The Criticisms and revisions to the U.S. Army Corps of Engineers principles and guidelines for benefit-cost analysis (Part 2)

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Overview

PART 2

4. How might benefit-cost analysis be improved in Principles and Guidelines?

5. What are special considerations for flood projects?

6. How were Principles and Guidelines applied to the Upper Mississippi Comprehensive Plan?
Criticisms and Revisions to the P&G

• Major criticisms from:
  - National Research Council
  - EPA
  - The Corps

• Revisions from:
  - Agency regulation
  - Federal legislation

• The Corps is reviewing P&G
Principle Criticisms

- National vs. Regional Accounting
- Planning Areas
- Environmental Quality (monetary vs. non-monetary)
- Public Safety
- Uncertainty and Risk
National vs. Regional Accounts

**Major Criticisms:**
- NED is heavily weighted relative to other accounts
- Who should pay?
- Other Social Effects (OSE) not considered in NED

**Options:**
- Cost sharing
- Require other accounts (RED, EQ, OSE) in reporting
- Use BCA methods to account for distributional effects in NED
Planning Area

How the planning area is defined and managed by planners affects the benefit-cost analysis.

**Major Criticisms:**

- Project area versus affected area
- Local vs. regional definitions of affected area differ

**Options:**

- Upstream-downstream analysis
## Environmental Quality

Environmental effects and ecosystem services are difficult to quantify or value in benefit-cost analysis.

### Major Criticisms:

- No strong guidance on how to quantify and monetize environmental effects
- Difficult to make comparisons between accounts and within EQ account

### Options:

- Use newer methods for quantifying and monetizing environmental effects
- Require EQ analysis
Public Safety

Major Criticisms:

• Health and safety reporting is currently not required in the Principles and Guidelines

Options:

• Include non-monetized health and safety effects in required accounts

• Use methods of BCA (i.e. Value of a Statistical Life) to monetize health and safety risks

Figure from O’Conner and Costa (2004)
Uncertainty and Risk

Analysis can provide benefit-cost information as probabilities and better account for risk.

Major Criticisms:

• Analysis focuses on point estimates

Options:

• Use probability distributions (i.e. Monte Carlo)
• Consider output pricing
• Use distributions of risk
5. What are special considerations for flood projects?
Define and Include Risk

“Let no one believe that because you are behind a levee, you are safe”
--Brig. Gen. Gerald Galloway

Risk: potential outcomes that can be described in reasonably well-known probability distribution.

Figure from Corps at http://www.asce.org/files/pdf/erp.pdf
Nonstructural Alternatives

The Corps could include a plan which primarily employs nonstructural alternatives.

Examples:

• Flood forecasting
• Awareness raising
• Recovery plans
• Zoning and relocation
Development Behind Levees

Remove subsidies and incentives to build in risky areas.
6. How were the P&G applied to the Upper Mississippi River Comprehensive Plan?
Case Study: Upper Mississippi

- Upper Mississippi River Comprehensive Plan (UMRCP)
- WRDA of 1999 authorized UMRCP
- Fourteen alternative plans that include: no action, non-structural, structural alternatives, and low benefit-cost ratio (0.03 – 0.07)
- Reconnaissance study
Planning Area
In the Upper Mississippi Case Study

• Upstream and downstream effects in individual plans

• Plan A, D and G – Impacts on Lower Mississippi

• Formulation of Plan M after public hearings – typical example of upstream – downstream conflict
Environmental Quality

In the Upper Mississippi Case Study

• The EQ account is not required; the Corps only conducted a preliminary assessment.

• Mix of monetized and non-monetized values in account but nothing indicating if and how they were compared or combined.

• Monetized values not moved to the NED account as required by the P&G.

• Other environmental impacts discussed but not quantified or included in EQ account.
Flood-Specific Considerations
In the Upper Mississippi Case Study

- Risk Analysis with the Risk Informed Decision Framework (RIDF)
- Nonstructural alternatives in UMRCP alternative plans:
  - Relocations
  - Buyouts
  - Urban floodplain development restrictions
1. What is the current benefit-cost analysis practice within the Corps?

2. What criticisms and suggestions exist to modify current benefit-cost analysis practices?

3. How was benefit-cost analysis used in the case study of the Upper Mississippi Comprehensive Plan?
Findings

General considerations:

- **National vs. Regional Accounting**
  Include costs and benefits in proper accounts

- **Planning Areas**
  Select appropriate spatial bounds

- **Environmental Quality**
  Include ecosystem services and other non-monetary benefits appropriately

- **Public Safety**
  Account for public safety

- **Uncertainty and Risk**
  Communicate the range in risks
Findings

Flood specific considerations:

Non-structural Alternatives
Give full consideration to all potential solutions (structural and nonstructural)

Treatment of Risk
Incorporate risk into the decision-making framework

Development Behind Levees
Discourage development in places that are risky
Highlights

• Great opportunity to update science and economics of BCA

• Upper Mississippi provides examples for innovative methods

• Future research questions:
  - How should BCA process be evaluated?
  - How should climate change be included?
  - When is BCA the appropriate tool?
Thank you!

Questions?
Additional items
(possible references for questions & answer)
# P&S and P&G Accounts

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<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>National Economic Development</td>
<td><strong>Required</strong>&lt;br&gt;Economic value of the national output of goods and services</td>
<td>Monetary</td>
<td><strong>Required</strong>&lt;br&gt;Economic value of the national output of goods and services</td>
<td>Monetary</td>
</tr>
<tr>
<td>Environmental Quality</td>
<td><strong>Required</strong>&lt;br&gt;Natural and historical resources, ecological systems, and irreversible commitments to future uses</td>
<td>Monetary and/or Non-monetary units</td>
<td>Ecological, cultural, and aesthetic effects on natural and cultural resources</td>
<td>Non-monetary units</td>
</tr>
<tr>
<td>Regional Economic Development</td>
<td>Regional employment, population distribution, economic stability, and environment</td>
<td>Monetary</td>
<td>Regional economic activity, income transfers, and employment effects</td>
<td>Monetary</td>
</tr>
<tr>
<td>Other Social Effects/ Social Well-being</td>
<td>Real income distribution, life, health, safety, education, culture, recreation, and emergency preparedness</td>
<td>Monetary and/or Non-monetary units</td>
<td>Urban and community impacts, effects on life, health and safety, and relevant effects not reflected in other accounts</td>
<td>Monetary and/or Non-monetary units</td>
</tr>
</tbody>
</table>
NED and RED can be of different signs and different magnitudes for the same project. Four possible combinations of circumstances of Regional Economic Efficiency and National Economic Efficiency:

<table>
<thead>
<tr>
<th>Possible Combination of Regional and National Economic Capacity</th>
<th>Regional Economy</th>
<th>National Economy</th>
<th>Treatment of RED vs. NED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Below Capacity</td>
<td>Below Capacity</td>
<td>Conducting a Corps project in the region may preclude conducting a project in some other region of the nation that results in higher returns. Therefore a Corps project may have positive RED and negative NED effects. It is possible that the RED would be positive and the NED would be positive but smaller.</td>
</tr>
<tr>
<td></td>
<td>Below Capacity</td>
<td>Near Capacity</td>
<td>Conducting a Corps project will draw economic resources from other regions to meet the increased demand in the region with the Corps project. Therefore, in an extreme case the RED may be 0 and the NED positive.</td>
</tr>
<tr>
<td></td>
<td>Near Capacity</td>
<td>Below Capacity</td>
<td>Conducting a Corps project will draw resources from within the region and possibly from surrounding regions. RED may be either positive, while NED is either negative or smaller than RED.</td>
</tr>
<tr>
<td></td>
<td>Near Capacity</td>
<td>Near Capacity</td>
<td></td>
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</tbody>
</table>
**Time Line**

**Aug 2002** – Collaboration Team formed to work with Corps Product Development Team (PDT)

**Sep 2002 & Jun 2006** – four public meetings hosted by Rock Island and St. Louis Districts

**2004** – Evaluation of RED benefits completed

**Early 2005** – UMRCP draft report issued to public

**Aug-Sep 2005** – Hurricanes Katrina and Rita

**Fall 2006-Spring 2008** – public input led the PDT to develop Plan M

Figure from UMRCP website:  [http://www2.mvr.usace.army.mil/UMRCP/](http://www2.mvr.usace.army.mil/UMRCP/)
The Corps is not required to evaluate the impacts of projects. The information from these projects would improve future planning processes.