Measuring the Economic Benefits of Water Quality Improvement with the Benefit Transfer Method: An Introduction for Non-Economists

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Outline

- Rationale
- Theory
- Methods
- Case Study
- Conclusions

Benefit-Cost Analysis (BCA)

- BCA is a tool for defining and attaining optimally managed environmental and natural resources.
- “Optimal” is where NB = B – C are maximized.
- “Zero” water pollution is unrealistic and inefficient.

Benefits: Theory

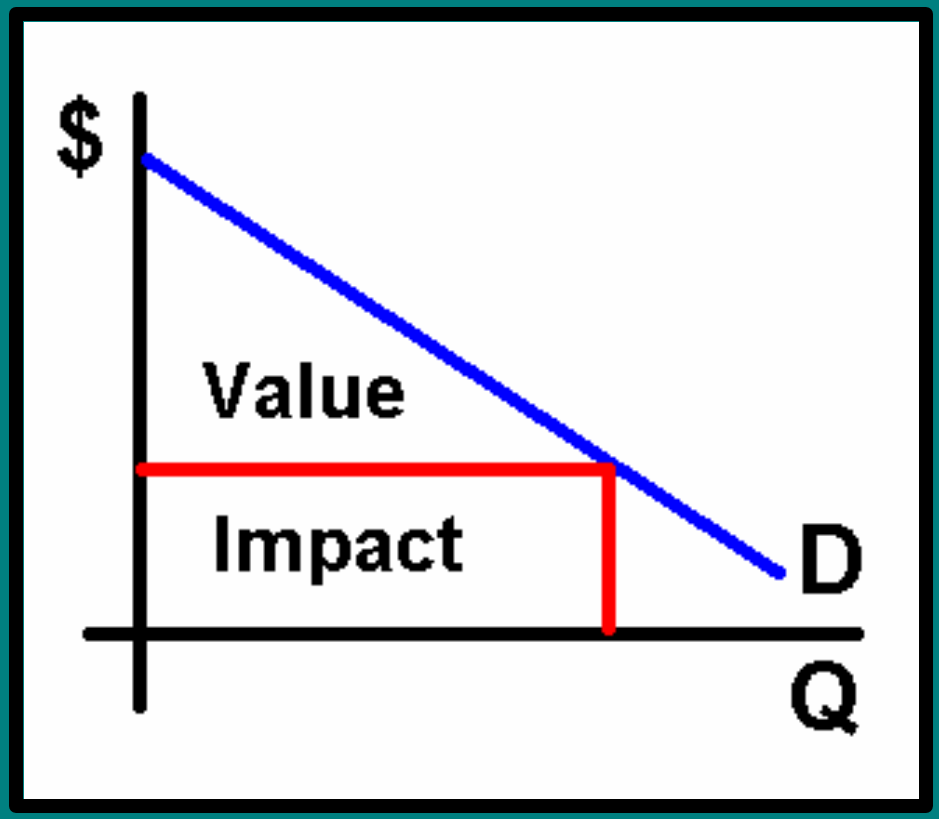
- Economic benefits are:

  (1) the dollar value of the satisfaction obtained from the use of a good or service.

  (2) the (greatest) amount of income an individual would be willing (and able) to give up in order to consume the good.

Benefits are not Impacts

- Benefits (i.e., value) are not measured by what you actually have to pay for a good ("cost" or "price"), but rather by what you would be willing to pay for a good.



Benefits: Theory

- Economic value extends to goods that are not traded in the market place.
- People are willing to give up time or other resources (including money) for the opportunity to consume “non-market” goods and services.

Use and Nonuse Values

- *Use value* consists of the tangible components of the good.
- *Nonuse value* pertains to the intangible or indirect uses of a good.
- TV = UV + NUV

Benefits Estimation: Methods

- Two categories of techniques that economists use to quantify the value society places on water resources:

  (1) Stated preference methods

  (2) Revealed preference methods

Stated Preference Methods

- Contingent Valuation
- Contingent Behavior
- Conjoint Analysis

- Are used to measure use and nonuse values
- Extremely flexible
- Are criticized for “hypothetical bias”

Contingent Valuation

- The CVM is a survey technique based on the idea that people's willingness to pay can be determined by asking them directly in the context of hypothetical situations.

Revealed Preference Methods

- Travel Cost Method
- Hedonic Price Method

- Are used to measure use values
- Difficult to assess policies that are beyond historical experience

Travel Cost Method

- The “price” of a recreation trip is the transportation and time costs.
- The number of trips is inversely related to the implicit price (i.e., distance).

Hedonic Price Method

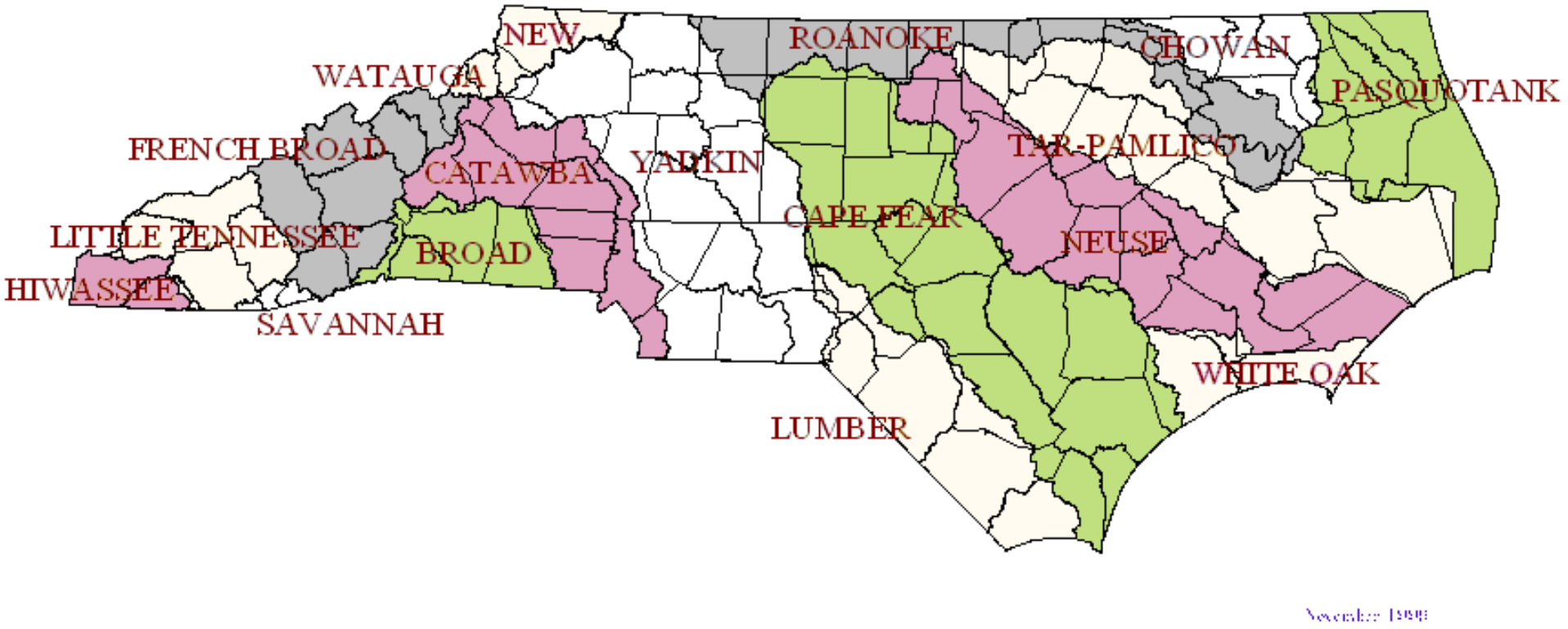
- Amenity values are capitalized in housing and labor costs.
- Housing prices are higher in “nice” places.
- Wages are lower in “nice” places.

Benefit Transfer

- Uses benefit estimates borrowed from other studies combined with other estimates to construct aggregate benefit and cost estimates.
- A useful approach for policy analysis when there is not enough time or money to conduct primary data collection or analysis of secondary data.

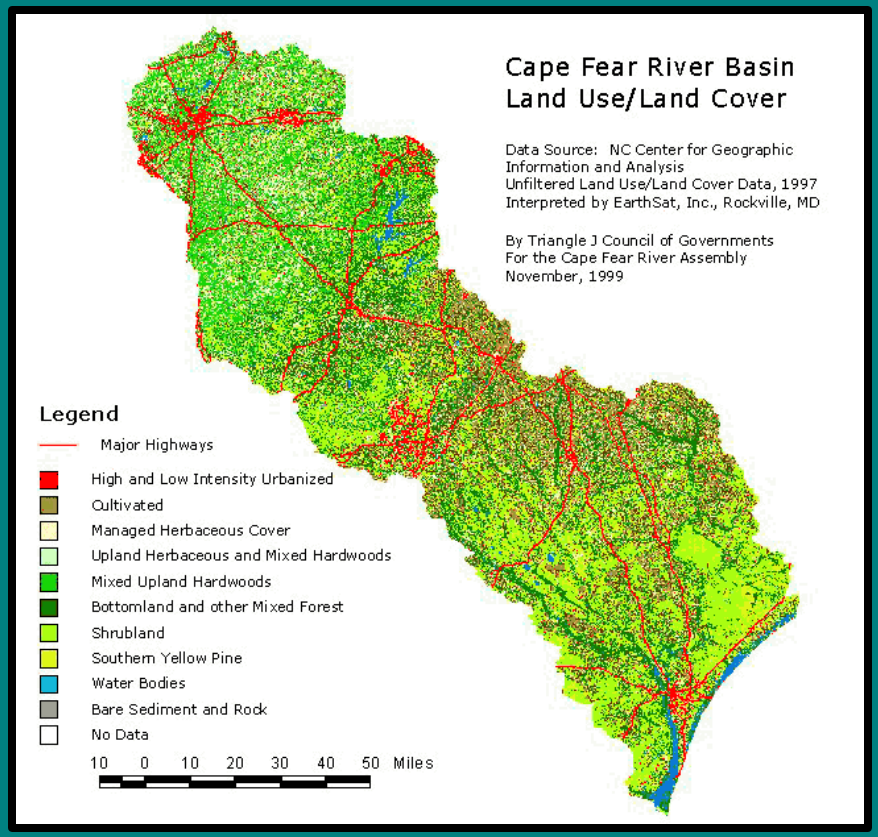
Case Study: Cape Fear River, Wilmington, NC

North Carolina's River Basins



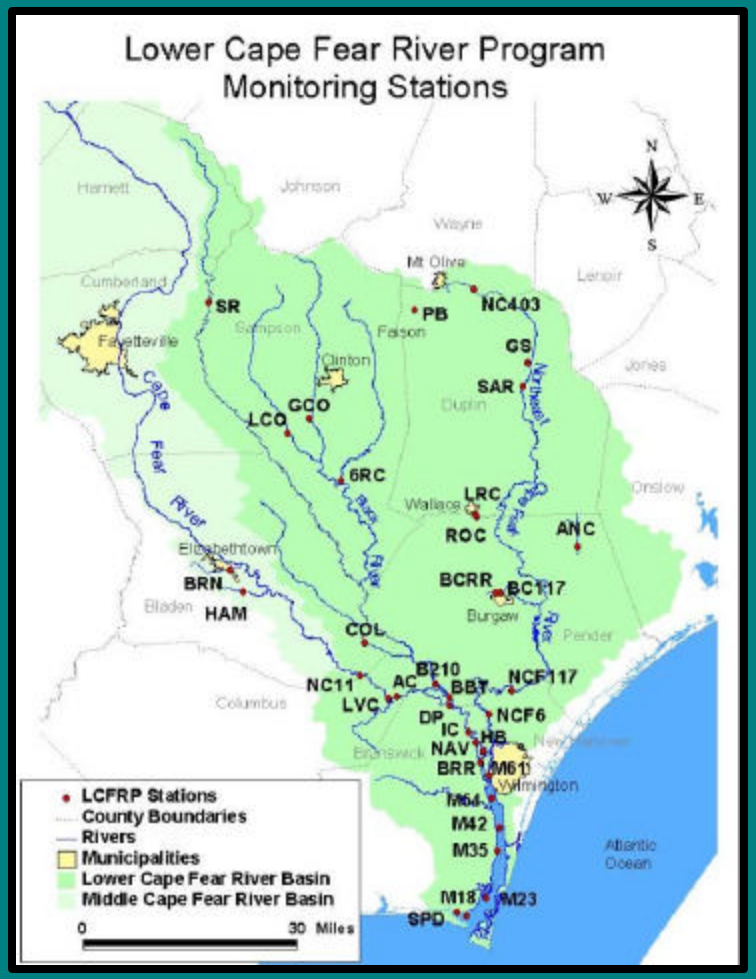
Cape Fear River Overview

- State's largest river basin
- Forested land > 50%
- Developed land increased by 42% from 1982-1992
- Contains 54% of state's swine operations



Cape Fear River Water Quality

- 20% of the monitored waters are rated as “impaired”
- Most of the impaired stream miles are located near urbanized areas



Benefit Transfer

- Contingent Valuation Method
- Travel Cost Method
- Hedonic Price Method

- Apply these methods to estimate the value of avoiding water quality degradation in the lower Cape Fear River (Wilmington, New Hanover County)

Contingent Valuation Method

- Study site: Catawba River (NC) (Kramer and Eisen-Hecht (WRR, 2002)
- WTP = $139/household/annually for five years to avoid water quality degradation in the entire river basin
- New Hanover County Population = 70,000 households
- Total Annual WTP for five years = $9.7 million

Travel Cost Method

- State level random utility model (Phanuef, WRR, 2002)
- Per trip WTP = $2.25
- Freshwater angling days in New Hanover County = 24,146 (NSFHWAR)
- Total annual WTP for basin wide water quality improvements = $54,328

Hedonic Price Method

Present Value of WTP (millions, r=5%)

CVM	TCM	HPM
$44	$1.09	

Conclusions

- Economics can be used to analyze the efficiency of water quality policy.
- Several benefit estimation methods are available.
- Benefit transfer is often used as a cost-effective tool.
- Pay attention to choice of method and definition of benefits.
- Future research …

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