CALCULATING ENVIRONMENTAL BENEFITS

TEACHING ECOSYSTEM RESTORATION PLANNING TO A NEW GENERATION OF PLANNERS

Goals, Performance Metrics, and Habitat Units

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Teaching Ecosystem Restoration Planning to a New Generation of Planners
Goals, Performance Metrics, and Habitat Units...

- Six-step Process...really?
  - Problem Identification
  - Project Objectives
  - Selection of Measures
  - Performance Metrics

- At the Heart of the Matter
- Case Studies 1 – 4
- Conclusions and Recommendations
The Six-step Planning Process

1. identify problems and opportunities
2. inventory and forecast conditions
3. formulate alternatives
4. evaluate alternatives
5. compare alternatives
6. select plan
Examples of Common Issues

A. Defining the Underlying Problem
B. Defining Objectives
C. Selecting Measures
D. Metrics, Models and Alternative Evaluation

Examples of Common Issues

1. Identify problems and opportunities
2. Inventory and forecast conditions
3. Formulate alternatives
4. Evaluate alternatives
5. Compare alternatives
6. Select plan
National Economic Development (NED) vs. National Ecosystem Restoration (NER)

(A) Defining the Underlying Problems

Generally obvious...

Not so obvious...
Both causes and symptoms may not be readily visible.

NED studies have pre-defined monetary outputs and the scale of the problem is generally well known. Ecosystem restoration studies may have neither the problem or the end-state defined.

Examples of Common Issues

- Navigation
- Flood Risk Reduction
- Ecosystem Restoration
(A) Defining the Underlying Problem

Examples of Common Issues
National Economic Development (NED) vs. National Ecosystem Restoration (NER)

(B) Defining Project Objectives

- Reduce NED inefficiencies
- Other objectives ancillary

- Requires a clear understanding of what portions of the problem can be fixed
- Team must avoid consensus by a “kitchen sink” mentality

Examples of Common Issues
Defining Project Objectives

Examples of Common Issues

1. Identify problems and opportunities
   - Problems
   - Root causes understood
   - Opportunities
   - Constraints and risk
   - Project goals - practical? sustainable?

Team consensus
National Economic Development (NED) vs. National Ecosystem Restoration (NER)

(C) Selecting Project Measures

- Teams choose from a suite of common solutions
- Results from application of standard measures are well understood and conceptually predictable

- Potential measures are almost completely unique to each project
- Generally must be identified (and agreed upon!) by the team
- Ways in which a measure potentially affects problems and objectives may be uncertain

Examples of Common Issues
1 identify problems and opportunities
2 inventory and forecast conditions
3 root causes understood
4 opportunities
5 constraints and risk
6 project goals – practical? sustainable?
7 current (existing) relevant to problem
8 identify and approve resource trends conditions
9 identify future year w/o and w/project conditions
10 forecast or justify future without conditions

(C) Selecting Project Measures
Examples of Common Issues
National Economic Development (NED) vs. National Ecosystem Restoration (NER)

(D) Metrics, Models and Alternative Evaluation

- Metrics are defined by doctrine
- Relationship between the metric (dollars) and the problem/objective/measure is intuitive
- Standard models are generally available

NED

NER

- Metrics are defined by the team
- Must have scientific link to the problem, the objective, and the measures
- Must be measurable at the appropriate scale
- Models are almost always project specific and often developed or modified for individual use

Examples of Common Issues

BEACH FX: POTENTIAL DAMAGES BY REACH (present value over 50-year period)
<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Identify problems and opportunities</td>
<td><img src="image1.jpg" alt="Image of a bird and a bird's nest" /></td>
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<tr>
<td>2</td>
<td>Inventory and forecast conditions</td>
<td><img src="image2.jpg" alt="Image of a bird" /></td>
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<tr>
<td>3</td>
<td>Formulate alternatives</td>
<td><img src="image3.jpg" alt="Image of a bird" /></td>
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<tr>
<td>4</td>
<td>Evaluate alternatives</td>
<td><img src="image4.jpg" alt="Image of a bird" /></td>
</tr>
</tbody>
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Examples of Common Issues:

- **Identify problems and opportunities:**
  - Current (existing) resource trends
  - Identify future year w/o and w/project conditions

- **Inventory and forecast conditions:**
  - Identify and approve methods or models to forecast project outputs
  - Forecast or justify future without conditions

- **Formulate alternatives:**
  - Metrics (note: not $) unique to NER & ER studies
  - Measures formulated
  - Objectives - measurable and specific
  - Management measures (scale, duration, sustainability)
  - Combine management measures into alternatives
  - Develop rough order of magnitude costs

- **Evaluate alternatives:**
  - Publicly and politically acceptable?
  - Regulatory and compliance with laws and regulations?
  - Complete? Appropriate? Scale?
  - Efficient? Fix the problem? Provide practical engineering solution?
  - Outputs (metrics) significantly above the future without project condition (no action)?

(D) Metrics, Models, and Alternative Evaluation

Examples of Common Issues
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"PLANNING LAND"
At the Heart of the Matter....

- Ecosystem Restoration planning is inherently more complex than traditional NED planning.
- There are many more than six steps involved in linking performance measures and metrics back to the problem and forward to the benefits.
- Strong team leadership is needed to avoid dangerous detours and dead-end side trips.

Examples of Common Issues
CASE STUDY 1: LAKE JESUP

INCORRECT PROBLEM STATEMENT

Government Cut is causing sedimentation and the channel should be removed *versus* there is a sedimentation problem; we need to investigate and address causes.

Actual Problem: Eutrophication (upstream nutrient flow)

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Objectives NOT linked to original problem:

- Regional water supply objective adding NED to the mix
- Lake Worth Lagoon restoration objectives: an estuary geographically unrelated (and of a small scale with reduced benefits)

CASE STUDY 2: LOXAHATCHEE RIVER RESTORATION
MULTIPLE UNRELATED OBJECTIVES

PROBLEM: A loss of freshwater inflows from inland sources causing intrusion of brackish water up-river and loss of cypress forest stands
GOALS VERSUS MEASURES

“The Means Became the End”

PROJECT GOAL: Enable sheetflow from WCA 3A North to WCA 3A South, keeping flow in marsh NOT to backfill Miami Canal - management measure

CASE STUDY 3: DECOMP

Modeling indicated partial fill of Miami Canal sufficient to hydrate WCA 3A south
CASE STUDY 4: C-111 SPREADER CANAL
ALTERNATIVE EVALUATION AND METRICS

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Measuring Project Impacts:
Taylor Slough Hydration (more scale appropriate to project) versus Salinity Levels in Florida Bay

Taylor Slough and C-111 toward the end of the natural and built system

Atlantic Ocean

FLORIDA BAY

TAYLOR SLOUGH

EVERGLADES NATIONAL PARK

C-111

CERP
The Six-step Planning Process

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“Planning Land”

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Conclusions and Recommendations

Winning the Game

Macro-view
- Detailed audit by experienced planner “early in the game.”
  Is the team asking the right questions? What are the risks?
- Long-term recording strategy to document team decisions
- Facilitation training
- Training/mentoring by senior planners
- Communication with maps, graphics, diagrams, etc.

Micro-view
- Goals and objectives linked to problems and opportunities
- Objectives measurable at a scalar level
- Sizing and combining of management measures into alternatives should be based on a clear understanding of the ecosystem function
- Performance metrics sensitive to the study scale and model capability