

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.

## **Constructed value approaches**

Excerpt from draft SAB Committee report, *Valuing the Protection of Ecological Systems*

*and Services: Constructed value processes can help in both estimating values and, in some cases, making policy decisions. A central premise of constructed value processes is that people's preferences and values for complex, unfamiliar goods, such as many ecosystem services, are multi-dimensional and that people sometimes construct their preferences and values for such goods during the process of elicitation. This premise contrasts with the premise underlying some valuation methods, most notably economic valuation methods, that assume preferences are given and that values or contributions to well-being can be measured using a single metric such as willingness to pay or accept.*

*Constructed value processes can be used either as part of a valuation process or directly in decision making. In both situations, constructed value processes involve a number of steps, including identifying objectives, defining the attributes to be used to judge progress toward the objectives, specifying the set of management options, and measuring changes in relevant attributes under the options (Gregory et al., 1993; Gregory et al., 2001; Gregory and Wellman, 2001). Objectives are diverse and often multi-dimensional. Examples include maintaining some requisite level of ecological services, protecting endangered or threatened species, producing particular resources, increasing tourism or recreational opportunities, and supplying a sense of pride or awe (Gregory et al., 2001). The final output is either a judgment about the current state of the system relative to an alternative state (if the context is evaluative) or the selection or*

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*identification of a preferred management option (if the context is decision making).*

*Constructed value processes draw on inputs from a variety of disciplines, including economics, ecology, psychology, and sociology. A discussion of the use of decision science approaches for ecological valuation appears in section 4.2.6.*

*These deliberative processes, if done in a careful way and supported by appropriate resources, can provide useful input for valuation by identifying what people care about.\* Deliberative processes can be especially useful for providing input in valuation situations where the public may not be fully informed about ecosystem services. Such processes involving science, agency, and members of the public can be helpful for getting an idea of what an informed public might value. To adequately address and incorporate relevant science, however, it is important that such deliberative processes receive sufficient financial and staff resources (SAB, 2001).*

**Overview of Approach.** The committee uses the term “value” in a broad sense that includes moral, spiritual, religious, aesthetic, and other attributes appropriate considerations to guide choices and policies. Values are normative, which means that they shape thinking and preferences about what one ought to do and how one ought to feel. In many contexts values themselves are shaped by processes of deliberating about different actions, policies, and states of affairs and comparing them to each other.

Deliberative methods for valuation need to be developed in a way that is sensitive to the insights provided by more than 30 years of research on decision making. One of the main themes that emerged from this research is that people’s preferences and values for complex, unfamiliar goods, are often constructed during the process of elicitation (Lichtenstein & Slovic, 2006). In keeping with the constructive nature of environmental preferences and values, designers of a valuation exercise must function not only as

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\* While stakeholder processes are sometimes used as a decision mechanism per se, the C-VPES considered them only as a way of providing informed input from the public into valuation processes. A 2001 SAB report assessed stakeholder processes involving environmental science and concluded that they are appropriate as a decision making mechanism per se in only a modest subset of environmental regulatory decisions under select conditions, if at all (SAB, 2001).

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archeologists, carefully uncovering what values exist, but also as architects, working to build a defensible expression of value (Gregory, et al., 1993).

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### **The Constructive Nature of Environmental Preferences**

One achievement of behavioral research on decision making has been to demonstrate the strong influence of context on measures of preference and value. As a result, decision scientists seeking to elicit values have recognized that order of effects, the range and mixture of items being evaluated, the amount and nature of information provided about each item, the method of elicitation, and many other contextual factors can affect the results of any serious elicitation attempt. The nature of these effects are not merely “biases” to be minimized by more careful procedures. Rather, they represent fundamental changes in the preferences and values themselves.

Research on what has come to be known as "the constructive nature of preference" has strong implications for attempts to value environmental impacts. Consider, for example, the phenomenon of preference reversal, which has been studied by psychologists and economists for more than twenty-five years. For example, Irwin et al. (1993) conducted several studies showing preference reversals in willingness to pay responses (WTP). These studies involved comparisons of improvements in consumer goods, such as a better camera, with improvements in air quality. They found that WTP based on a single-stimulus response favored improvements in consumer goods and WTP based on a choice response (e.g. which improvement would you pay more to obtain?) favored improvements in air quality. Findings of preference reversals involving environmental values provide strong evidence for the constructive nature of preference. As Tversky, Sattath, and Slovic (1988) observed: “In the classical analysis, the relation of preference is inferred from observed responses and is assumed to reflect the decision maker's underlying utility or value. But if different elicitation procedures produce different orderings of options, how can preferences and values be defined? And in what sense do they exist? (p. 383).”

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An important corollary of the constructive view is that the strong values that people hold for environmental goods are not represented in their minds in monetary form. Consider all the goods that we might want to value in dollar terms. These could be arrayed on a continuum according to the level of market experience that we have with them. At one extreme, would be goods such as groceries, for which market experience is great and the strength of our values or preferences can be relatively easily represented by a market price. As we move from groceries to appliances, automobiles, and homes, market experience lessens and the ease of representing our preferences monetarily declines as well. For goods such as air or water quality, wilderness areas, endangered species, and many other elements of the natural environment, the market no longer applies, and the link between values and money becomes tenuous—so tenuous that it may not exist. Thus, we can have strongly held values that are not at all coded mentally in terms of dollars. Attempts to translate such values into monetary equivalents must take special cognizance of this problem.

Brief description of the approach. Individual valuation methods must be responsive to a set of identified objectives. For example, if an objective in a given decision is to improve environmental health, desired attributes that will define “environmental health” must first be identified and operationalized. Decision makers, analysts, and stakeholders must first establish what “environmental health” will mean as well as the attributes of it that will guide its measurement. In a decision making context, the first aspect of measuring value, therefore, entails predicting the level of achievement that can be realized by implementing one of a set of management options across the objectives and their associated system-specific attributes that come to define their objectives of interest (simply “environmental health” in the example above). In an evaluative context, this first step entails measuring the level of change—improvement or degradation—that has been realized, relative to some previous state, across the objectives and their associated attributes that are of interest. These processes of measurement or prediction involve the application of the various analytic methods within the specific domain of interest.

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Once objectives and their system-specific attributes have been specified and values obtained across the full range of alternatives under consideration, a decision maker (or decision makers depending upon whether the choice calls for judgments by an individual or a group) can go about the process of:

- selecting or identifying a suitable management option (in a decision making context), or
- making judgments about the current state of the system relative to a previous state (in the case of evaluation).

This process, by necessity, involves confronting tradeoffs when attributes of value or objectives inevitably conflict. The overall value of the benefits obtained from ecological systems and services are ultimately reflected in: a) the full spectrum of values obtained across all of the stated objectives and their associated attributes and b) the tradeoffs that are made when:

- in the case of decision making, comparing one alternative—which yields a suite of benefits and costs—with others, or in the case of valuation, comparing the improvements or declines that are presently realized relative to some past state.

In the important first step of the valuation process, the analyst collects, lists, and organizes a description of the problem, identifying all the attributes (that is, all the aspects of the problem that have value to people). The goal is to develop an explicit, comprehensive picture of all factors that contribute significantly to the value of the good or activity. To do so, the analyst will consult both technical experts, to get the facts, and the affected citizenry, to find the link between the facts and the values.

Diverse groups of people should be consulted to select the value attributes. These stakeholders are defined in an operational sense as groups of people who, for any reason (e.g., place of residence, occupation, favored activities), share common concerns or opinions regarding a proposed action. The analyst might convene several stakeholder groups, each composed of seven to ten; from each group, a values structure is elicited. Careful selection of stakeholder groups ensures that the full range of views is adequately covered. For example, the representatives of an environmental advocacy organization

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might be expected to present a somewhat different list of attributes than would members of the local Chamber of Commerce, but the views of each group are likely to encompass those of many other citizens.

Suppose that someone wanted to construct a value for the damage resulting from a specific pollutant accidentally spilled into an estuary. Technical experts can provide information describing the lake before and after the damage. These descriptions then can be presented to representatives of the people affected by the damage to identify the value attributes. For example, the physical event of the death of a large number of fish might imply aesthetic loss (when the dead fish wash up on the shore), loss of genetic diversity, and loss of commercial fishing jobs and profits. These losses indicate the value attributes.

Generic attributes for the lake problem might be Effects on Scenic Beauty, Effects on Genetic Diversity, Human Health Effects, Effects on Commerce, and so forth. Each attribute would have sub-attributes. For example, sub-attributes influencing Effects on Commerce might be Real Estate Values (the price of vacation homes would go down if the shore line becomes ugly), Tourist Values, and Entitlement (expressing the general public's non-use value for a beautiful lake). Some or all of these sub-attributes might be further broken down into sub-sub-attributes, and so forth, until all relevant values have been listed and organized. At the lowest level, each attribute is described in terms of some specific measure. For example, one sub-component of Scenic Beauty concerned with shoreline attractiveness might have as its bottom-level measure the number of dead fish per acre of beach.

After the structure of the problem has been determined, deliberation and argument can then be organized around the identified multidimensional attributes of value.

### Key References

- Gregory, R., J. L. Arvai, and T. McDaniels. 2001. Value-focused thinking for environmental risk consultations. *Research in Social Problems and Public Policy* 9:249-275.
- Gregory, R., S. Lichtenstein, and P. Slovic. 1993. Valuing environmental resources: A constructive approach. *Journal of Risk and Uncertainty* 7:177-197.

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Gregory, R., and K. Wellman. 2001. Bringing stakeholder values into environmental policy choices: A community-based estuary case study. *Ecological Economics* 39:37-52.

??Irwin et al.

Lichtenstein, S., and P. Slovic. (Eds.). (2006). *The Construction of Preference*. New York: Cambridge University Press.

Tversky, A., Sattath, S., & Slovic, P. (1988). Contingent weighting in judgment and choice. *Psychological Review* 95: 371-384.