Use of Ecosystem Services in Evaluating Biodiversity Offsets and Demonstrating Environmental Sustainability

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Ecological Service Valuation

- **Actions** and decisions that affect habitats/land, etc., can substantially affect ecosystem service values
- **Changes** to these values can be quantified and evaluated
  - Tools developed and utilized primarily in the NRDA arena
  - Natural resource economics approaches
  - Litigation tested methodologies
  - HEA, REA, Benefits Transfer, etc.
Why Formal Quantification is Important?

- **Enables you to:**
  - Document the ecosystem value of a parcel of property;
  - Document the ecosystem cost/benefit of an action;
  - Compare ecosystem benefits/costs between actions (i.e., NEBA); and
  - Select/modify actions that maximize ecosystem benefits

- Subsequently, quantified values provide supporting information for decision-makers and other stakeholders
Ecosystem Service Valuation and Application to Sustainability
### Potential to Rank Actions and Alternatives for Comparison

#### Net Environmental Benefit Analysis Example Table (Measure Net Change in Metric)

<table>
<thead>
<tr>
<th>Action/Alternative</th>
<th>Environment</th>
<th>Social</th>
<th>Economic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Biodiversity/Habitat</td>
<td>Climate Change</td>
<td>Water/Ground water</td>
</tr>
<tr>
<td>ALT 1</td>
<td>Ecological Services (dSAYs)</td>
<td>Ecological Risk Profile</td>
<td>Net GHG Emissions (tons/yr) and Carbon Sequestration (tons/yr)</td>
</tr>
<tr>
<td>ALT 2</td>
<td></td>
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<td>ALT 3</td>
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<td>ALT 4</td>
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Demonstrating Environmental Stewardship and Sustainability
(develop net benefit of actions)

Area B - Services Provided (Ecological Benefit)

Area A - Services Lost (Ecological Loss)

Offsets: How much is enough?

Years

Baseline
Biodiversity Offsets
Trends
Biodiversity Offsets

- **Defined:**
  - Conservation actions intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects, so as to ensure no net loss of biodiversity
    - Voluntary or Non-Voluntary

- Governments and companies are increasingly using biodiversity offsets
United States (US) and in Europe, laws have been enacted to provide for compensation for damage to natural resources.

Generally, two approaches have been used to calculate the amount of required compensation:
- monetary value of the damages; and
- calculating the amount of natural resource restoration needed to compensate for the harm.

Recent European Union (EU) Directives covering environmental compensation state a preference for resource equivalency approaches over monetary valuation.
Laws Requiring Offsets: Examples

- Wetland Banking in the US
- Conservation Banking in the US
- NRDA in the US
- Habitats and Birds Directives and implementing regulations in the EU
- Offsets in Brazil under the Forest Regulation and National System of Conservation Units
- Federal Law for the Protection of Nature and Landscape in Switzerland
- Offsets in Australia
- No net loss of fisheries habitat in Canada under the Fisheries Act
Opportunities Using Offsets

- Demonstrate Environmental Sustainability and Stewardship
- Mitigation and Mitigation Banking (generate revenue)
- Liability Offset
- Potential Tax Benefits
- Enhance planning and project implementation (e.g., EIS, EIA)
- Cost Effective Conservation
- Can increase property values
Biodiversity Offsets

Case Study
Tennessee Case Study

- Comparative land reuse designs
- Over 300 parcels
- Comparing designs as part of the EIS alternative comparison process
  - Economic
  - Conservation
  - Balanced: economic and conservation
- Provide defensible basis for final site reuse design
Tennessee Case Study Results

Exhibit ES-4. Ecological, Recreational, and Real Estate Values Per Acre Per Alternative (32 parcels, using Alternative A as a baseline for comparison)

The exhibit shows a bar chart comparing the percentage differences from Alternative A for ecological, recreational, and real estate values under different alternatives.

- **Baseline Mgmt Plan**: The percentage difference is shown for each category (ecological, recreational, real estate) under this alternative.

- **Economic**: The percentage difference for economic values under this alternative is highlighted.

- **Maximized Alternative (balanced)**: The percentage difference for maximized alternative (balanced) is also shown.

The chart indicates that Alternative B has a significant impact on the ecological values, while Alternative C shows a substantial increase in real estate values compared to Alternative A.
Ecological and human use services were evaluated to develop and maximize benefits to demonstrate that the recommended alternative was environmentally sustainable while managing real estate values.
Alternative Comparisons Using Ecosystem Services

- Land Re-Use Designs (e.g., Brownfield, greenspace designs)
- Remedial Actions
- NEPA Alternatives
- Land Management Actions
- Restoration, Recreational Area Designs (e.g., eco-tourism)
- BioDiversity Offsets
- Any actions that affect natural resource service values (ecological and human use)
Questions