

Only the text in the *green italics* represents the consensus views of the SAB Committee on Valuing the Protection of Ecological Systems and Services and has been approved by the chartered SAB. All other text was provided by individual committee members and is offered to extend and elaborate the very brief descriptions provided in chapter 4 of the SAB Report, *Valuing the Protection of Ecological Systems and Service* and to encourage further deliberation within EPA and the broader scientific community about how to meet the need for an integrated and expanded approach for valuing the protection of ecological systems and services.

Referenda and initiatives

Excerpt from draft SAB Committee report, *Valuing the Protection of Ecological Systems and Services*: *Referenda or initiatives can provide information about how members of the voting population value a particular governmental action involving the environment.*

Analysis of referenda or initiatives can reveal whether the majority of the voting population feels that a given environmental improvement is worth what it will cost the relevant government body, given a particular means of financing the associated expenditure (and hence, an anticipated cost to the individual who is voting). In casting their votes, individuals may consider not only what they personally would gain or lose but also what the community as a whole stands to gain or lose if the proposal is adopted. Similarly, analyses of public votes about whether to accept an environmental degradation (e.g., through hosting a noxious facility) seek to determine if the majority of the voting population in that community feels that the environmental services that would be lost are worth less than the contributions to well-being the community would realize (e.g., in the form of tax revenues, jobs, or monetary compensation).

These approaches provide information about the policy preferences of the median voter and, under certain conditions, provide information about the mean valuations of those who participate in the voting process. To the extent that voters consider their own budget constraints when voting, these valuations reflect economic values, i.e., willingness to pay or willingness to accept. As with all economic values, the revealed economic value reflects both personal benefits and costs, as well as any altruistic motivation (public regardedness) individual voters have when casting their votes.

Further reading

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These approaches provide information about the policy preferences of the median voter and, under certain conditions, provide information about the mean valuations of those who participate in the voting process. To the extent that voters consider their own budget constraints when voting, these valuations reflect economic values, i.e., willingness to pay or willingness to accept. As with all economic values, the revealed economic value reflects both personal benefits and costs, as well as any altruistic motivation (public regardedness) individual voters have when casting their votes.

Brief description of the method. Referendum and initiative votes provide the basis for a set of valuation approaches that can yield monetized values, but use somewhat different logic than that of the conventional individually based revealed-preference and stated-preference methods. The outcomes of referenda (measures placed on the ballot by a legislative body) and initiatives (ballot measures proposed by citizens) directly express what the body politic collectivity values in terms of policy outcomes. These expressions may or may not correspond closely to the aggregated values of the individuals in the community in terms of outcomes. Referenda approaches (not to be confused with the “referendum format” often used for posing questions to solicit contingent valuation responses) provide information about the policy

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preferences of the median voter; under certain circumstances this information can tell us about the median voter's valuation of specific environmental amenities, and can even provide information, albeit weaker, about mean valuations of those who participate in the voting process. They can also be useful for cross-validating any other valuation approach that permits a prediction as to the outcome of a referendum or initiative. When a referendum or initiative is followed by a survey to determine what voters believed the financial burden to be, the approach can also elicit relevant beliefs and motives to reinforce the specific willingness-to-pay or willingness-to-accept information.

There are four variants for analyzing referenda and initiatives:

- Referendum/initiative analysis
- Analysis of public decisions to accept pollution or resource depletion
- Referendum/initiative analysis followed by a survey
- Analysis of public decisions to accept pollution or resource depletion followed by a survey

Direct referendum/initiative analysis, with or without a follow-up survey, can evaluate trade-offs between community and/or household costs (higher taxes, possibly job losses) and eco-system improvements (establishment or improvement of air, water, biodiversity protection, etc.). Direct analysis of public decisions to accept pollution or resource depletion, with or without a survey, can evaluate trade-offs between community and/or household benefits (increase in tax base, job creation, infrastructure improvements, etc.) and eco-system deterioration (greater pollution, amenity reductions).

Text Box 1: Direct Analysis of Public Decisions to Accept Pollution or Resource Depletion

Some public votes can provide inferences for willingness-to-accept decisions. These decisions involve a community's vote as to whether to permit the entry of a new firm or a new (or increased) economic activity despite the expectation that such permission will degrade the ecosystem. The payment represents the ceiling on the community's valuation of the environmental amenities that are being relinquished. It is a ceiling because of the possibility that the community would have accepted a lower level of compensation, and if the community valued

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the forgone eco-system services more than the compensation, then presumably it would not have accepted the compensation. However, if there is a vote and the outcome is close, the calculated valuation can be considered to be close to the community's valuation.

The estimation task involves assessing the amount of environmental damage in physical terms and the amount of compensation in monetary terms. Typically this compensation will come in the form of additional sources of taxes, the value of infrastructure that the new entrants provide for the community, additional income earned by community members, etc. The per-household as well as per-community compensation would be relevant. For example, the entry of an air-polluting factory may be accepted only after the factory's owner commits to a certain number of jobs for the community, building a park, upgrading roads, contributing to the community's vocational program.

Obviously many "community decisions" to permit the entry of polluters or other activities that degrade the ecosystem are not amenable to this approach, because community leaders negotiate the level of benefits that the community will receive without a vote being taken, or the benefits or costs are difficult to estimate.

Text Box 2: Referendum/Initiative Analysis Followed by a Survey

The alternative to relying solely on the referendum or initiative outcomes to make willingness-to-pay estimates consists of combining the voting outcome with a follow-up survey to determine the perceptions of the stakeholders. This variant amounts to a hybrid of the first variant and the "referendum format" contingent valuation approach. The floor of the willingness-to-pay value of the proposed eco-system improvements is estimated by determining the voters' perceptions of the eco-system improvements and costs proposed by a recent referendum or initiative. The respondents are asked whether they voted, how they voted, and what they believed the benefits and costs of the proposal were. The quantitative analysis of results of the referendum/initiative is the same as direct analysis without a survey, but using the perceived rather than actual stakes.

If, in addition to asking how respondents voted and their perceptions of the benefits and costs of the proposal, the randomly-sampled respondents who opposed the proposal are asked what (lower) cost would have induced them to vote for the proposal, and those who supported the proposal are asked how much more they would have been willing to pay, this approach also permits an estimate of aggregate and mean values, just as a standard contingent valuation study would, with less potential distortion arising from respondents' desire to be regarded in a favorable light. Thus the survey following a referendum or initiative can provide an internal cross-check of how much correspondence there is between the stated-preference approaches and the referendum or initiative findings (Schläpfer, Roschewitz, & Hanley 2004, Vossler and Kerkvliet 2003). In fact, the voting results can serve as a cross-check for any of the survey or other individual or group assessment methods.

It should be noted that in focusing on the benefits and costs that respondents report, rather than the actual benefits and costs that the referendum or initiative proposal specifies, the results do not

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reflect the community's formal decision. This is a significant difference in the philosophy underlying the standing of the results. That is, the first variant, even if it does not necessarily reflect the values that voters perceive, does represent what the voters have chosen. On the other hand, without the survey, the analyst cannot be certain what financial impact the voter believes is at stake, inasmuch as many initiatives and referenda do not explicitly specify the voter's financial burden. Different logics underlie their standing.

Text Box 3: Public Decisions to Accept Pollution or Resource Depletion Followed by a Survey

Just as the analysis of referendum and initiative outcomes can be augmented by determining voters' perceptions of the stakes, the ceiling of the willingness-to-accept value of eco-system deterioration can be estimated by determining the benefits perceived by voters who supported the arrangement accepting the entry of a polluting or depleting operation into the community, and their perceptions of the damage that would be done. Like the direct analysis of willingness-to-accept votes, if the arrangement was approved by the electorate, and the property rights are clear and transactions are low, the ratio of the perceived costs and compensation represents the ceiling of the median voter's valuation. The survey, best administered as soon as possible after the actual vote, would reveal what the community members interpreted the benefits and costs to be, thus bringing the valuation closer to individual values. But again, there exists a trade-off that the results would not have standing as the "community's choice." If the survey includes the questions of the conventional contingent valuation regarding how much each respondent would have been willing to accept, then the results would be even more robust in finding mean and aggregate valuations as well as median valuations.

How the method could be used as part of the C-VPESS expanded and integrated framework. These public decision approaches can provide monetized values—of the community's formal decision and values, ceilings, or floors of the median voter's valuation. In addition, with the follow-up surveys they can provide information on beliefs, assumptions, and motives regarding the ecosystem preservation issues that the voters perceive are at stake. Because the approaches focus on the content of proposals before the voting public, they do not directly identify ecosystem service impacts as a natural scientist or engineer would, but they will reflect voters' assessments of ecosystem service impacts. The approaches focusing exclusively on the decision outcomes do not directly identify changes in ecosystems and ecosystem services that are of greatest concern to people, although the survey variants can include questions to elicit this information. The approaches do address ecological impacts that other monetized approaches may underestimate, in that participation in citizenship, in contrast with the private-utility decisions reflected in the standard revealed-preferences approaches, can reflect concern for

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community well-being (“public regardedness”) insofar as voters hold such regard. The approaches do not involve inter-disciplinary collaboration among physical/biological and social scientists or ecologists. There is a very strong potential that a data bank of inferred values from fairly large numbers of referenda and initiatives would assist EPA in presenting ranges of value for benefit transfers.

Status as a method. The logic of using formal public outcomes to infer how much society values particular outcomes has been used primarily in the literature on health and safety. For example, the value of a “statistical life” has been estimated by calculating how much public policies commit to spend in order to reduce mortality rates from health or safety risks, or, conversely, how much economic gain is associated with public decisions that reduce safety (e.g., by examining official decisions of U.S. states to raise or lower speed limits, Ashenfelter & Greenstone [2004] estimated the market value of the time saved by getting to the destination more quickly, and from that estimated the value of the additional expected traffic fatalities). The logic of making valuation inferences from referenda and initiatives has been addressed in a few publications, most directly in Deacon & Shapiro (1975) and Shabman & Stephenson (1996).

In comparing the valuations yielded by stated-preference approaches with those derived from public decisions, the studies typically show the inferences from public decisions to yield lower values—not surprising in light of the absence of the hypothetical element in the public-decision results. Although systematic comparisons with conventional revealed preference approaches are lacking, it is likely that the valuations of eco-system components calculated from public decisions would be higher, because public decisions do capture whatever elements of public-regardedness are present among the voters. The valuations based on public decisions have relevance within the paradigm that gives standing to the community votes as reflecting the policies that the public prefers. Even when a referendum or initiative passes by a wide margin, which reduces the precision of estimating the value held by the median voter, these outcomes provide strong input to decision makers regarding publicly held values.

Strengths/Limitations. Willingness to pay (WTP): The results will be most easily interpreted if the initiatives or referenda are: a) as focused as possible on a single dimension of environmental protection or amenity; b) free of ideological debate; c) confined to easily identifiable government costs rather than diffused and uncertain costs such as job losses; and d)

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the wording of the referendum or initiative is both unambiguous and clarifies the costs to the voters if the measure passes.

Willingness to accept (WTA): The results will be most meaningful if: a) the vote is explicit; b) the expected damage is well specified; c) property rights are clearly held by the community (i.e., the community has the right to refuse entry) d) the community's gains can be easily estimated; and e) the transaction costs are low.

The most useful referenda or initiatives would propose direct costs to the voters, typically in the form of taxes, fees, or bonds to finance actions designed to improve or protect ecosystems. Referenda or initiatives that entail restrictions on development (such as more stringent emissions or effluent standards) are less useful, because of the uncertainty of the level and incidence of the economic impacts. Similarly, in order to isolate the values attributed to particular ecosystem benefits, referenda and initiatives that address only one objective, such as preserving habitats or reducing air pollution, are more useful. With multiple objectives, the analysis cannot assign the willingness to pay to each component. Similarly, if it is clear that a referendum or initiative entails additional partisan political stakes (e.g., if it is widely viewed as a political test of a government official), the results are less illuminating in terms of the ecosystem values that the voters hold. The criterion of unambiguous wording is important in light of the findings that the wording of the questions can make a significant difference in the responses (Cronin 1989, Magleby 1984). However, the problem of misleading wording has been addressed in many jurisdictions, where election commissions have to approve the wording of both referenda and initiatives. Moreover, the fact that specific wording can influence responses is obviously not unique to the actual referendum and initiative situations; stated preference approaches, and surveys in general, face the same wording challenge.

Valuation based on initiative or referendum results would work best when:

- applied to the same jurisdiction (e.g., if a city is considering another storm control issue, the analysis of that city's referendum would be most appropriate), but can still be used via benefits transfer;
- a unitary conservation or environmental benefit is involved;
- the initiative or referendum outcome was a close vote (this yields stronger inferences about the actual valuation, rather than floors or ceilings);

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- extraneous issues (such as whether the vote is a “political test” on particular politicians, or the mode of financing is controversial) are unimportant; and
- surveys can be accomplished soon after the actual vote.

These approaches attempt to measure the sum total of values of improving or protecting ecosystems and eco-system services; therefore both means and ends (instrumental and intrinsic) values can be involved. All variants in principle could measure the values attributed to all types of services, expressed in terms of monetary values per unit of ecosystem improvement or protection. The variants are flexible in terms of levels of data, detail, and scope, inasmuch as initiatives and referenda decisions have been made at all sub-national levels. The valuations can be aggregated across benefits and with other methods, as long as the scale and magnitude of benefits are roughly the same. While highly complex initiatives and referenda are not good candidates for estimating value, the valuations generated from simpler cases can be used as inputs for complex applications.

Any EPA decision context calling for monetized valuation could employ these variants, either singly or as cross-checks with conventional revealed preference or stated preference approaches. Benefit transfer applications will be limited to cases of similar magnitudes of benefits, because of the likelihood that community decisions are highly sensitive to such magnitudes.

In uses that apply valuations directly to the jurisdiction previously experiencing the initiative or referendum, the scale would be the same municipality, county, or state. For benefits transfer, the scale should also be the same, given the need for similar magnitude of benefits and costs mentioned above.

Making valuation estimates directly from referendum or initiative outcomes has two advantages over conventional valuation methods. Unlike the standard revealed-preference approaches, such as hedonic pricing or the travel-cost method, voting on referenda or initiatives will reflect as much (or as little) public-regardedness as the voters actually hold toward the objectives involved. Standard revealed-preference approaches reflect the private utility-maximizing decisions of individuals who purchase homes, spend money to visit parks, etc.; these decisions do not reflect what individuals want for their communities. Voting affirmatively for referendum- or initiative-proposed public expenditures does elicit valuing on behalf of the

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community, insofar as the voters are so disposed. Of course, a voter may vote for or against a referendum or initiative proposal strictly out of concerns for herself and/or her family, but the outcome does not exclude the existence value component should it exist.

Unlike the conventional stated preference approaches such as contingent valuation, the analysis based on referendum or initiative outcomes is not subject to the possible distortions of hypothetically-posed choices. If a voter supports the referendum or initiative proposal, the vote contributes to the likelihood that the expenditures will actually occur and the costs will actually be borne. Some might argue that the chance that any one vote will decide the outcome of the referendum or initiative is remote, and therefore the vote is more of a symbolic act than a trade-off choice. However, there are two important responses to this point. First, whatever the mix of motives of the voters, the outcome is the community's decision, and therefore has standing in and of itself. This is the same logic by which we accept elected officials as legitimate even if we are dubious about the motives or rationality of the voters. Second, even if a voter believes that the chances that his or her vote will make the difference are negligible, the vote is still an expression of support or opposition to the proposal. There is little reason to believe that a "yes" vote would reflect just the gratification of voting "yes" (especially in secret balloting) rather than a belief that the proposal merits support.

Another concern that some would level against inferences based on referenda or initiatives is that these votes are often subject to intense efforts by interest groups, advocacy groups, and even governments to manipulate public perceptions (Butler & Ranney 1978, Cronin 1989, Magelby 1984). This concern has two aspects: whether the information on which voters base their decisions has been distorted, and whether the votes are swayed by appeals on one side or the other, especially by the side with the greatest resources (Hadwiger 1992, Lupia 1992, Owens & Wade 1986). The first aspect is more compelling: we certainly would be less willing to accept the validity of an estimate derived from voting decisions driven by serious misconceptions of the proposed benefits and/or costs. The outcome is still the official decision of that community, but the justification for using the result as the basis of benefits transfer to other communities would be very weak. On the other hand, the fact that referenda and initiatives are often subject to intensive campaigns of persuasion may be considered a virtue rather than a drawback, insofar as it would provide more information on both sides. In addition, the fact that

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individuals are exposed to efforts at persuasion is by no means confined to referenda and initiative contests: respondents to contingent valuation surveys have of course been subjected to many years of promotional activities by environmental groups; people who travel farther to a particularly popular national park such as Yosemite have been influenced by all sorts of communications extolling its virtues. In short, efforts at value persuasion are pervasive, and in any event should not be a basis for rejecting the significance of decisions of individuals exposed to those efforts. The philosophical basis underlying the use of referenda or initiatives, namely that the public's preferences are legitimately shaped by the political process, and that the public's policy preferences are important beyond how the public values the outcomes that these policies may produce, is quite different from the "progressivist" position that individuals' values should be determined in isolation of politics (Sagoff 2004: 177-178).

Another difference in philosophical basis is that the referendum and initiative results reflect intensity of attention to the issue, at least insofar as those who do not care enough to vote are excluded from the analysis. From the progressivist, technocratic perspective, everyone's values ought to be incorporated, because the policies ought to maximize utility (i.e., the consequences of public decisions) regardless of whether specific individuals are mobilized to take action. On the other hand, prominent strains of pluralist democratic theory regard intensity as a fully legitimate factor in determining policy outcomes (Lowi 1964).

One limitation of estimating values from referendum or initiative outcomes is that it is often difficult for voters to assess the actual stakes involved. The benefits will often have to be predicted (e.g., how much biodiversity will a reserve really safeguard; how much flooding will the flood-control system actually prevent?), entailing an amount of uncertainty. The benefits that do occur will often be community-wide, with some uncertainty as to how much an individual or particular household can take advantage of the benefits. On the cost side, the burden of a tax increase or bond measure on household expenditures may be very difficult for the typical voter to estimate, and the impacts of development restrictions may be even more difficult in light of the uncertainty as to which families would ultimately be affected. Insofar as the costs specified by the referendum or initiative are not easily translatable into household budget terms, the outcome, though it is still "the community's decision," is less revealing about the values held by the voters.

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The outputs of these approaches should be easy to understand and to communicate to the public. It is a significant advantage to be able to say that the valuation of an ecosystem component has been estimated on the basis of how communities have decided what these components are worth.

Text Box 4 Referenda and Initiatives Used to Validate Contingent Valuation

In addition to taking the valuation derived from the analysis of public decisions as an input in itself, the analysis of public decisions, particularly referenda and initiatives, can be used to validate the results of other valuation methods. Several studies have compiled the results of initiatives and/or referenda in order to try to validate more conventional valuation techniques, especially contingent valuation (Kahn & Matsusaka (1997), List & Shogren (2002), Murphy, et al. (2003), Schläpfer, Roschewitz, & Hanley (2004), Vossler & Kerkvliet (2003), Vossler, Kerkvliet, Polasky & Gainutdinova (2003). As Arrow, et al. (1993) recommend:

The referendum format offers one further advantage for CV. As we have argued, external validation of elicited lost passive use values is usually impossible. There are however real-life referenda. Some of them, at least, are decisions to purchase specific public goods with defined payment mechanisms, e.g., an increase in property taxes. The analogy with willingness to pay for avoidance or repair of environmental damage is far from perfect but close enough that the ability of CV-like studies to predict the outcomes of real-world referenda would be useful evidence on the validity of the CV method in general. The test we envision is not an election poll of the usual type. Instead, using the referendum format and providing the usual information to the respondents, a study should ask whether they are willing to pay the average amount implied by the actual referendum. The outcome of the CV-like study should be compared with that of the actual referendum. The Panel thinks that studies of this kind should be pursued as a method of validating and perhaps even calibrating applications of the CV method

Does this method incorporate any specific ways of treating uncertainty? Is there any approach unique to this method? There are two distinct sources of uncertainty involved with this approach, depending on which variant is employed and how the outcomes are interpreted. If the referendum or initiative results are used without a follow-up survey, and the results are interpreted as indicating the aggregation of individual valuations, then there is uncertainty as to whether the voters understood the benefits and the payments accurately. If the results are interpreted as the community's preference per se, then the result is accurate in itself, as long as vote miscounting is not an issue.

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The follow-up survey provides a way to determine whether voters understood the benefits and payments accurately. However, like any survey it also has its own sources of uncertainty: biases in which voters agree to respond to the survey, and untruthfulness in the individual responses. An additional source of potential uncertainty would arise if non-voters are asked to respond to the survey because of error on the part of the survey team. Despite these potential pitfalls, the follow-up survey (equivalent to a contingent valuation study) would serve as a cross-check on the referendum or initiative results.

Another source of uncertainty in undertaking a benefits transfer of valuation based on referenda or initiatives is that communities where these efforts are tried may be atypical; for example, it is possible that referenda and initiatives are more likely to be launched in communities with a stronger commitment to conservation. However, if enough straightforward referenda and initiatives are analyzed and put into comparable terms, including those that failed to pass, the range of results would provide more robust information than any single result.

Research needs. The research needed to make the results of public decisions through referenda and initiatives most useful for inferring values would consist of the creation of a data bank of referenda and initiative outcomes, optimally screening out those involving multiple, confounding elements. Because more than 1,100 referenda on open space issues alone were conducted in the United States between 1997 and 2004 (Banzaf, et al. 2006), the chances are good that a sizable number of referenda will meet the criteria. A preliminary analysis is needed to determine whether the communities that hold referendum votes are atypical of communities in general (i.e., is there a selection bias among the referendum-holding communities that would make their valuations atypical of the entire set of communities?). Thus a group of researchers at Resources for the Future is conducting in-depth analysis of 15 county-level, open-land referenda in Colorado, and also assessing the other open-land referenda in the rest of the United States (Banzaf, et al. 2006), to determine what kinds of communities hold referenda and what explains why the majority of referenda pass. The analysis of the valuation of benefits or damage would be straightforward calculation of the ratios of benefits or costs to the per-household costs, when such ratios can be deduced from simple referendum or initiative choices. The survey variants would involve considerably more effort of developing the questionnaire, administering it immediately after a referendum or initiative, and analyzing the additional information, yet the

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results would provide information on both median and mean valuation. Once model surveys are developed, they could be used with minor adaptations in different settings. In terms of resources required to make progress, roughly three researcher-years could produce a credible data base and systematically distill the information from the voting results that would be useful for policymakers. Using initiative or referendum voting results to cross-validate other valuation methods can be done at relatively low cost, although the follow-up survey options entail more effort, depending of course on how elaborate they are.

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Only the text in the *green italics* represents the consensus views of the SAB Committee on Valuing the Protection of Ecological Systems and Services and has been approved by the chartered SAB. All other text was provided by individual committee members and is offered to extend and elaborate the very brief descriptions provided in chapter 4 of the SAB Report, *Valuing the Protection of Ecological Systems and Service* and to encourage further deliberation within EPA and the broader scientific community about how to meet the need for an integrated and expanded approach for valuing the protection of ecological systems and services.

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