

CHOICES, PRICES, AND COLLECTIVE ACTION IN U.S. WATER POLICY

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THE CONTEXT

It has been approximately 6 decades since the first Flood Control Act called for a weighing of the benefits and costs of publicly funded water resource investments. Over that period attention has been devoted to the definition of benefits and costs, the existence and relevance of secondary benefits and costs, the proper discount rate, and the appropriate geographic scope of the economic analysis of projects (the accounting stance). Throughout this history, there has been a subtle struggle between the “political” dimension of water resource investments, and the “economic” dimension.

The political aspects have taken two distinct forms. The first aspect considered water resource investments to be part of the larger developmental imperative of a relatively young nation seeking to improve water-related transportation facilities, to provide economic opportunities in arid regions, to bring rivers under control so that particular locations might be made more habitable, and to provide cheap electricity through the development of hydropower potential.

There is another aspect of the political dimension that might be regarded in a more cynical light. In this realm, water resource investments have often been seen as forms of financial largess to particular regions or localities despite the dubious merit of the undertakings. In this view, the nation now has harbors that should not have been dredged, rivers that should not have been straightened, locks and dams that should not have been built, wetlands that should not have been drained, and deserts that should not have been irrigated. Each of these undertakings has occurred, in this view, because of the ability of powerful local political leaders to deliver public works projects to their constituents.

On the economic front, the general tendency has been to urge caution with respect to the first kind of political influence over investment activities, and to denounce with some vigor the second kind of political role. Economists brought to the debate a continuing concern that the political influence—of either kind—over water

projects carried a very high social opportunity cost. That is, by funding such projects, the federal treasury was taxing away the funds that might more profitably be invested in the private sector—or even in other public undertakings. Such projects were, in other words, crowding out allegedly superior investments. There also has been the sense that the economic evaluation of such projects was so flawed that important natural assets have been unnecessarily destroyed. Proper economic evaluation would have saved the nation much superfluous public spending, and it would have precluded the destruction of a great deal of natural habitat.

These two domains—the political and the economic—have never mixed well. Those in the political realm have tended to regard economics (and the sort of benefit-cost analysis advocated by economists) as hopelessly abstract, naive, and irrelevant to the developmental needs of the nation and its various regions. Not surprisingly, economists have viewed the political realm as hopelessly perverse and concerned only with “pork-barrel” projects. The political realm saw economists as standing in the way of progress, while economists saw the political realm as dominated by wastrels intent on squandering precious financial resources.

The standoff was probably most pronounced in the early 1970s when there were attempts to reform the way in which federal projects were evaluated. This effort was spawned by a spreading recognition that perhaps economists were right about the effect of contemporary evaluation protocols. The Office of Management and Budget was the driving force behind the review, while the U.S. Water Resources Council was charged with developing new principles and standards for the evaluation of federal water projects. The contending camps engaged in spirited debates about how projects ought to be evaluated. As this process was reaching some degree of resolution, the election of President Jimmy Carter put the politics of water on a new and more tenuous footing. In essence, many proposed projects were held up, and there were serious efforts to kill a number of others.

Ironically, this hiatus in the development of new water projects coincided with the realization that perhaps all of the viable water investments had been implemented. That is, there were not many “good” projects left—even to those who had never been reluctant to point out promising ways to spend federal funds on water-related investments. This was also the beginning of the period in which much traditional federal spending was coming under attack. The massive federal budget deficits, brought on by the Reagan tax cuts of the early 1980s, eliminated the prospects of any new federal spending for most non-military activities. The final irony is that it was precisely during this period that economists began to develop improved methods for measuring the economic value of many environmental attributes that had hitherto been considered as “intangible” in traditional benefit-cost analysis. While water projects were becoming less likely, there was a new and growing opportunity for valuation of environmental goods and services.

Accidents involving oil tankers—most prominently the Exxon Valdez in Alaska—brought together the growing interest in valuation with the new legal field of natural resource damage assessment. Here was an arena ideally suited to valuation studies. Beaches were spoiled, wildlife was killed, and sea life suffered untold damages. Surely there was a role for economists to assess precisely the monetary extent of such damages? The pull of litigation proved irresistible to many economists with the Exxon Valdez damages trial providing a forum for the full display of their resource valuation wares. On a less pleasant note, with economists working either for Exxon or for the State of Alaska, it was inevitable that rival factions would form that have sundered friendships and collegiality to this day. Both professional pride and prodigious consulting fees were at stake. The fissures remain.

HYPOTHETICAL MARKET TRANSACTIONS

The logic of resource valuation follows immediately from the market in which we interact on a daily basis. One enters the market with money and seeks, in return, some good or service. In such settings the entitlement structure is clear; the buyer owns the money and the merchant owns the good or service. If a purchase is made then ownership immediately changes — the merchant now owns the money and the buyer owns the good or service just purchased. We often overlook the legal side of market transactions but that is the most fundamental aspect. After all, theft is merely a situation in which the buyer keeps the money and also acquires the good or service from the merchant; the transaction is incomplete.

When we seek to determine the value individuals attach to various environmental goods and services we capture only one part of the traditional market transaction. That is, we pose a hypothetical transaction and ask what the individual would be willing to pay to *imagine* a particular circumstance—but not to acquire anything. Or, we ask them what they would require by way of compensation to *imagine* a particular circumstance. The respondent is asked to imagine future states of the world and is asked to indicate the nature of the monetary value that is associated with that hypothetical state. This is not as novel as it may at first appear. Each of us contemplates how much we would be willing to pay to acquire new goods and services that we never actually acquire. We are imagining what it would be like to possess those things, and we are reflecting on our willingness to pay for them. An equally common hypothetical transaction occurs when we contemplate what our wage or salary demands would be to accept particularly distasteful lines of work in especially unpleasant surroundings. We are imagining what it would be like to be in a particular situation and we are calculating our willingness to accept compensation for that hypothetical situation.

Resource valuation practices seek to mimic this process by posing quasi-transactions. The controversy over valuation tends to focus on the extent to which hypothetical “prices” from this quasi transaction capture the true value to the individual respondent, and the extent to which individual valuations (if accurate) can be regarded as pertinent to the entire population. These issues concern the twin problems of whether individuals can correctly *imagine* future states represented by the hypothetical transaction, and whether they can correctly allocate their constrained budget across both real and necessary transactions and quasi-transactions that are both unfamiliar and most often quite contrived (and artificial). In the case of studies where individuals are asked about levels of required compensation, the problem is compounded by the need to impose a sense of realism on their responses. We might think of these concerns as addressing the economic coherence of resource valuation. We might also think of this as concerning the validity of the valuation process.

There is another dimension to the valuation problem that has received much less attention by economists. To illustrate this problem, consider efforts to establish the monetary value of a wetland. Individuals will be asked what they would be willing to pay to preserve a wetland in its current state. Our surveys will elicit a range of “prices” that individuals will assure us they stand willing to pay to prevent the wetland being destroyed. Or, they will indicate the price that captures their willingness to accept compensation for the destruction of the wetland.

While seemingly straightforward, one immediately realizes the fictitious nature of this “commodity” called a *wetland*. To know what a wetland is “worth” to a sample of hypothetical consumers is to know very little about what a wetland is “worth” to the larger ecosystem of which it is an important ingredient. What general ecological services are performed by that wetland? Does the respondent to a contingent valuation study understand those services and their value in the larger environment? The wetland in this illustration is an example of what we call the “commodity fiction.” We have “commoditized” wetlands in order to allow us to think about them in a choice-theoretic framework. But has something been lost in this commoditization? The answer, I suggest, is most certainly yes.

THE COMMODITY FICTION

There are several problems that arise when we attempt to assign monetary values to fictional commodities. These problems will be classified as problems of: (1) cognition; (2) incongruity; and (3) composition (Vatn and Bromley, 1994).

Cognition

A wetland offers amenity services in terms of scenic values, it offers habitat for wildlife, and it offers ecological services in the form of nutrient processing. There may well be other distinct services provided by wetlands. Which of these services is the respondent “valuing” when queried about value? It is obvious that problems exist if the only wetland services are those associated with the respondent’s knowledge of the wetland and so the response to a hypothetical survey will understate the full social value of the wetland. This has been termed *functional transparency* (Vatn and Bromley, 1994). An additional difficulty in the realm of cognition is that respondents are not always adept at comparing disparate attributes about environmental resources. This has been termed the problem of *valuing across scales* (Vatn and Bromley, 1994).

Incongruity

The problem of incongruity arises because many respondents will resist (or reject) monetization of nature. That is, the moral dimension of many natural resource issues may confound efforts to assign straightforward monetary values to the various attributes of nature. Moreover, economic choices are usually made at the margin, yet resource valuation is often not marginal in nature; an entire wetland—not the marginal acre of wetland—is the object of valuation.

Composition

The composition problem arises because parts of nature have been isolated and commoditized so that we can undertake to value them. The demarcation that forms the basis of valuation is contrived in that it mirrors the human construction of ecological reality. Economists talk of use value and non-use value as if these were the sole source of values in a complex portion of nature. But nature is composed of much more than what we choose to identify for valuing.

THE CONTEXT OF VALUATION

The valuation of nature functions in two distinct realms—the *ex ante* realm and the *ex post* realm.

The Ex Post Realm

As indicated previously, current valuation work received its primary impetus from the need to assign values in natural resource damage litigation. It is here that valuation, despite its weaknesses, is unavoidable because one or both parties to an accident will insist that such valuation take place; the victims of an accident will seek an estimate of their losses, and the defendant will seek to counter those claims. Each party will marshal its experts, the work of both sides will be subjected to the very greatest scrutiny, and ultimately a balance will be struck by a judge (or possibly a jury). The final outcome will probably not satisfy either party, but it will represent a judicious balancing of the claims of both sides.

We can think of this as the *ex post* dimension in which two processes are underway simultaneously. First there is the primary task of making the accident victim whole. We might think of this as the *equity* aspect. The equity aspect is concerned with allowing the victim of an accident to recover a measure of financial relief. The second process can be thought of as an *efficiency* aspect. Here the judge seeks to have the monetary settlement send the appropriate signals to the defendant in the accident, as well as to others who might be the source of future accidents. If the accident is an oil-tanker spill, the settlement serves as a signal to other tanker companies of the possible costs of an accident. This signal will therefore create an incentive for other tanker lines to take precautionary actions to reduce the likelihood of future accidents. If the judge sets a very low figure for damages then future accidents will not be much affected by this accident. On the other hand, if the damage award is very high then the incentive effect for other tankers will be quite pronounced. I call this the efficiency aspect because the magnitude of the settlement will affect future resource allocation in the oil-tanker industry.

The Ex Ante Realm

In the ex ante realm, valuation is used to make decisions about possible future actions. We are familiar with this dimension of valuation because it is part of the benefit-cost analysis to which most public investments are subjected. Unlike the ex post realm, valuation is not imposed by legal disputants but is part of the process of considering alternative investments. But the role of benefit-cost analysis, and the role of valuation within benefit-cost analysis, can vary considerably. It is to that variation that I now turn.

PROJECT EVALUATION

The fundamental challenge in evaluating water resource investments is to understand the proper role of economics in the formulation of public policy. For water resource agency staff, and for politicians who see water resource investments as part of their obligation to constituents back home, it is important for them to understand that the economic implications of such investments must not be obfuscated and distorted. No one is well served by trickery and legerdemain when it comes to the use of public funds for investments that overwhelmingly favor a narrow clientele base—whether irrigators, barge companies, or fish and wildlife enthusiasts. Economists are correct to insist that all of the benefits and costs—or the positive and negative impacts—of mooted projects must be carefully calculated and clearly expressed. Economists will also insist that only those projects with a positive net present value (NPV) are legitimate candidates for implementation. And, the discount rate most economists prefer is the rate that is relevant to private sector investments. If a lower rate of discount is used then taxes are withdrawing investment capacity from the private sector that is then redirected to the public sector where the investments necessarily generate a lower social return. Economists tend to see benefit-cost analysis in this role as a protector against bad public investments.

Economists must, however, make a serious effort to understand the proper role of economics in public policy (Brandl, 1985; Bromley, 1990; Tribe, 1972). As a start, economists must realize that the mere existence of economic implications of public projects does not thereby render those public projects and policies as strictly *economic* in nature. It is too easy for economists to believe that because there are economic impacts of projects, those projects must therefore be evaluated on strict economic criteria. While the economic implications are always relevant in such settings, it does not follow that they must be decisive in the consideration of whether or not to proceed with a project.

A related problem arises from the failure of some economists to recognize that there are important differences between private-sector investments and public-sector investments. In the private sector it is clear that a narrowly focused financial calculation is both necessary and sufficient to guide investment strategies. But projects in the public sector present a more subtle challenge; here things are not as clear as they are in the private sector. In essence many considerations that are external to the private firm are not external to the nation-state. When economists insist that the social evaluation of projects is but little different from that undertaken in the private sector, problems are bound to arise.

One of the more serious difficulties arises from the problem of time. The private firm is interested in only one aspect of time—the expected economic life of the contemplated investment and the time rate of recovery of the necessary investment costs. The calculation of the internal rate of return allows the firm to compare the growth in its net income flow with the marginal cost of the proposed investment. Future benefits and costs must be discounted at the opportunity cost of current production for future production. Only in this way can the firm avoid unprofitable investments.

This logic for private-sector investment behavior has, curiously enough, become the norm for public investments as well. This view was recently reiterated by a number of economists in an article in *Science* entitled “Is there a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?” (Arrow, *et al*, 1996). These authors state that: “Both economic efficiency and intergenerational equity require that benefits and costs experienced in future years be given less weight in decision-making than those experienced today (Arrow, *et al*, 1996, p. 222). Of course this is not true (Bromley, 1989; Chichilnisky, 1997).

The problem arises because of the tendency for some economists to confuse *benefits* in the future—that is consumption opportunities for future persons—with the *interests* of future persons. It is one thing to say that a dollar means less to me 30 years from now than it does today. It is quite another thing to say that 30 years from now a dollar received by an individual is less valuable to that individual because it was not received today. If the individual had no opportunity to receive that dollar today—perhaps because she was not yet alive—it is nonsensical for those of us now living to discount it. To do so is to apply your time preference to that dollar, not the time preference of the unborn recipient.

Put another way, to discount benefits received by future persons is to discount the interests of future persons. To

discount the interests of future persons is to take a rather strong ethical position. Since economists like to insist that they are objective and not given to taking ethical positions, it is curious to see discounting receive such a strong defense. Contrary to the position outlined above by Arrow and his co-authors, intergenerational efficiency and equity require that intergenerational allocations be such that no individual would freely choose to change places with any other individual. A state of fairness is the absence of envy among all agents through time. In practical terms, intergenerational equity is violated if the interests of future persons are discounted vis-à-vis the interest of those now living.

The difficulty is that water investments do indeed have a long time-stream of benefits. Current decision-makers must weigh the present-valued gains against the present-valued costs and therefore discounting is an important analytical aid. But we must be clear that this discounting practice follows from the implicit assumption that the only beneficiaries who matter for the evaluation are those of us living in the present; in the absence of that assumption, it would be wrong to discount future benefits.

This can be seen more clearly if we contemplate a regulation that will bestow improved water quality on those who are yet unborn. Here the costs are borne by those now living, while the benefits will accrue some years hence. Under a strict discounting rule it is possible that such regulations would appear “uneconomic” and would not be undertaken. Yet to operate in this way is to sentence the future to a degraded environment. To repeat an earlier point, it is both inefficient and inequitable to discount the interest of future persons when making intertemporal choices. We need better evaluation protocols.

This discussion of the interests of future persons is a good lead in to the most serious indictment of project evaluation (benefit-cost analysis) in general, and resource valuation in particular.¹ The central problem arises because there is no assurance that a project with a positive net present value is socially preferred over the situation that would prevail without the project—or compared to a project with a lower net present value (Mishan, 1980). By this fact it necessarily follows that a project with a negative net present value cannot be judged as socially inferior to the situation that would prevail without the project. This is serious stuff indeed for those who have imagined all these years that a good rigorous benefit-cost study will protect us from bad projects.

To elaborate somewhat, when we undertake a benefit-cost analysis we are attempting to arrive at economic values (prices and quantities) for the positive and negative

effects of projects. Once that economic evaluation is completed, the second step is more difficult. It is at the second step that we must ask whether the supposed positive economic effects of a project represent an *improvement in social well being*. This two-step decision process is usually collapsed into a single step showing that the economic gains exceed (or fail to exceed) the project's costs and it is this information that is taken as sufficient for a “good” decision to be rendered. But this conflation of an economic gain with a social improvement is quite unjustified without clear evidence of an aggregating rule that maps individual valuations into collective valuations (Bromley, 1990; Mishan, 1980; Saraydar, 1989).² Without this aggregating rule, the economist is using economic indicators to draw conclusions about social preferences. This represents an unjustified leap of faith and therefore we are merely asserting something that cannot be proven.

CONCLUSION

We see that project evaluation—and environmental valuation—stand on two somewhat tenuous legs. At the valuation stage, efforts to assign monetary values to various environmental attributes suffers from several serious conceptual flaws. At the most fundamental level, the fictional commoditization of the environment assures us that the pieces of the environment to which we are asking individuals to assign monetary values are mere caricatures of the environment as a functional system.

When the results of these problematical hypothetical valuation activities are then inserted into a benefit-cost process that is itself conceptually flawed, the results are not encouraging. Coherence in project evaluation—and in the evaluation of proposed environmental regulations—of course calls for a weighing of the beneficial and harmful effects expected to arise from the proposed undertaking. But efforts to reduce all of these disparate impacts into one number (a net present value or a benefit-cost ratio) is to commit the fallacy of misplaced concreteness.

We must strive to make sure that unwise public actions are avoided. But we must strive equally hard to make sure that the careful and judicious consideration of investment and regulatory alternatives does not fall victim to the hasty and unexamined adoption of false indicators of truth. More careful evaluation (and valuation) must not be confused with the use of simplistic and misleading decision rules about what is best to do.

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ENDNOTES

1. Note the use of "evaluation" and "valuation." By *evaluation* I mean the process whereby an assessment is undertaken of the full range of benefits and costs of a proposed project. By *valuation* I mean the process of assigning monetary values to non-marketed environmental attributes.
2. We call this aggregating rule a "social welfare function."

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