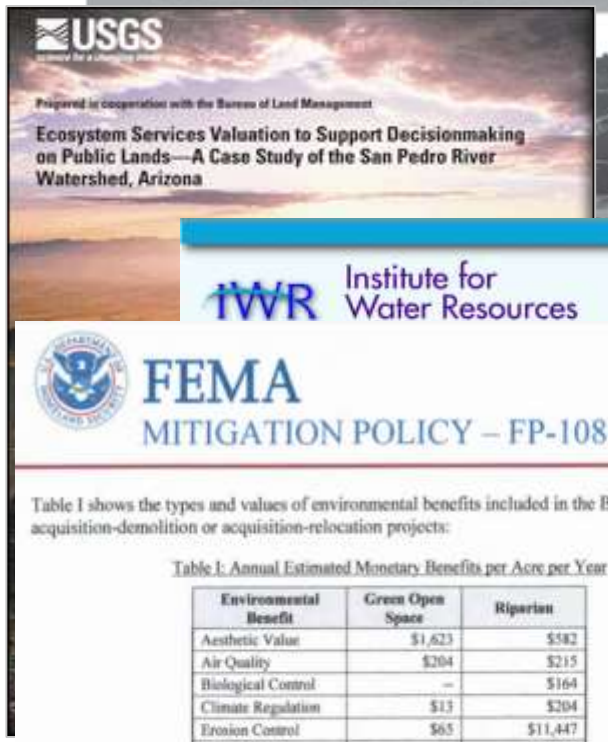


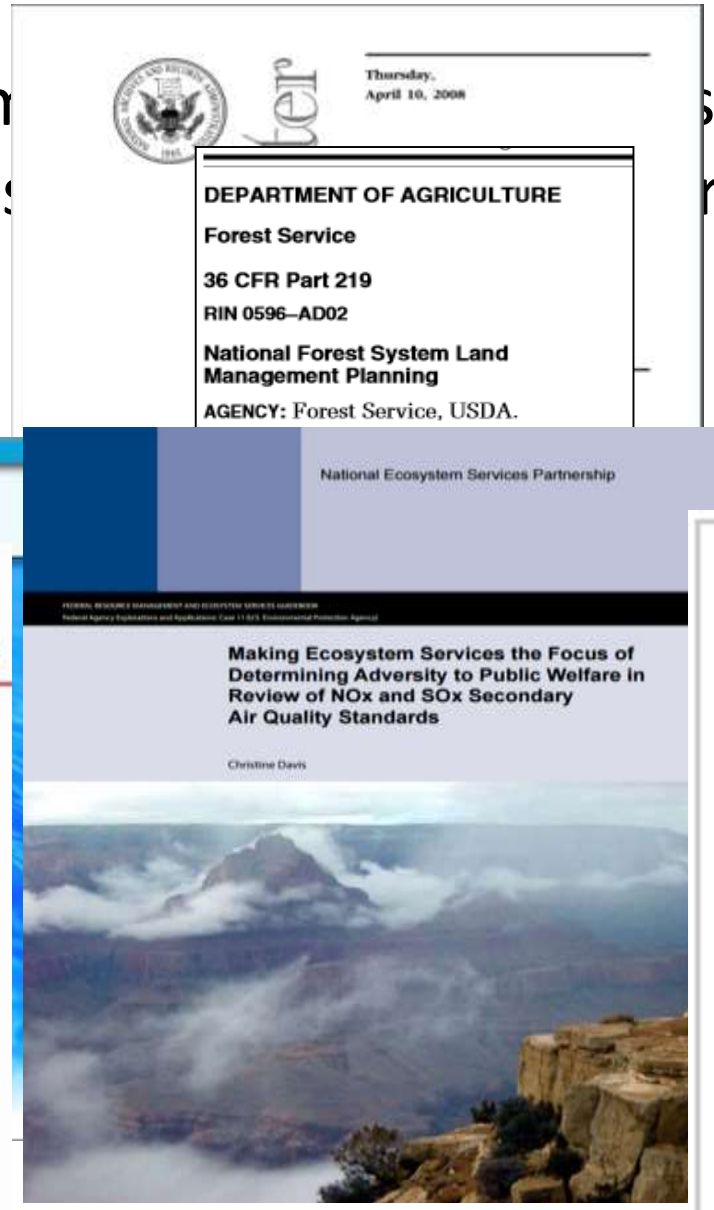
First version released Dec 2014
Over 150 people participated in its development
It continues to be updated with new content and resources

Played a key role, showing that there was sufficient:

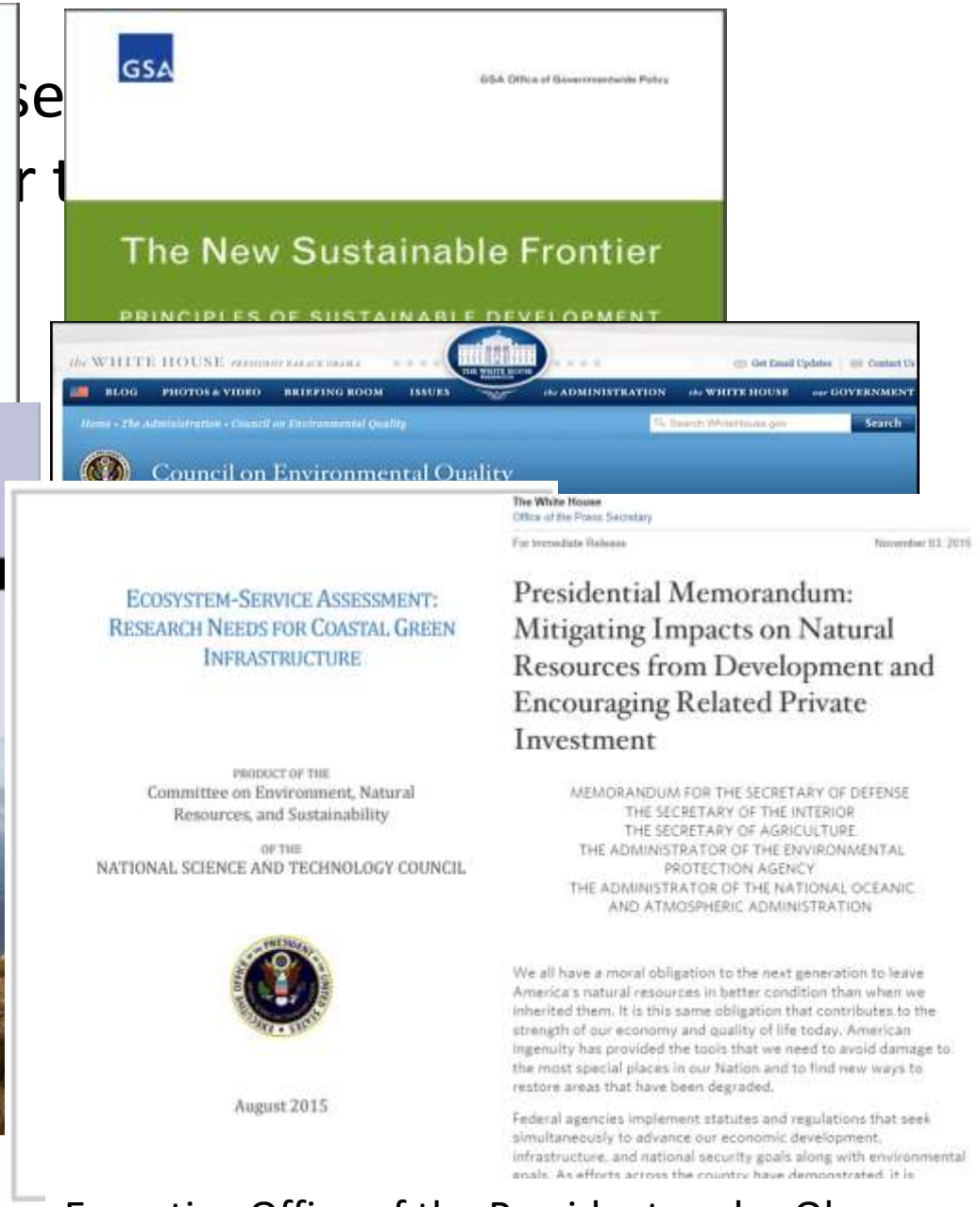
- consensus from experts on how to do this
- interest from agencies in trying it
- knowledge on how to integrate ES into practice



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

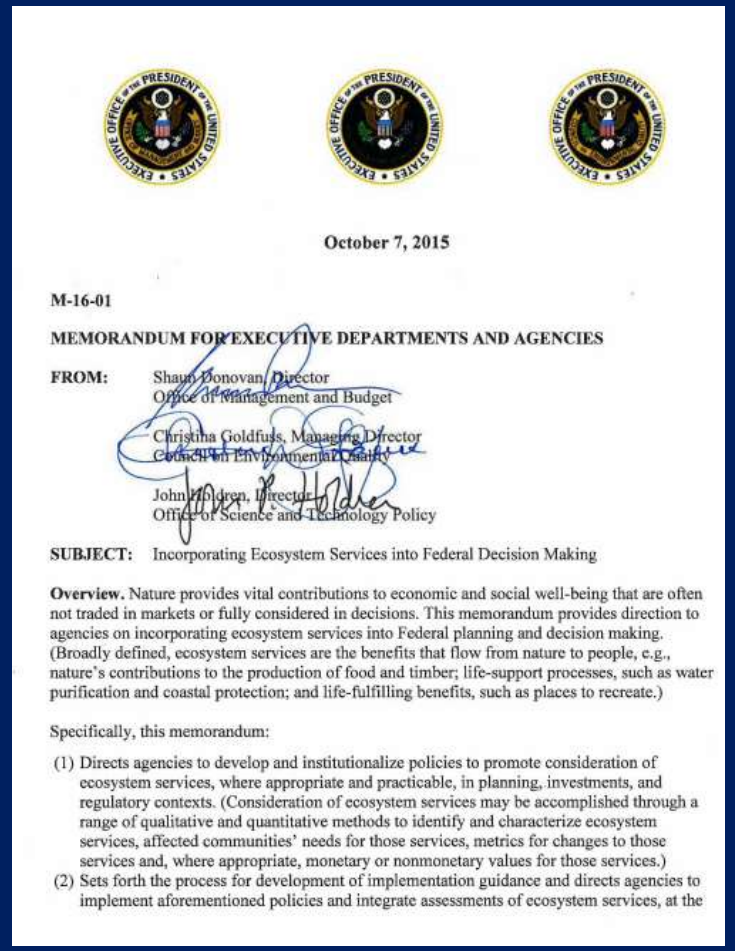
White House Memo

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 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.*



October 7, 2015

M-16-01

MEMORANDUM FOR EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: Shaun Donovan, Director
Office of Management and Budget

Christina Goldfuss, Managing Director
Council on Environmental Quality

John Holdren, Director
Office of Science and Technology Policy

SUBJECT: Incorporating Ecosystem Services into Federal Decision Making

Overview. Nature provides vital contributions to economic and social well-being that are often not traded in markets or fully considered in decisions. This memorandum provides direction to agencies on incorporating ecosystem services into Federal planning and decision making. (Broadly defined, ecosystem services are the benefits that flow from nature to people, e.g., nature's contributions to the production of food and timber; life-support processes, such as water purification and coastal protection; and life-fulfilling benefits, such as places to recreate.)

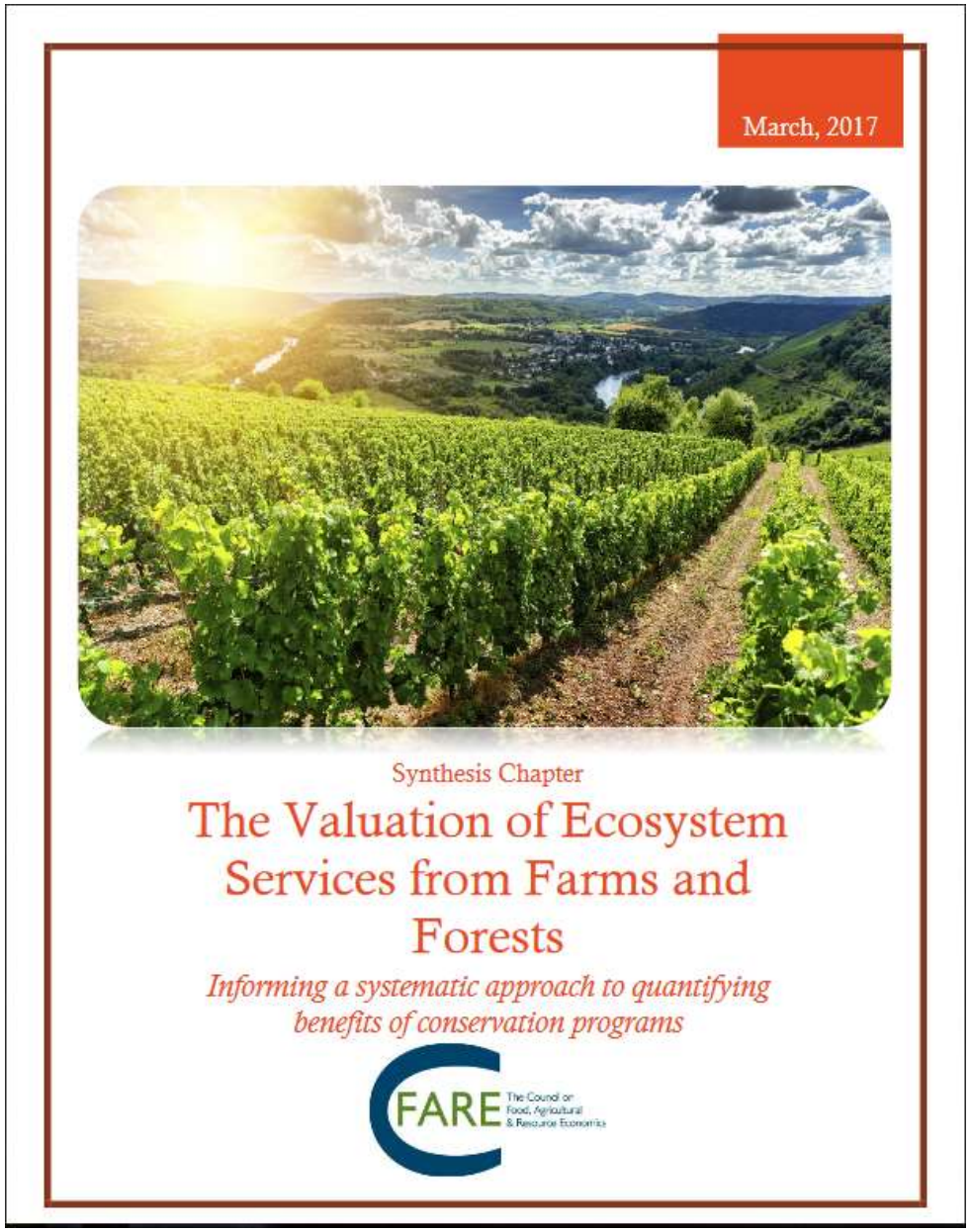
Specifically, this memorandum:

(1) Directs agencies to develop and institutionalize policies to promote consideration of ecosystem services, where appropriate and practicable, in planning, investments, and regulatory contexts. (Consideration of ecosystem services may be accomplished through a range of qualitative and quantitative methods to identify and characterize ecosystem services, affected communities' needs for those services, metrics for changes to those services and, where appropriate, monetary or nonmonetary values for those services.)
(2) Sets forth the process for development of implementation guidance and directs agencies to implement aforementioned policies and integrate assessments of ecosystem services, at the

USDA and USFS

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

Lisa Wainger and Dave Erving

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

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	
Ecosystem Service Benefits	***$ millions***
Dam operations, maintenance, etc.	$188.9
Irrigated Agriculture	$29.9
Wildlife refuge recreation	$4.3
Troll Chinook fishery	$134.5
Ocean recreational Chinook fishery	$50.5
In river Chinook fishery	$1.8
Total Quantified Use Benefits	**$409.9**
Ecosystem Service Costs	
Dam removal / mitigation	-$166.8
Klamath Basin Restoration Activities	-$472.1
Foregone hydropower	-$1320.1
Foregone reservoir recreation	-$35.4
Foregone whitewater recreation	-$6.0
Total quantified costs	**-$2,000.4**
NET BENEFITS (use values only)	**-$1,590.5**

Cost Benefit Analysis for removal of Klamath Dams

Use values only

Sources
Klamath River Basin Restoration Nonuse Value Survey – Final Report January 2012 by Mansfield et al. RTI
Klamath Facilities Removal Environmental Impact Statement/Environmental Impact Report – Dec 2012.

Economic Value of Klamath Dam Removals	
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Troll Chinook fishery	$134.5
Ocean recreational Chinook fishery	$50.5
In river Chinook fishery	$1.8
Total Quantified Use Benefits	**$409.9**
Non Use Value	**$15,645.0**
Ecosystem Service Costs	
Dam removal / mitigation	-$166.8
Klamath Basin Restoration Activities	-$472.1
Foregone hydropower	-$1320.1
Foregone reservoir recreation	-$35.4
Foregone whitewater recreation	-$6.0
Total quantified costs	**-$2,000.4**
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

Klamath River Basin Restoration Nonuse Value Survey – Final Report January 2012 by Mansfield et al. RTI

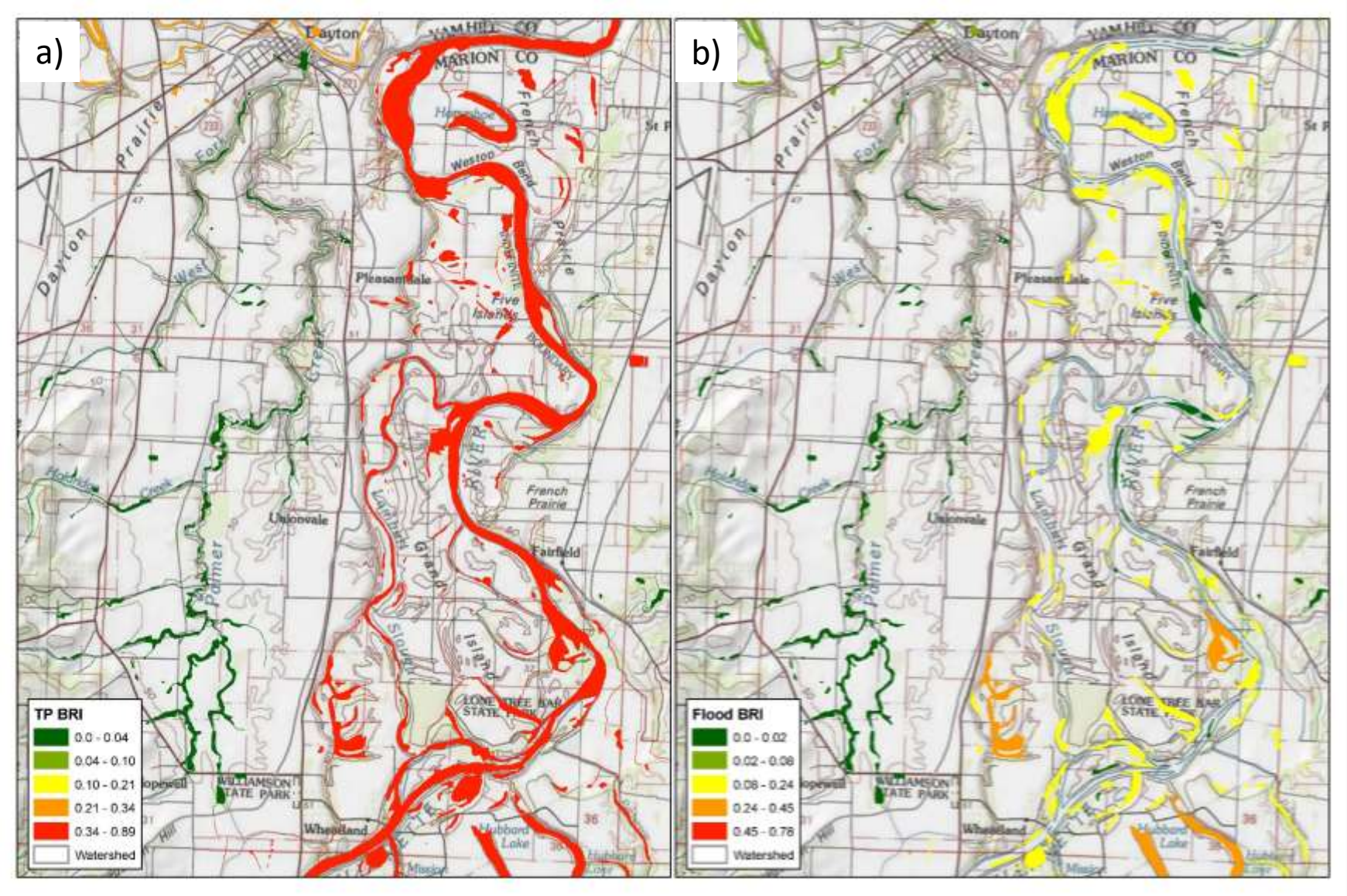
Klamath Facilities Removal Environmental Impact Statement/Environmental Impact Report – Dec 2012.

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

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.



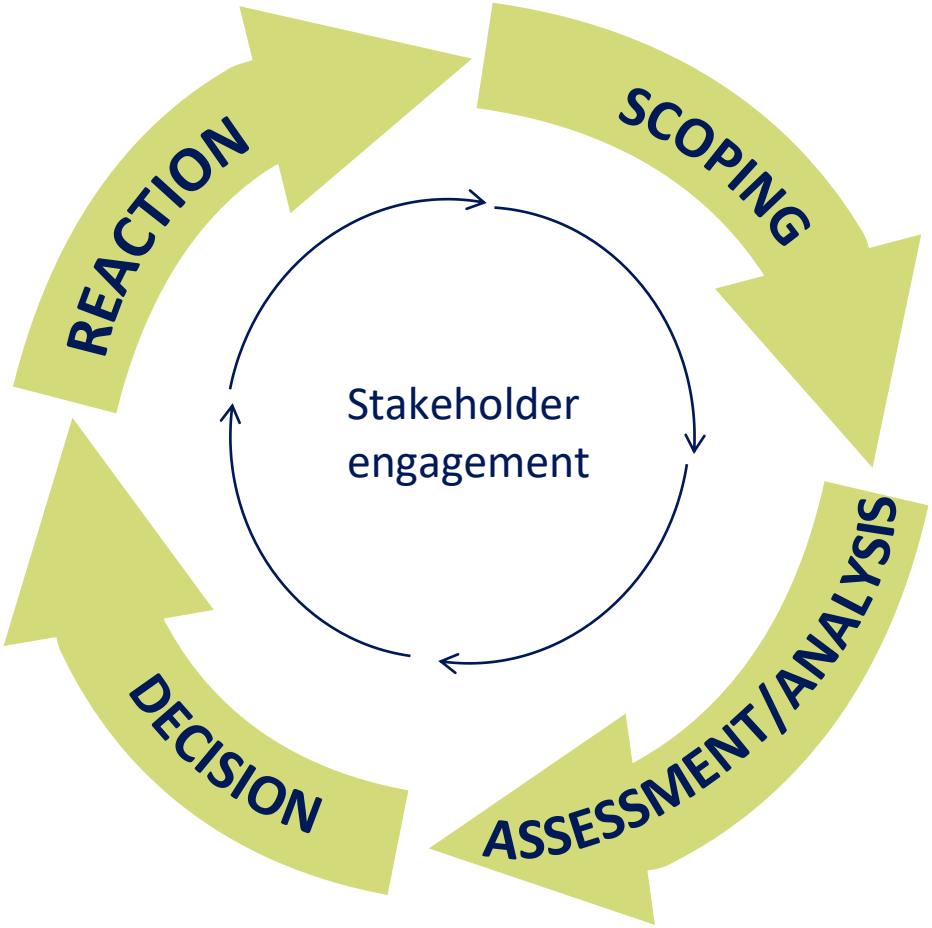
From Jimmy Kagan, in forthcoming paper, Olander et al. So you want your research to be relevant? Building the bridge between ecosystem services research and practice.

How do we incorporate ecosystem services?

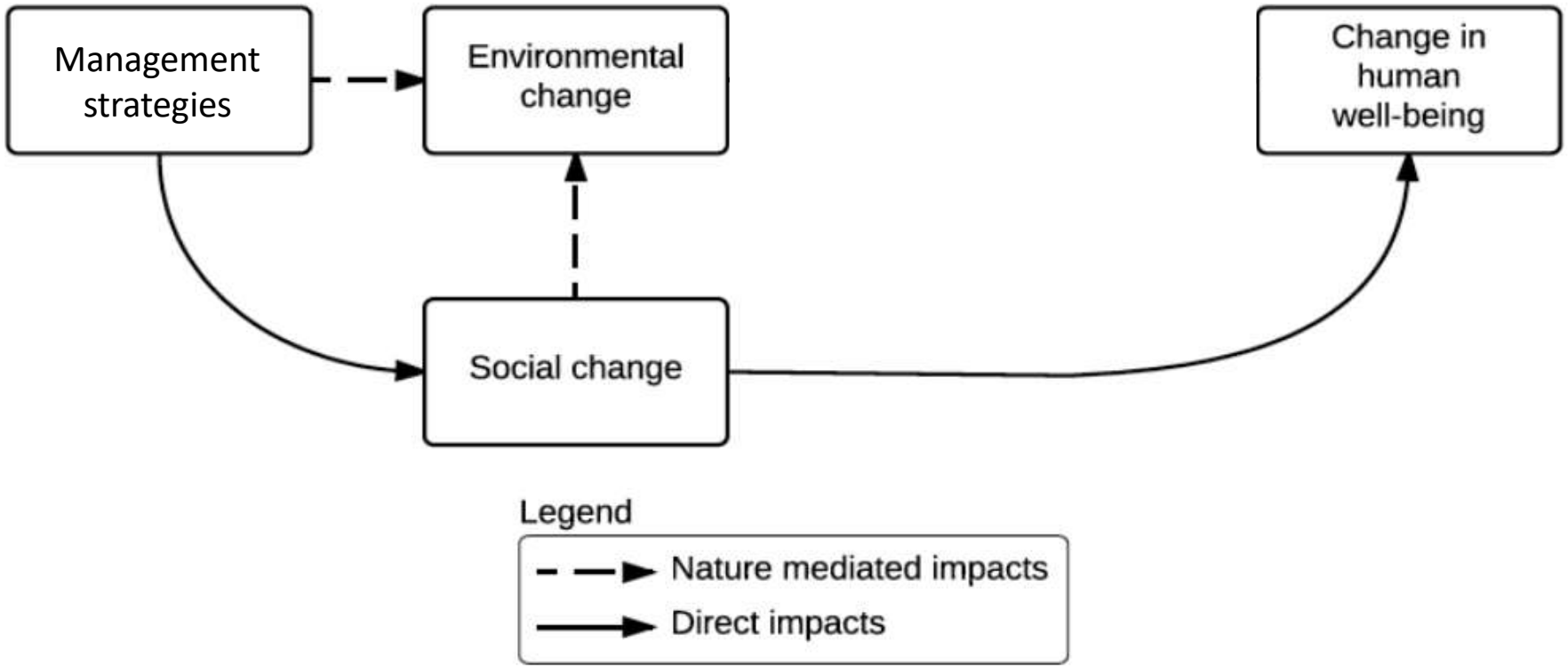
Ecosystem services can be used in existing planning and decision processes.

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.

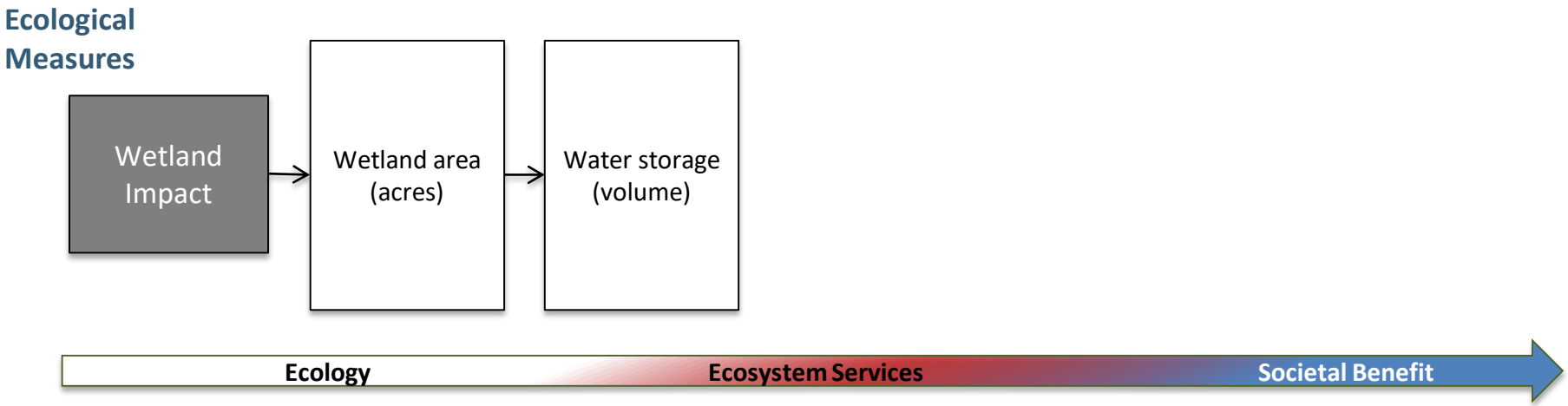


Incorporating ES means going beyond ecological measures



The Nature Conservancy

Incorporating ES means going beyond ecological measures



NESP

The linkages to ES can be made using conceptual models

Iovanna, R., A. Ando, S. Swinton, D. Hellerstein, J. Kagan, D. Mushet, and C. Otto. 2017.
Chapter 1: **Assessing Pollinator Habitat Services to Optimize Conservation Programs**.
The Council on Food, Agricultural and Resource Economics (C-FARE) Report No. 0114- 301b, Washington DC

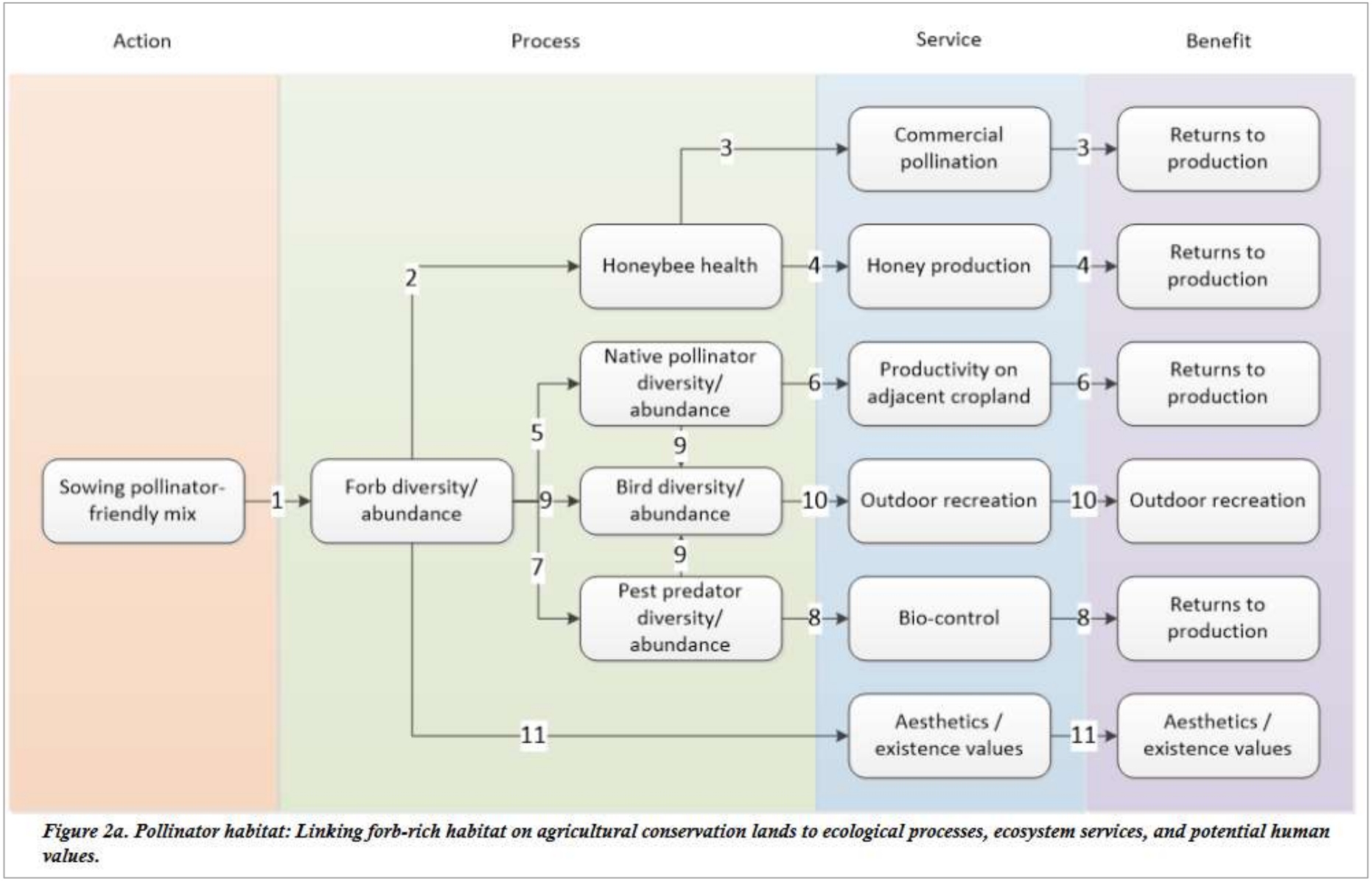


Figure 2a. Pollinator habitat: Linking forb-rich habitat on agricultural conservation lands to ecological processes, ecosystem services, and potential human values.

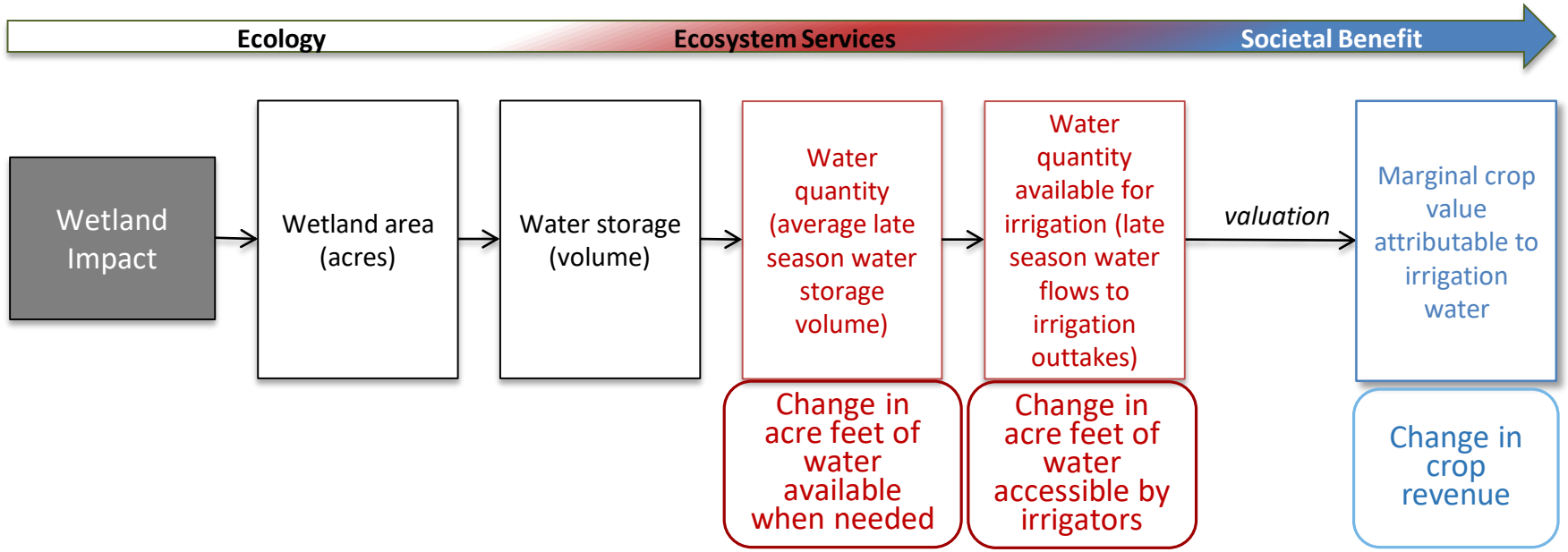
Characteristics of a good assessment of ES

- **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

Van Wensem, J., P. Calow, A. Dollacker, L. Maltby, L. Olander, M. Tuvendal, and G. Van Houtven. 2016. Identifying and assessing the application of ecosystem services approaches in environmental policy and decision-making. Integrated Environmental Assessment and Management.

How do we measure ecosystem services?

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



	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


Drina, Serbia


Eryngium yuccifolium, Ohio


Chelan mountain snail of Washington

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

Trump orders agencies to assess their 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 "thoro
of every executive department and agency," White House spokesman Sean Spic
today. The president will sign the order, titled "Comprehensive Plan for Reorga
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.

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

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

Nespguidebook.co

Home - Resources

RESOURCES

This section of the *Federal 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 this 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 collections of available resources.

- Federal Action on Ecosystem Services
- Data and Modeling Infrastructure for National Integration of Ecosystem Services into Decision Making: Expert Summaries
- Best Practices for Integrating Ecosystem Services into Resource Management
- Printable *Federal Resource Management and Ecosystem Services Guidebook*
- Ecosystem Services Toolkit from Canada
- Ecosystem Services Valuation
- State Level Ecosystem Services Assessments
- NESP Meetings and Webinars
- Ecosystem Service Tools and Methods

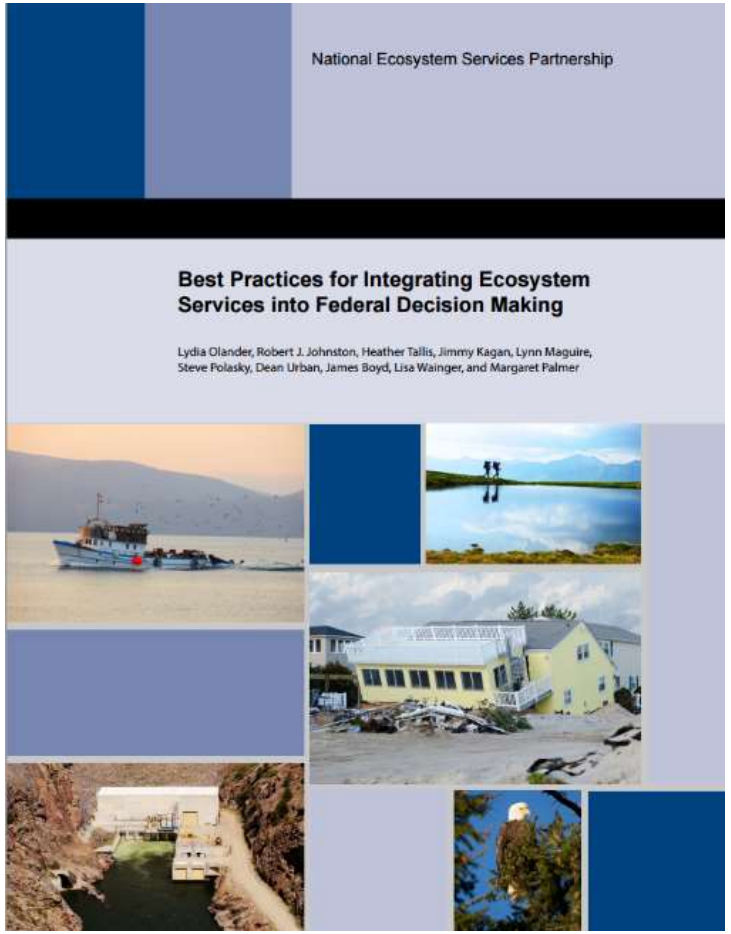
PRESERVING NATURAL RESOURCES

UNDERSTAND THE **MOTIVATION**

Integrating Ecosystem Services Into Federal Resource Management

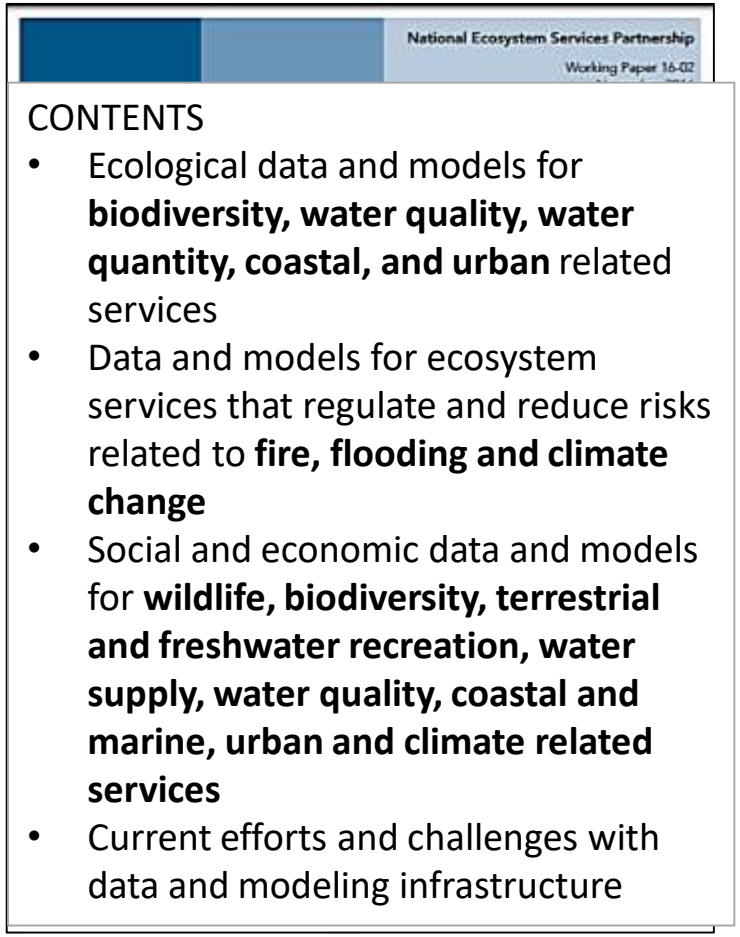
Frequently Asked Questions

Is an Ecosystem Services Approach Right for My Project?

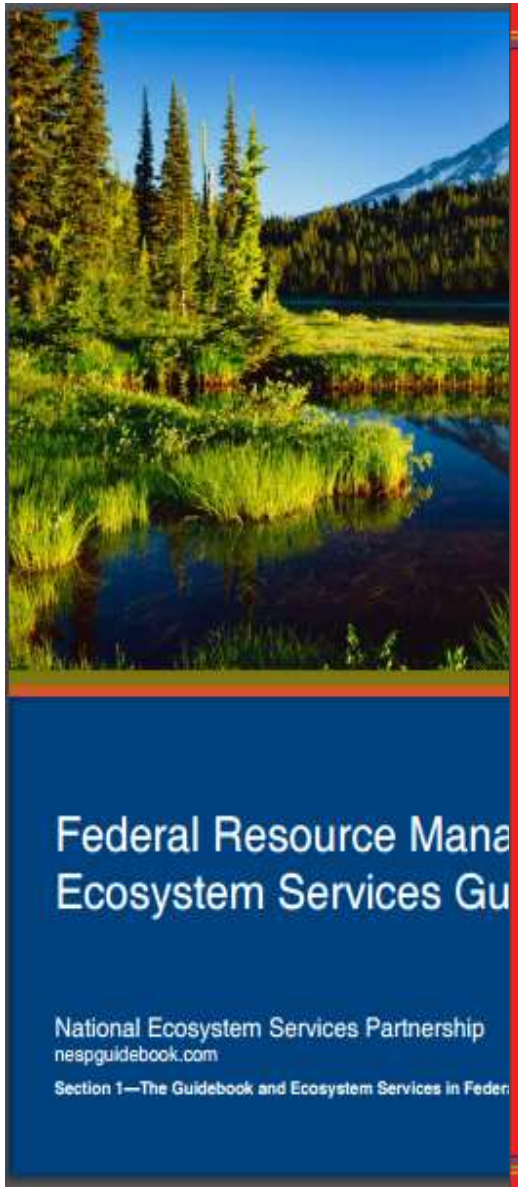


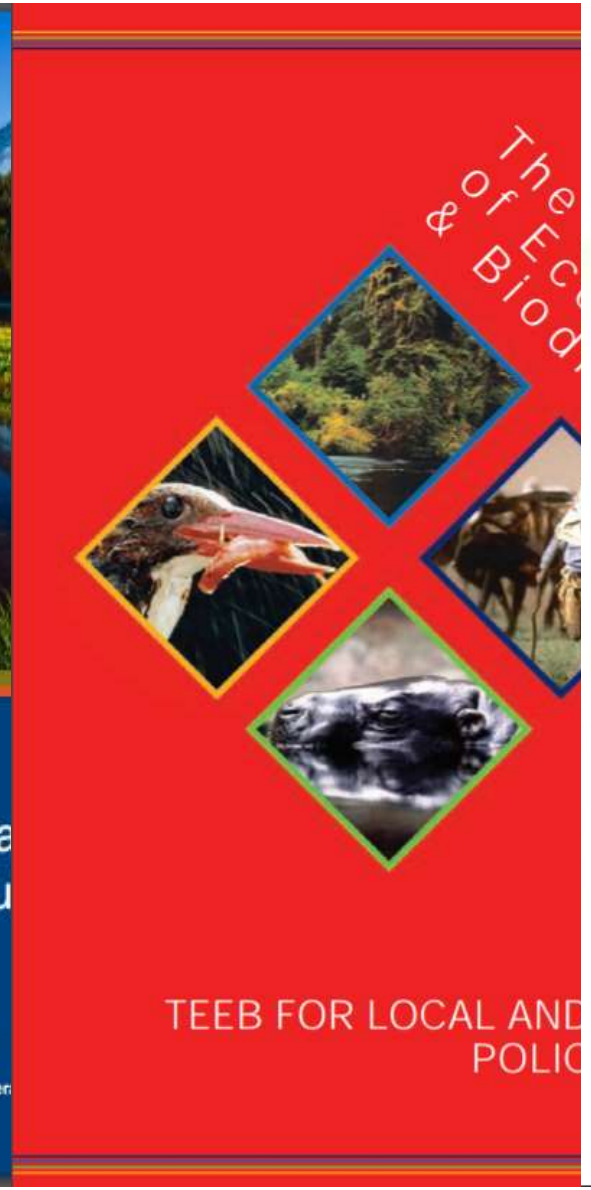
Non-monetary measures of ES

Consistency in ES measures

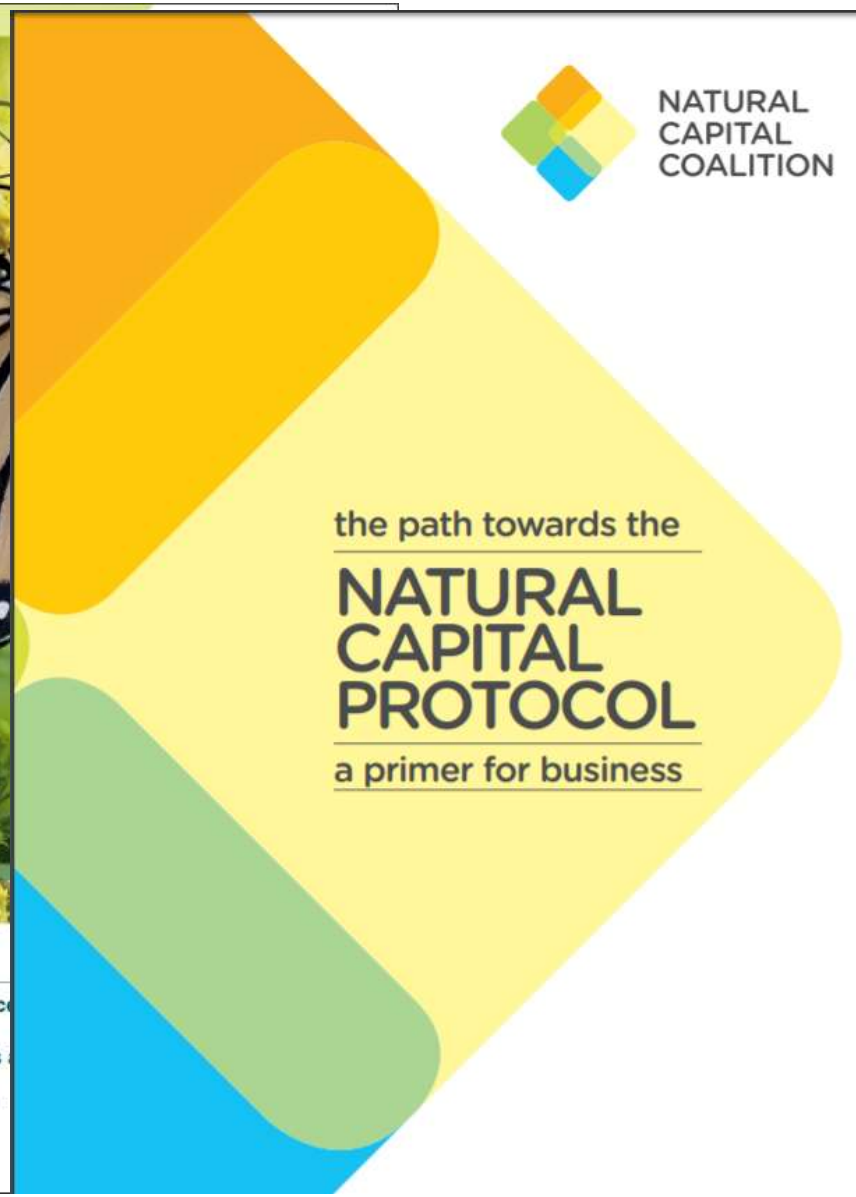


Data and models for quantifying ES


Federal Resource Mana
Ecosystem Services Gu
National Ecosystem Services Partnership
nespguidebook.com
Section 1—The Guidebook and Ecosystem Services in Feder


TEEB FOR LOCAL AND
POLIC


ECOSYSTEM
SERVICES
TOOLKIT
Completing and Using Ecosystem Servic
Assessment for Decision-Making:
An Interdisciplinary Toolkit for Managers
Value of Nature to Canadians Study Taskforce
Federal, Provincial, and Territorial Governments of Canada


NATURAL
CAPITAL
COALITION
the path towards the
NATURAL
CAPITAL
PROTOCOL
a primer for business

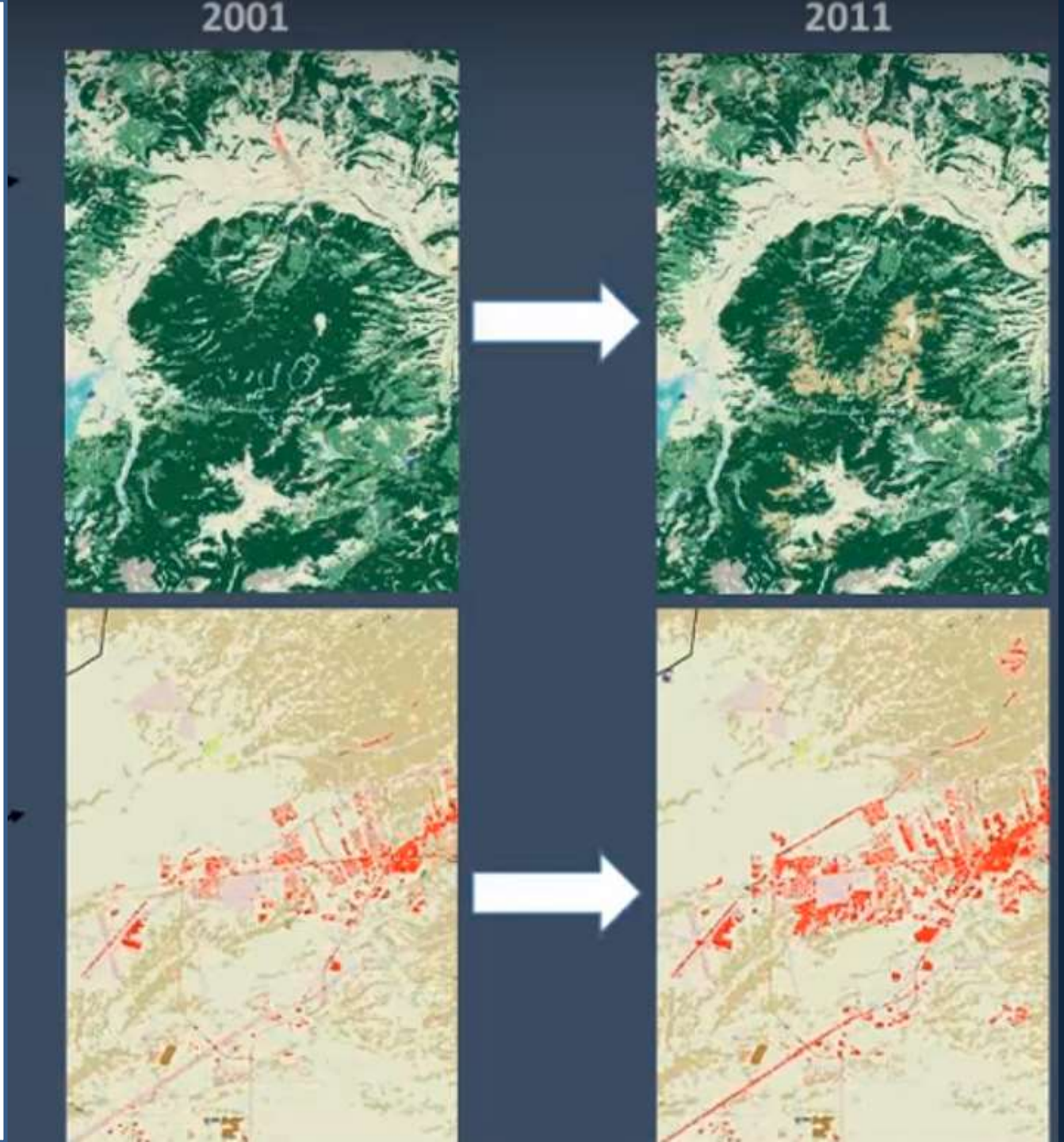
National Capital Accounting

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

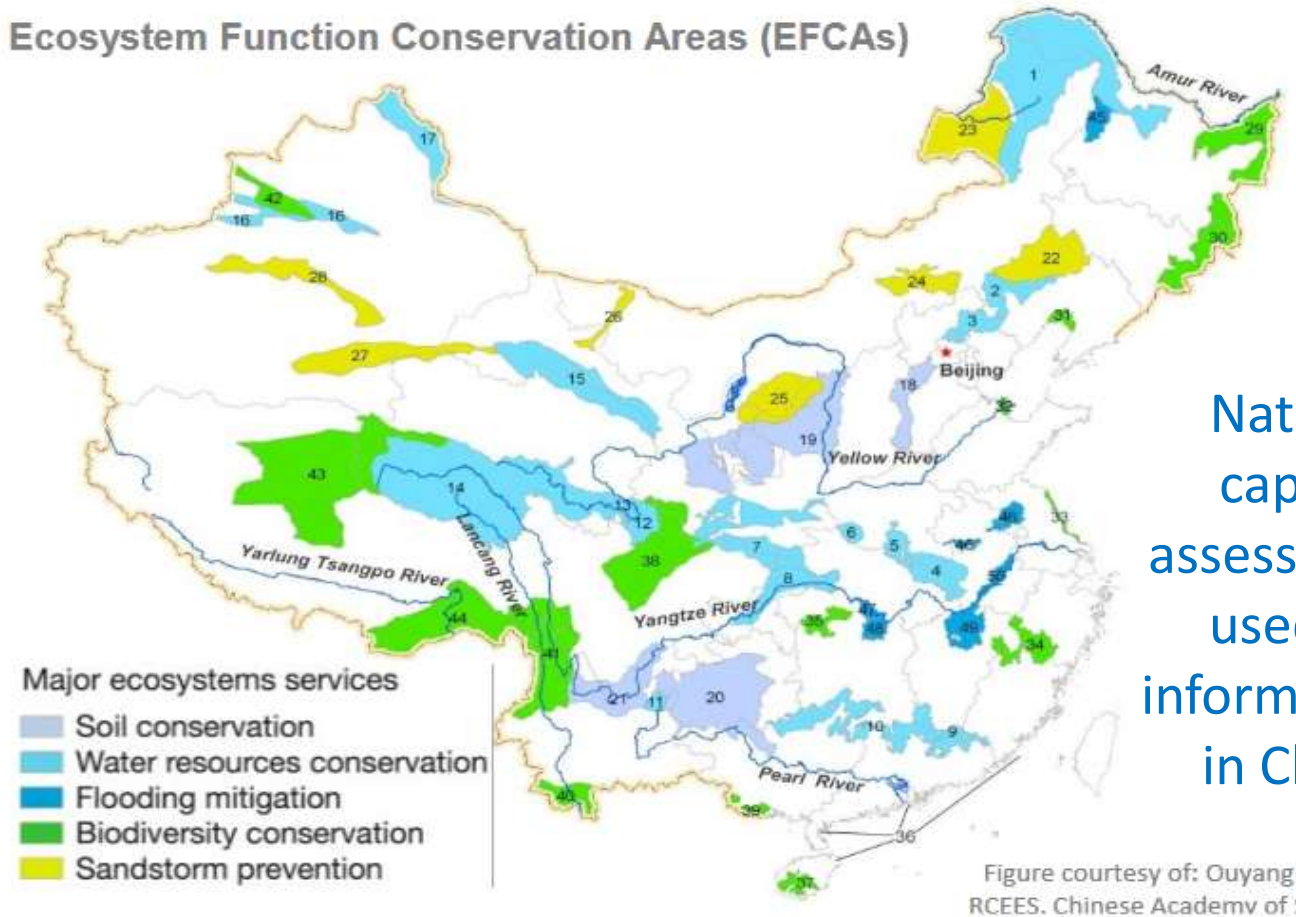
How is it useful?

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

DAMAGING THE PLANET DAMAGES HUMAN HEALTH

BIODIVERSITY

SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY

2 ZERO HUNGER

3 GOOD HEALTH AND WELL-BEING

4 QUALITY EDUCATION

5 GENDER EQUALITY

6 CLEAN WATER AND SANITATION

7 AFFORDABLE AND CLEAN ENERGY

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

10 REDUCED INEQUALITIES

11 SUSTAINABLE CITIES AND COMMUNITIES

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

14 LIFE BELOW WATER

15 LIFE ON LAND

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

17 PARTNERSHIPS FOR THE GOALS

SUSTAINABLE DEVELOPMENT GOALS

40%

of the world's population could be living in areas under severe water stress

1-2

million hectares of agricultural land per annum

Questions?

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https://nespguidebook.com/

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

National Ecosystem Services Partnership
Federal Resource Management and
Ecosystem Services Project

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