

# HOW VALUABLE IS VALUATION? ISSUE OVERVIEW

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This issue of *Water Resources Updates* is devoted to the question: Can we and should we assign economic value to natural resources and the environment? This question has faced water professionals since at least 1936, when the Flood Control Act first required benefit-cost analysis (BCA) of proposed federal water projects. The idea then was to make sure that public funds were spent wisely, with benefits exceeding costs. But BCA requires an accounting of *all* impacts of a proposed project, not just those covered in normal financial account, especially impacts on natural resources and the environment. The need to supplement the financial accounts set in motion a search for methods of nonmarket value measurement. This search has been in full pursuit for more than 30 years. In the meantime, environmental quality and ecological integrity have assumed added prominence in public policies toward water.<sup>1</sup> Economic valuation has been used to help set environmental quality goals and to determine the damages caused by polluters. With wider use, the practice of valuation is no longer carried out only in the lofty realms of project planning and evaluation. Today, it is fully engaged on the battlefields of high-stakes litigation.

There is ongoing controversy about attempts to place dollar values on the environment. Economists themselves have mixed views about valuation methods, since the most useful empirical methods are those that take the greatest liberties with the requirements of economic theory. The 1989 Exxon Valdez oil spill off the coast of Alaska, with huge liability at stake, elicited a frenzy of criticism and defensiveness within the profession (e.g., Hanemann, 1994; Diamond and Hausman, 1994). Commercial groups, such as mining, timbering, and transportation interests, attack nonmarket valuation methods hoping to undercut their use in setting monetary compensation for environmental and natural resource damages. At the other end of the spectrum, environmentalists push the valuation methods to extremes, seeking to include the value of nearly anything and everything in defense of the environment. A much-publicized 1997 study by a group of “ecological economists” (mainly ecologists) audaciously derived an economic value for the entire Earth ecosystem (Costanza *et al.*, 1997)!

In view of the controversy, a bit of sober reflection is warranted. Just what are these methods, what are their limitations, how are they being used, and do we really need them?

## POLICY CONTEXT OF VALUATION

The first three papers in this issue lay out the policy context for nonmarket valuation. John Loomis of Colorado State University is an experienced valuation practitioner. His article describes the role economic valuation studies have played in a number of major water resource debates, including water adjudications, ecosystem restoration, instream flow regulations, and fishery restoration. He focuses mainly on water resource problems under the jurisdiction of the Department of Interior. Loomis emphasizes the broad role of valuation in adding discipline and rigor to the evaluation of projects and policies. Furthermore, he argues that valuation reinforces democratic values by accounting for the economic effects on all citizens, counterbalancing the influence of monied special interests.

The author of the second paper, Carol Adair Jones, has witnessed the evolution of nonmarket valuation from a different vantage point--that of an agency official charged with creating and enforcing administrative regulations, specifically regulations promulgated by the Department of Commerce for marine resources. Her paper is a detailed exploration of the interaction between legal standards and nonmarket valuation methods. Since those methods are statistical in nature, they challenge legal principles of evidence and proof. Jones argues that case law has reaffirmed the principle that nonmarket values should be included in natural resource damage actions and, furthermore, that existing methods of valuation produce information that is certainly worthy of consideration in court.

Leonard Shabman of Virginia Tech, the author of the third paper, provides an incisive history of the role of valuation in U.S. flood control programs. Shabman traces the use of different valuation premises over time. The two competing premises are damages avoided and willingness to pay (WTP) for flood mitigation. The latter

measures what landowners would gain from flood protection while the former measures what they would lose without it. Economists generally believe on theoretical grounds that WTP is the preferred approach. In nonflood applications, empirical studies have shown that measured values can be much higher (and are theoretically unlimited) when people are giving up benefits than when they are paying to receive them (Hanemann, 1991; Bishop and Heberlein, 1979). Shabman argues that the more generous damages avoided approach was used during the Great Depression-inspired big water project era from 1936 through the 1960s. By the early 1970s, according to Shabman, the government had grown weary of ever bigger water projects. Not coincidentally, in 1972, the U.S. Water Resources Council established the more conservative WTP criterion as proper protocol and the era of big water projects rapidly ended. More recently, a very different type of water project has gained favor--removing projects previously constructed, such as dams, levees, and structures in the floodplain. Shabman argues that the Federal Emergency Management Agency has used the damages avoided approach to justify these projects while the federal construction agencies continue to use WTP, which does not favor these projects as strongly. Shabman concludes that the choice of valuation premise has more to do with political agendas than with theoretical correctness.

The perspectives offered by Loomis, Jones, and Shabman are invaluable. Together, they make a convincing case that academic arguments about valuation methods are often overshadowed by the political context within which valuation is used.

## VALUATION METHODS

The next three papers in this issue explore the uses of specific valuation methods. Before summarizing their contributions, a brief introduction to the methods they discuss is in order.

There are two classes of nonmarket valuation methods. One involves the analysis of actual behavior; the other involves the investigation of potential behavior.

The terms *revealed preference* and *indirect methods* are used to describe the first class of methods. Revealed preference techniques are based on the actual expenditures of real consumers. These techniques include: 1) hedonic analysis where, for example, housing prices are statistically analyzed to determine what value people attach to noisiness or dirty air in their neighborhood; 2) travel cost analysis, where the cost of obtaining a recreational experience is used to place value

on the experience itself; and 3) mitigation cost analysis, where expenditures to prevent or remedy some problem, such as point of use water filters believed to reduce chances of ingesting cancer causing substances, are used to value that phenomenon. The chief virtue of these approaches is that they are based on real choices and real expenditures--what people do, not just what they say. On the other hand, indirect techniques are exercises in triangulation; prices of one thing are used to infer value about something else. There are many opportunities for slippage and arbitrary judgment.

The terms *stated preference* and *direct methods* are used to describe the techniques based on hypothetical behavior. Stated preference techniques involve creating settings in which people can express value for what might be. This frees the analyst to create situations that closely approximate the environmental phenomenon of interest--a specific change in water quality, for example--and to elicit values for that specific change. It also permits comprehensive valuation--eliciting a single value for the cumulative effects of an environmental change--something that is virtually impossible with revealed preference techniques. A third advantage is that stated preference techniques can capture values that are not expressed through use or experience--so called "nonuse" or "existence" values. In all three respects, stated preference techniques are superior to revealed preference techniques; on the last point, they are the only game in town. However, stated valuation settings are hypothetical and, with rare exception, do not require actual expenditures by respondents. This allows bias to be introduced, either by the analyst or by the respondents. Despite a growing body of work on "best practices" and evidence that these practices produce reliable estimates, at least as reliable as estimates based on arguable statistical assumptions applied to actual market data, the potential for bias remains a chief source of contention for many economists as well as for those accused of causing environmental or natural resource damages. The contention is especially great for nonuse values, where the intangible nature of the impacts compounds the hypothetical nature of the valuation process.

The paper by Richard Dunford and Jennifer Murdock of Triangle Economic Research, Inc., discusses the valuation of damages to groundwater due to hazardous wastes. Dunford and Murdock dissect valuation into its component steps: determine what damages have been caused, relating the damages to service flows of value to people, estimating the duration of those damages and the costs of mitigating them, and finally attaching value to the lost service flows and mitigation actions. Each of these steps poses challenges. They describe a variety of techniques that can be used to for valuing different

aspects of groundwater services, including both revealed and stated preference approaches. But, they also suggest that monetary valuation might better be avoided in some cases. They propose conjoint analysis and habitat equivalency analysis as methods of translating losses in biophysical services into offsetting compensation, also in biophysical terms, avoiding the need for translation to dollar values.

John Hoehn of Michigan State University and Douglas Krieger of the Environmental Economics Research Group discuss an unusual application of the stated preference technique. Their application is unusual, first, because it is directed toward a very conventional water services—potable water supply and sanitary waste removal—rather than environmental insults. In this respect, it harkens back to studies of public infrastructure that were common in the U.S. 30 or 40 years ago. Second, it takes place in Egypt. Very few nonmarket valuation studies have been done in developing countries. This paper shows how these techniques might fruitfully be employed in that context.

Hoehn and Krieger surveyed residents of Cairo in areas where public supplies of safe water were either unavailable or unreliable, and residents who lacked sanitary sewer connections. The study provides an interesting blend of ethnographic and economic methods, using ethnographic insights to determine how to frame the economic questions in culturally-appropriate terms. The survey elicited responses about the benefit to be realized from specific water service and sanitation projects. The results were cross-checked against a hedonic analysis of housing rental rates in relation to water supply and sanitation services. The results of the revealed preference analysis were quite close to those obtained from the survey response. This convergence of results from different valuation techniques is frequently seen in the valuation literature. It certainly lends credibility to the findings. All in all, Hoehn and Murdoch present an example of a well-conceived valuation study.

The third commentary on valuation methods is offered by Clifford Russell and Christopher Clark of Vanderbilt University. Like Hoehn and Krieger, these authors focus chiefly on stated preference methods. But, Russell and Clark are more concerned with the goals of valuation than the practice, and in articulating a case in support of stated preference techniques. In their view, revealed preference methods are satisfactory for only a limited set

of valuation situations. There are important classes of situations where they are inadequate or potentially misleading. Specifically, where nonuse values are likely to play a large role, where a policy or program will affect several, related service flows, or where no data are available to cover the range of anticipated experience, revealed preference methods are ineffective or potentially misleading. Overall, they argue that revealed preference methods will never be adequate to meet the need for valuation and are just as arbitrary in fundamental ways as stated preference methods are accused of being. Their vote goes toward further development of stated preference methods.

## VALUATION AND POLICY ANALYSIS

This issue concludes by returning to the big picture—the value of valuation. Two papers, one by Bromley and the other by O’Neil, place valuation in context, responding to the implied question: Is valuation essential to policy decisions?

Like Carol Adair Jones, William O’Neil has observed the use of valuation techniques from the vantage point of an agency official. His perch is the U.S. Environmental Protection Agency and his speciality is water quality regulation. He argues here that benefit-cost analysis generally, and benefit valuation by extension, is often pursued to unrealistic extremes. Girded by the theoretical purity of their practices and with single-minded dedication to the cause of economic efficiency, academic economists overestimate and overstate what these tools contribute to public dialogue. In truth, according to O’Neil, their most important contribution is in organizing data and framing the discussion, not in producing unassailable nonmarket values or definitive net benefit estimates. By imposing structure on the debate, O’Neil believes these tools help combat subjectivity, fads, and special interests.

Daniel Bromley of the University of Wisconsin takes the critique of valuation and BCA further, concerned both by the fractionalization of environmental systems required by many valuation methods and by the presumption that economic gain is the ultimate yardstick of policy acceptability. Improving upon the former, in his view, does not diminish the latter. No matter how well valuation is done, no matter how thorough and careful the benefit-cost analysis, economics is not all that matters in the selection of public policies and investments. For Bromley, valuation may be valuable, but it is not enough.

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## ENDNOTE

1. The expanded authority stems from the Clean Water Act Amendments of 1977, the Comprehensive Environmental Response, Compensation, and Liability (CERCLA--Superfund) Act of 1980, and the Oil Pollution Act of 1990. All three laws entrust government agencies to act as trustees of public resources and to seek financial redress of damages done to those resources

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