Integrating Ecosystem Services into Forest Service Programs and Operations

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Outline of Presentation

- USFS and Ecosystem Services
- Ecosystem Services and the chartering of NESST
- NESST General Technical Report
- Planning and Partnerships
- Performance and Evolution of NESST
- Synthesis and Future Directions
Ecosystem Services and the USFS

- Ecosystem Services for USFS evolved from multiple-use concept
- Ecosystem services as a working concept
- 2012 USFS Planning Rule
- 2015 Presidential Memorandum
- Ecosystem Services Champions Forum and evolution of NESST
# Natural resource legislation and federal agency responses and applications of ecosystem services.

<table>
<thead>
<tr>
<th>Legislation</th>
<th>Intent of Legislation</th>
<th>Federal Agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multiple Use Sustained Yield Act (1960)</strong></td>
<td>Sustainable management of natural resources</td>
<td>USFS and BLM</td>
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<tr>
<td><strong>National Environmental Policy Act (1969)</strong></td>
<td>Impacts of people and the environment and understanding of the connection between ecological systems and management actions</td>
<td>Any federal project that used federal funding</td>
</tr>
<tr>
<td><strong>National Forest Management Act (1976)</strong></td>
<td>Establishes policy of inventory and planning in accordance with MUSYA</td>
<td>USFS and BLM</td>
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<tr>
<td><strong>National Forest System Land Management Planning Rule (2012)</strong></td>
<td>USFS regulation to implement planning from NFMA</td>
<td>Rule explicitly requires managers to address ecosystem services in planning</td>
</tr>
<tr>
<td><strong>Presidential Memorandum: Ecosystem Services into Federal Decision Making (2015)</strong></td>
<td>Directs federal agencies to incorporate ES into decision frameworks</td>
<td>NOAA, NRCS, USFWS, USFS, EPA, BLM, USGS</td>
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</tbody>
</table>
USFS Planning Rule

- Ecosystem services and multiple uses “considering a full range of resources, uses and benefits”

- MUSYA—timber, water, recreation, range, wildlife & fish.

- Early adopter forests are using Planning Rule for forest plan revisions and assessments.

- 2015 Directives state the N.F. should include “key ecosystem services” in forest plan revisions.

- E.S. also includes cultural heritage values, and other services not directly included in multiple uses.
Incorporating Ecosystem Services into Federal Decision Making

- Directs agencies to develop and institutionalize policies for ecosystem services in planning, investment and regulatory context.
- Each agency developing work plan due March, 2016.
- Implementation guidance, CEQ convening subject matter experts for “community of practice” concept.
Case Study examples including:

- Marsh Project
- Cool Soda Project
- Forest Planning
- Early efforts for integrating ecosystem services into USFS programs and operations
Evolution and Chartering of NESST

- Ecosystem Services Champions Forum in 2012.
- Scientists—R&D, Line officers—NFS, Practitioners—S&P
- Set of recommendations for Ecosystem Services Framework including: developing common language and understanding, relevance to the agency, available tools and information, better communication across USFS Deputy Areas.
- Not exactly… USFS leadership directed us to develop national strategy and policy for the agency
- NESST was chartered in 2013, re-chartered in 2016.
NESST- National Ecosystem Services Strategy Team

Robert Deal, Nikola Smith, Jonas Epstein, Emily Weidner, Mary Snieckus, Lisa Fong, Tommie Herbert, Tania Ellersick, Greg Arthaud, Claire Harper, many others
NESST Purpose

“The National Ecosystem Services Strategy Team was established to collaboratively develop national strategy and policy around ecosystem services and integrate it into Forest Service programs and operations.”
• Introduction
• Ecosystem Services and USFS
• Elements of an Ecosystem Services Approach
  • Decision-Making and Analysis
  • Measuring, Reporting, Communicating
  • Partnerships and shared investments in ES
• Synthesis
  • Common Needs
• Next Steps

The Opportunities

- **Planning**: Consider a broad suite of ecosystem services in decision-making and priority-setting

- **Partnerships**: Connect providers and beneficiaries of ecosystem services through partnerships and investments

- **Performance**: Quantify and communicate in terms of benefits to people through measurement and reporting
Planning

Considering the full suite of objectives in analysis, decision-making and priority-setting

- Forest Planning
- Project Level Planning
- State Forest Action Plans
- Prioritizing Restoration Activities
“…… Plans will guide management of NFS lands so that they…have the capacity to provide people and communities with ecosystem services and multiple uses that provide a range of social, economic, and ecological benefits for the present and into the future. ……”
Evaluating **key ecosystem services**

1. Ecosystem service **contributions** by the plan area.

2. The **geographic scale** of these contributions (for example, watersheds, counties, regional markets, or eco-regions).

3. The **condition** and **trend** of these key ecosystem services.

4. The **drivers** likely to affect future demand and availability.

5. The **stability or resiliency** of the ecosystems or key characteristics of ecosystems that currently sustain ecosystem services.

6. The **influence of adjacent lands** or other conditions beyond the authority of the Forest Service that influence the plan area’s ability to provide ecosystem services.
Ecosystem Services Identified in Assessments

between 7-22 services per assessment
Relationships Identified in the Planning Process

National Forest or Grassland and broader landscape → Ecosystem processes & functions → Forest Goods and Services → Benefits → Users & other beneficiaries

Other private and public goods and services

Agency Infrastructure and Operations

Social and economic sustainability or conditions:
- Jobs
- Quality of life
- Education
- Health and safety
- Traditions
- Etc.

conditions, trends, drivers / stressors
Inyo, Sequoia and Sierra National Forests
Relative capacity for:
- Flood protection
- Assets for providing water supply
- Water quality
- Drinking water importance

Mapped areas of service provision at risk from stressors:
- Climate change (changing snowpack; seasonal flows; peak flows)
- Development / impervious surfaces
- Uncharacteristic (large) wildfire
- Impaired waterbodies
Water Supply Asset Mapping

CAL FIRE - FRAP

Water Supply Assets

Combined Assets

High
Medium
Low

Methodology
Input assets:
- Surface water runoff
- Surface water storage watersheds
- Groundwater basins
- Forest meadows
- Public water supply*

The 30 meter grid of each asset was combined, adding the ranks together to arrive at a final score. Water storage watersheds were weighted by 2 as they were deemed to contribute more directly and significantly to water supply. The score was ranked to reflect high, medium, and low combined asset levels.

*Narrative due to data limitations

Data Source: DOI, FPE - Fire and Resource Assessment Program (FRAP) 2014 Assessment
Forest Contributions to Water Supplies

Forests to Faucets Project
Assessing Drinking Water Importance and Threats

Increasing focus on geospatial tools to quantify benefits delivered to the public

Characterization of threats and justification for targeted restoration

National Forest Contributions to Stream Flow
Rocky Mountain Research Station, Luce et al. 2016
Other Ecosystem Service Indicators

**Timber** – appropriate vegetation types and infrastructure locations

**Grazing** – permitted areas

**Energy** – potential areas of fuel treatment (source of biomass)
- proximity to biomass energy generating facilities
- critical areas of potential hydropower, geothermal, wind, solar

**Recreation** - “Recreation Opportunity Spectrum”; recreation sites; visitation

**Aesthetics** – existing condition based on “Visual Quality Objectives”

**Cultural services** – historic sites, Tribal significance, locations of important species for hunting, medicine, and food

**Carbon Sequestration** – sites vulnerable to fire, land cover critical in providing capacity for carbon sequestration

**Biodiversity** – critical terrestrial and aquatic habitat
From Policy to Practice: project-level implementation
National Environmental Policy Act (NEPA)

Promote harmony between **people** and the **environment**

**PROPOSED ACTION**

- Proposal Development
- Community Engagement & Collaboration
- Adaptive Management
- Environmental Analysis
- Monitor and Evaluate

**PROPOSAL**

**Implementation**

**DECISION**
Information exchange about public values and forest conditions
“every piece of land has its own signature and function”

Karen Bennett, Retired Regional Soil Scientist, USFS Pacific Northwest Region

making connections between ecosystem services and site-specific ecological context
An Ecosystem Services Approach to Management of a Complex Landscape: The Marsh Project

Tim Foley, Joe Bowles, Nikola Smith, and Pete Caliguiri

Sustaining Ecosystem Services across Public and Private Lands: The Cool Soda All Lands Restoration Proposal

Nikola Smith
State Forest Action Plans

Required under the U.S. Farm Bill

✓ Preserve working forest lands
✓ Protect forests from harm
✓ Enhance **public benefits** from trees and forests
“A sustainable forest land base requires relief from development pressures, an intact industry infrastructure, and conservation incentives and markets that value working forests’ ecosystem services.”

~ Washington State Forest Action Plan
Leadership in the South

- Tennessee estimates the value of its urban forests for improving air quality is over $203 million annually.
- Georgia determined that its forest industry employs 128,000 at an economic benefit of nearly $29 billion.
- USFS is assisting the Southern Group of State Foresters to standardize ecosystem service valuation across the region.
National Programming priorities and outcomes

✔ Where can restoration actions be most effective in ecological, social and economic terms?

✔ How can we minimize costs and tradeoffs?

✔ What is the American public receiving from these investments?
Partnerships

Connecting providers and beneficiaries of ecosystem services through partnerships and shared investments.

- Incentives for Private Landowners
- Damage Assessments
- Environmental Markets
On average, each acre of healthy riparian forest protected through the program results in an $438 economic benefit per year, with a 260% return on investment over 20 years.
Private Sector Partnerships: Brewshed Investments
Deschutes National Forest, Oregon

GOODLIFE
BREWING COMPANY

BREW
SHED
SESSION ALE

12 FL. OZ. (355mL)
4.5% by VOL.
12p IBU: 30

SUSTAINABLE SESSION SERIES

BREWshed
SESSION ALE
We owe a ton to our wild, forested watersheds. They’re the backdrop to endless GoodLife adventure. They’re also our natural born purifiers, transforming snow and rain into fresh, crystalline water. Water that makes seriously tasty and distinctly Bend beer. The Pacific Northwest is home to some of Earth’s finest water, and to salute the source, we’re donating a portion of this ale’s sales to the Oregon Brewshed® Alliance and Washington Brewshed® Alliance, two crews committed to defending and protecting the wilds and its mighty watersheds. Because great beer in the great outdoors means going with the flow.

GREAT BEER begins with
CLEAN WATER
Leveraging Conservation Finance Opportunities

From 2004 to 2015, the private sector channeled $8.2 billion of private capital into investments seeking measurable environmental benefits in addition to financial return.

- Watershed investments
- Compensatory mitigation
- Corporate social responsibility
- Voluntary and regulatory carbon
- Voter initiatives
Performance

Quantifying and communicating the value of resources and impacts of management actions in terms of benefits to people

- National Assessments
- Performance Management
- Inventory Monitoring & Assessment
Performance Reporting

Creating standardized metrics & indicators that enhance national reporting, program management, and encourage third-party investment.
Performance Reporting

Creating standardized metrics & indicators that enhance national reporting, program management, and encourage third-party investment.
Summary of Opportunities

- Ecosystem services **science** can help us analyze trade-offs between management decisions and plan for continued public benefits at the landscape scale.

- Ecosystem services **tools and methodologies** can help us quantify and communicate the impacts of Forest Service management.

- Ecosystem services **concepts** can help us to build partnerships that connect providers and beneficiaries and invite diverse stakeholders to share in our agency’s mission.
## Common Needs

### Table 4—Core opportunities and needs for ecosystem services integration into U.S. Forest Service policy and operations

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Resources and cooperation</th>
<th>Needs</th>
</tr>
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<tbody>
<tr>
<td>Consider ecosystem services approaches as a means to improve the transparency and success of analysis, decisionmaking, and priority setting.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest planning</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Project-level NEPA</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Program area priority setting</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>State forest action plans</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Quantify and communicate in terms of benefit to people through measuring, reporting, and outreach.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National assessments</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Inventory monitoring and assessment</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Performance measurement</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Connecting providers and beneficiaries of environmental benefits and values through investments in ecosystem services.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incentives</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Damage mitigation</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Investment partnerships</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Environmental markets</td>
<td>✓</td>
<td>✓</td>
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*NEPA = National Environmental Policy Act.*
A changing political landscape...

- Tradeoffs, Decision-Making & Regulatory Streamlining
- Conservation Finance & Market-Based Solutions
- Metrics - Quantifying Outcomes
- Economic Valuation & Natural Capital
- Communications & Messaging
National Action Plan – 2017 & Beyond

Facilitate a Community of Practice

• Program/capacity mapping to identify strategically important points of contact

• Develop and refine a compendium of resources and continue monthly webinar series

• Develop internal training materials to foster greater understanding of ES & valuation in decision-making

• Liaise and build upon inter-agency foundation for Natural Capital
National Action Plan - 2017 & Beyond

Strategic Engagement with Leadership
National Action Plan – 2017 & Beyond

Strengthening Agency Communications

- Update to Forest “Benefits” at a Glance
- Communications Framework in coordination with regional plans
- Website redesign
National Action Plan – 2017 & Beyond

Market-Based Solutions

- Mokelumne Avoided Cost Analysis
- Flagstaff Schultz Fire Analysis
- Denver Water Avoided Cost Analysis
- Pure Waters Partners Economic Analysis

The Pay-for-Success Model
Does it make economic sense to increase investment in proactive forest management to reduce the risk of large, damaging wildfires?
National Action Plan – 2017 & Beyond

Market-Based Solutions

- Support pilot projects that enable innovative financing
- Watershed Investment Partnership toolkit

The Pay-for-Success Model
Does it make economic sense to increase investment in proactive forest management to reduce the risk of large, damaging wildfires?
National Action Plan - 2017 & Beyond

Quantifying Impact through Metrics
Welcome to the USDA Ecosystem Services Assessment Portal, a collection of links to guides, databases, online tools, and downloadable software to help users identify, quantify, and value ecosystem services.

<table>
<thead>
<tr>
<th>Title</th>
<th>Description</th>
<th>Sponsorship</th>
<th>Ecosystem Services</th>
<th>Theme</th>
<th>Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>A decision framework for identifying models to estimate ecosystem services gains from restoration</td>
<td>This report describes key characteristics of 13 tools that help to valuate ecosystem services.</td>
<td>Federal</td>
<td>General</td>
<td>General</td>
<td>Guidance</td>
</tr>
<tr>
<td>AGNPS (Agricultural Non-Point Source)</td>
<td>AGNPS is a watershed model developed by the USDA Natural Resources Conservation Service that helps users to calculate changes in water and soil quality, outputting estimates of nitrogen, phosphorus, organic carbon, and several pesticides. In addition, the model calculates water and sediment yield by particle size class and source.</td>
<td>Federal</td>
<td>Provisioning services, Regulating and supporting services</td>
<td>Water, Habitat</td>
<td>Assessment</td>
</tr>
<tr>
<td>AgWa ( Automated Geospatial Watershed Assessment)</td>
<td>AGWA is a GIS-based hydrologic modeling tool that estimates the hydrologic impacts of land-use change at the watershed scale. It is useful for estimating water runoff and erosion estimates.</td>
<td>Federal</td>
<td>Provisioning services, Regulating and supporting services</td>
<td>Water</td>
<td>Assessment</td>
</tr>
<tr>
<td>Air</td>
<td>Air is an application developed by the USFS that helps air resource managers analyze the effects of air pollution to resources managed by the Forest Service.</td>
<td>Federal</td>
<td>Regulating and supporting services</td>
<td>Health</td>
<td>Mapping</td>
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Synthesis and Future Direction for NESST

- Moving from policy issues at national scales to Forest scale application of ecosystem services concepts.
- Need some additional examples of how Forests will be applying ecosystem services (e.g. USFS Planning Rule).
- Applications of ecosystem services at project scales.
- NESST team may be involved in trainings, workshops and webinars to get expertise out to the field.
Example: USFS R5 Ecosystem Services Framework

- **Coordinate Integration** of Forest Benefits
  - Regional Leadership and Program Priority Setting
  - Forest Management Plans and NEPA
  - Coordination with State Initiatives/Programs

- **Quantify and Communicate** the Value of Resources and Impacts of Management Actions in Terms of Benefits to People
  - Standardize Tools for Valuation of Benefits
  - Compile and Complete Connective Data and Narratives
  - Create Communication Tools and Messages

- **Connect Providers and Beneficiaries of Ecosystem Services**
  - Collaborative Frameworks and Authorities
  - Demonstration Projects
  - Outreach Initiatives and Communication Products
Regional Leadership and Program Priority Setting

- **Regional Leadership Goals** to increase agency relevancy by connecting the public to how their lives are made better by benefits received from our National Forests, and to
  - Incentivize citizen-stewardship, volunteerism, and restoration investment

- **ES Steering Committee** formed to provide broad guidance for communications, integration of work, and access to senior-level thinking and strategy.
  - Comprised of RO and NF leadership, meets quarterly
  - Identified initial priority Benefits to focus on – Water, Carbon, Local Economies
  - As leadership solidifies its thinking around its strategy, the R5 Regional Leadership Team from all 18 Forests will likely be asked to provide thoughts on engagement in this effort.

- **Dedicated staff** at RO to advance and coordinate **Ongoing** and New Ecosystem Service Programs
  - 1 full-time RO specialist reporting to Regional Forester team, focusing on coordination of program, communication strategies and products
  - 1 part-time RO specialist in State and Private Forestry focusing on coordination of program, data/analysis coordination and state initiatives

Element #1: **Coordinate Integration**
Standardize Tools for Valuation of Benefits

– **Water Example**:  
  - Quantity from NF: Using mean water supply information (T. Brown 2016)  
    - 34 million acre feet annually from R5 NFs  
      - 50% of CA’s water supply  
      - Enough for entire US population for 115 years!  
    - Have estimated quantity by NF; Valuation ongoing  
    - Tracking various project and research metrics (BFC, SoCal, etc)

– **Carbon Example**:  
  - WO OSC Carbon work  
  - FIA and CA on annual inventories;  
  - Adapting for SoCal Forests;  
  - Project level GGRF calculations

– **Local Economies Example**:  
  - Using At a Glance info as baseline #s
Nature’s Benefits Demonstration Projects

- Coordinate with Ongoing Research Projects
  - Coordination with PSW; University research
  - SoCal Ecosystem Service Project
  - State Meadow Carbon Research

- Tapping into Existing Markets
  - Compensatory Mitigation
  - Voluntary Carbon
  - GGRF (State Carbon Grants)

- Develop and Follow Innovative Upstream/Downstream Finance Mechanisms
  - Exploring private financing - eg: Forest Resilience Bond & Blue Forest Conservation
  - Good Neighbor and Stewardship Agreements
  - Other Regional successes and NESST
Questions and Discussion