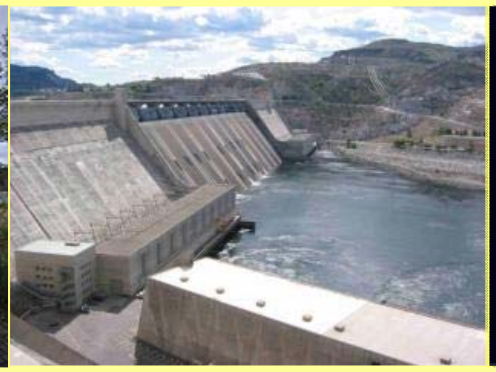
# The Criticisms and revisions to the U.S. Army Corps of Engineers principles and guidelines for benefit-cost analysis (Part 2)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# Overview

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

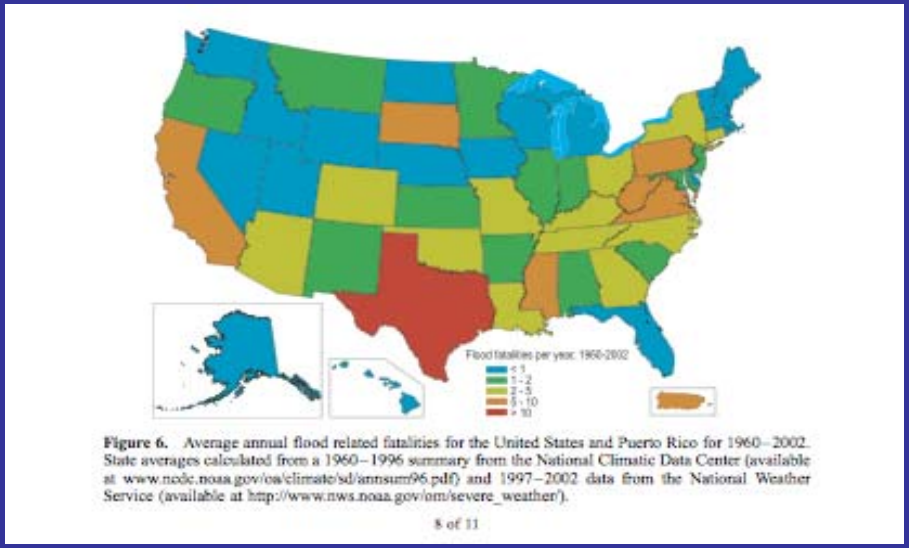


**Figure 6.** Average annual flood related fatalities for the United States and Puerto Rico for 1960–2002. State averages calculated from a 1960–1996 summary from the National Climatic Data Center (available at www.ncdc.noaa.gov/oa/climate/sd/annsum96.pdf) and 1997–2002 data from the National Weather Service (available at http://www.nws.noaa.gov/om/severe_weather).

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*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.

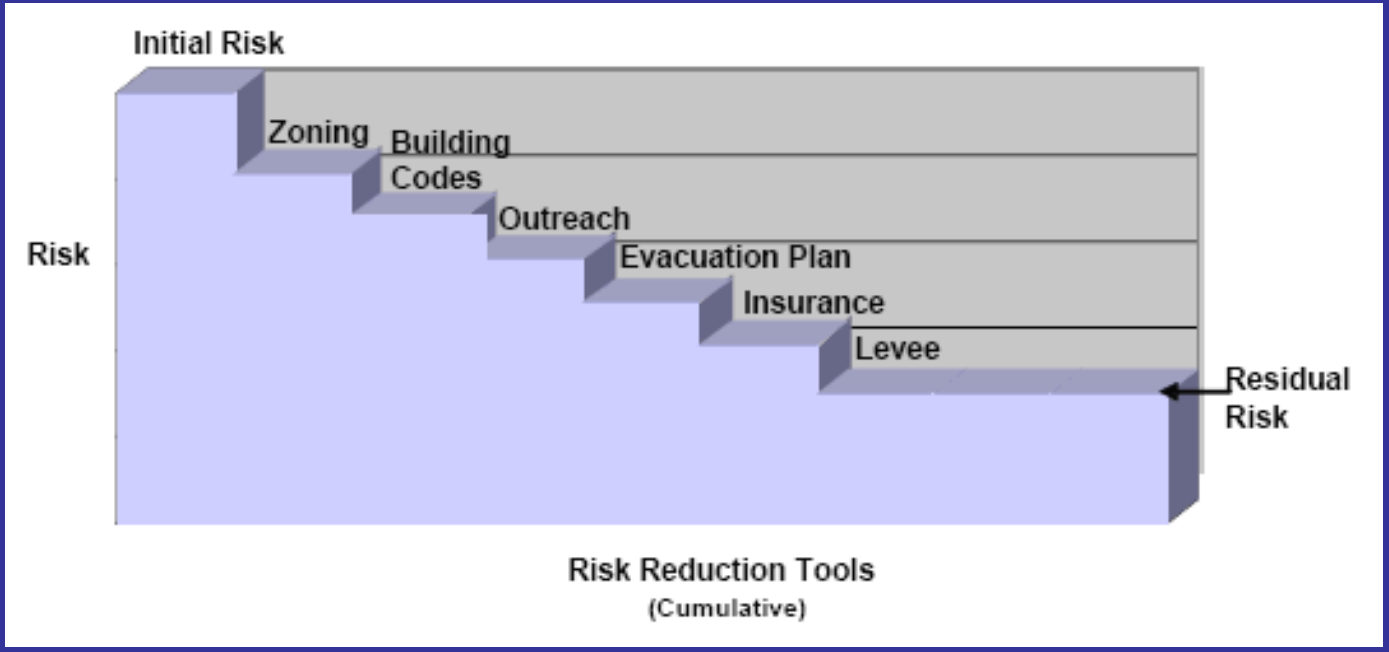



*Figure from Corps at http://www.asce.org/files/pdf/erp.pdf*

# 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 conduced 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

# Project Scope Revisited

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

**Public Safety**

Account for public safety

**Environmental Quality**

Include ecosystem services and other non-monetary benefits appropriately

**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

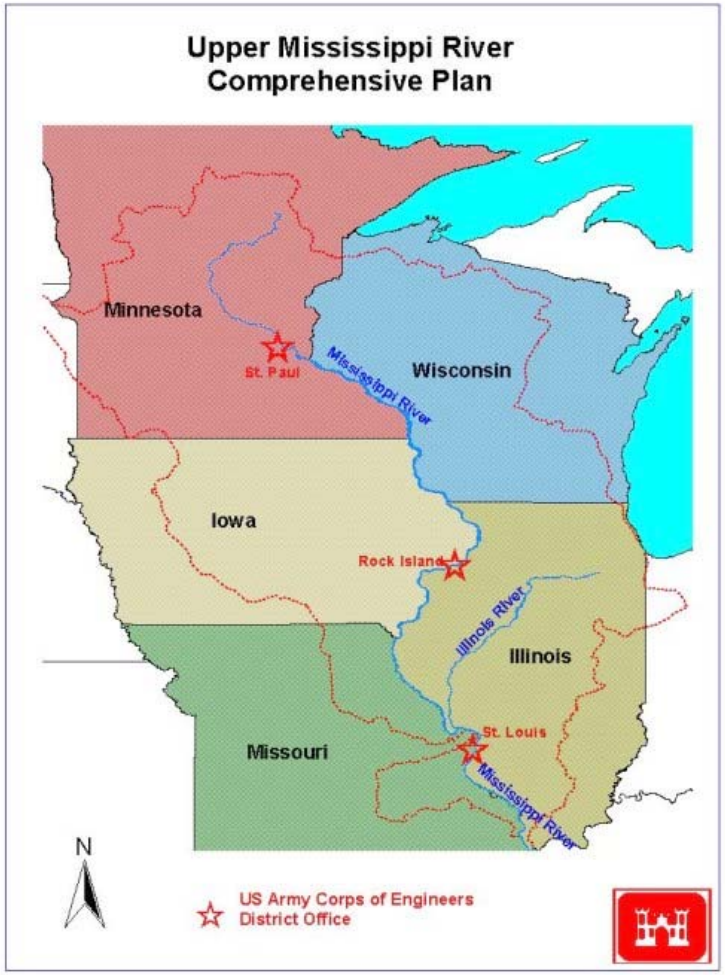
| Account | P&S (1974) | Metric | P&G (1983) | Metric |
|---|---|---|---|---|
| **National Economic Development** | **Required** Economic value of the national output of goods and services | Monetary | **Required** Economic value of the national output of goods and services | Monetary |
| **Environmental Quality** | **Required** Natural and historical resources, ecological systems, and irreversible commitments to future uses | Monetary and/or Non-monetary units | Ecological, cultural, and aesthetic effects on natural and cultural resources | Non-monetary units |
| **Regional Economic Development** | Regional employment, population distribution, economic stability, and environment | Monetary | Regional economic activity, income transfers, and employment effects | Monetary |
| **Other Social Effects/ Social Well-being** | Real income distribution, life, health, safety, education, culture, recreation, and emergency preparedness | Monetary and/or Non-monetary units | Urban and community impacts, effects on life, health and safety, and relevant effects not reflected in other accounts | Monetary and/or Non-monetary units |

# National vs. Regional Accounts

**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:**

| Possible Combination of Regional and National Economic Capacity | | | | |
|---|---|---|---|---|
| **Regional Economy** | Below Capacity | Below Capacity | Near Capacity | Near Capacity |
| **National Economy** | Below Capacity | Near Capacity | Below Capacity | Near Capacity |
| **Treatment of RED vs. NED** | 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. | Unlikely by definition | 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. | 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. |

# UMRCP




## 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/

# Project Evaluation

The Corps is not required to evaluate the impacts of projects. The information from these projects would improve future planning processes.