



Economic Benefits of Protecting Water Resources

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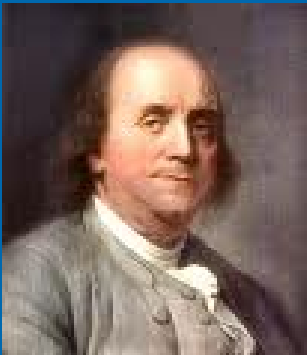
Adams County “State of the Waters”
Conference
May 13, 2010

Outline

- Motivating Water Resources Protection
- Economics Ideas for Valuing & Managing Water
- Benefits of Protecting Water Resources
- Factors Affecting the Value of Water
- Groundwater Uses & Valuation
- Benefits “Transfer” Example for Nutrient removal for the Chesapeake Bay
- Conclusions

Motivating Water Resource Protection

“When the well’s dry,
we know the worth of
water”



- Benjamin Franklin,
Poor Richard's Almanack



Motivating Water Resource Protection

“[Water] is the most widely used resource by industry; it is used both directly and indirectly to produce energy; it provides the basis for much of our outdoor recreation; it is an important part of our transportation network; it serves as a vehicle for disposing of wastes; and it provides important cultural and amenity values. The quality of life, as well as life itself, depends on an adequate supply of fresh water.”

- Kenneth Frederick, *Resources for the Future*

Motivating Water Resource Protection

- Water provides important functions, services & values to individuals & society
- Decision-makers need credible and accurate information about the impacts of human actions on water resources
- Information about impacts does not have to be in economic (\$) terms
 - But impacts expressed in \$ (benefits or costs) often have more influence in decisions

Key Ideas from Economics Concerning Valuing & Managing Water

- Managing water: *Opportunity cost*
 - Every decision has an cost in terms of the opportunity forgone (i.e. there's no such thing as a free lunch)
- Benefits of Protected Water = *Avoided Costs*
- Types of Values
 - Intrinsic Values
 - Market Values = f (supply & demand)
- The “diamond – water paradox”

Benefits Provided By Clean Water

Benefit	Impact
Healthier Consumers	Reduced medical costs Improved work attendance
Increased Recreational Use	Increased tourism expenditures More recreation opportunities
Aesthetics	Higher property values More recreational use
Increased wildlife habitat	Sustainable ecosystems Productivity of fisheries
Nutrient removal	Reduced water treatment costs Reduced monitoring & oversight
Enhanced Community Supply	Less susceptibility to droughts & floods Greater customer satisfaction

Source: Adapted from National Water Resource Institute, 1999

Factors Affecting the Value of Water

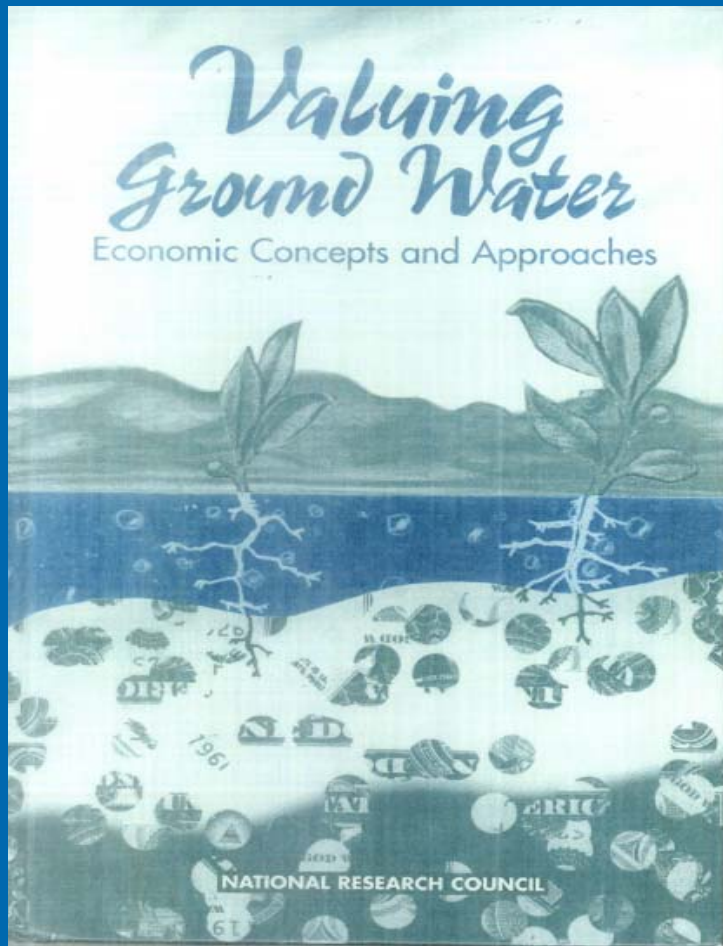
- Scarcity
- Quality
- Use
- Location & Timing
- Intrinsic Value

Water Protection Benefits & Costs

Surface water vs. Groundwater

- Groundwater issues tend to be more localized & more uncertain (tying cause to effect can be difficult, lags, etc)
- Groundwater impacts stay with the local area longer because groundwater moves more slowly
- Are some groundwater impacts Irreversible?

National Research Council's Study of Groundwater Values



National Academy of Sciences, 1997

Groundwater

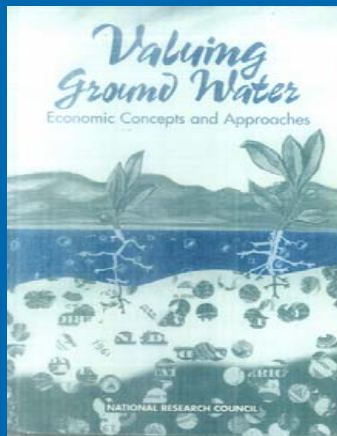
Uses/Services as they Affect Value

➤ Extractive uses

- Municipal
- Agricultural
- Industrial

➤ *In situ* uses

- Buffer value
- Waste assimilation
- Subsidence avoidance
- Salt water intrusion avoidance
- Ecological Services



Economic Approaches for Valuing Water Services

- Direct - Survey citizens to estimate Willingness to Pay for or Willingness to Accept changes in water quality or quantity
- Indirect - Observe market trades or human behaviors
 - Derived demand
 - Cost of Illness
 - Defensive behavior (bottled water, etc)
 - Property values
- All methods have Challenges & Limits
- Another approach: “Benefits Transfer”

Benefits Transfer Example

Chesapeake Bay Nutrient Reduction

➤ Types of Benefits

- Recreation
- Commercial fishing
- Health
- Property values
- Regional Economic Impacts

➤ Overall estimate of benefits of nutrient reduction plan was \$360 to \$1,800 million (1996 dollars)

- Much uncertainty and many impacts not well considered
- Net benefits concluded to be positive

Source: Morgan and Owens, 2001.

Conclusions: Need to Motivate Water Resource Protection

- Water provides important functions, services & values to individuals & society
- Decision-makers need credible and accurate information about the impacts of human actions on water resources
- Information about impacts does not have to be in economic (\$) terms
 - But impacts expressed in \$ (benefits or costs) often have more influence in decisions

Benefits of Protecting Water Resources

“An ounce of prevention is worth a pound of cure.”



- Benjamin Franklin,
Poor Richard's Almanack

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U.S. exempted BP rig from environmental study

Government oversight was 'little more than rubber-stamping,' expert says



The Deepwater Horizon oil rig is seen in flames on April 28, as crews try to put out the blaze.

Additional Resources

GROUNDWATER & PUBLIC POLICY SERIES 4

COOPERATIVE EXTENSION • SOIL AND WATER CONSERVATION SOCIETY • FRESHWATER FOUNDATION

THE COSTS OF GROUNDWATER CONTAMINATION

Determining the true cost of a groundwater contamination incident requires assessment of the value of the groundwater resource in question. A clear understanding of these value sources and resulting contamination cost estimates suggests important implications for researchers and policymakers.



by
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Washington, D.C.
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Bawler RCB/
Hagler, Bailly, Inc.
Boulder, Colorado

OPPORTUNITY COST:

WHAT IT IS AND HOW IT IS DETERMINED

Resources are valued primarily for the services that they provide. For example, water can be used for irrigating cropland, washing clothes and drinking. The amount people are willing to pay for clean water depends on the nature of those uses and the availability of substitute resources that could provide the same services. Also, resources not being used currently may have value to people who expect to use them in the future or who wish to ensure that they are available for others to use. Finally, there may be those willing to pay for preservation of rare resources merely to ensure their continued existence, regardless of plans for actual use. Using this reasoning, economists refer to the sources of value for a resource as use, option, and existence or bequest values.

If a valuable resource is damaged or lost, then the cost of that event can be determined by examining the change in the services available from the resource. In response to the loss or damage, the services can be restored by the least-expensive alternative methods or the services can be foregone. The extra cost of the least-expensive response option represents the cost of the adverse event.

In this context, the words use and service include indirect effects as well as direct services provided by the affected resource. For example, groundwater may serve as a drinking water supply and as a recharge source for a wetland. Since the wetland provides services such as recreation, wildlife habitat, spawning grounds and lower-level food chain functions, it has value in addition to the value of drinking water. The extra cost of restoring these functions or loss of those functions is part of the "cost" of groundwater contamination.

In theory, these principles are straightforward to apply. For any contamination incident, the first

The amount people are willing to pay for clean water depends on the nature of these uses and the availability of substitute resources that could provide the same services.

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Valuing Pennsylvania's Water Resources



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