EPA Science Advisory Board
Committee on Valuing the Protection of Ecological Systems and Services
Public Teleconference
August 25, 2004, 1:00 p.m. - 2:30 p.m. Eastern Time

Purpose: The purposes of the teleconference are to:

1) discuss work initiated at the June 14-15, 2004 meeting of the Committee, including updates and discussions of the work on defining "Concepts and Methods" and text related to "Lessons from the Risk Assessment Experience," and
2) plan for the Committee's September 13-15, 2004 Meeting.

1:00-1:05	Opening of Teleconference	Dr. Angela Nugent, Designated Federal Officer
1:05-1:10	Review of the agenda	Dr. Domenico Grasso, Chair
1:10-1:40	Update and introduction to draft "Values and Valuation of Ecological Systems and services: Concepts and Methods" (15 minutes) Committee discussion (15 minutes)	Dr. Douglas MacLean
1:40-2:10	Overview of Valuing the Protection of Ecological Systems and Services: Lessons from the Risk Assessment Experience (15 minutes) Committee Discussion (15 minutes)	Dr. Paul Slovic, Dr. Joseph Arvai
2:10-2:20	Update on Agenda for September 13-15, 2004 and Discussion of Committee preparations	Dr. Angela Nugent Committee
2:20-2:30	Summary of Next Steps	Dr. Domenico Grasso
2:30	Adjourn	

Values and Valuation of Ecological Systems and Services:
Concepts and Methods
[Drafted by Douglas MacLean – version 3: 8/25/04]

The EPA makes decisions and policies that aim to protect ecological systems and services. The goal of this report is to characterize the values of those systems and services and to assist EPA in designing methods for assessing those values and comparing them to other values. In this section we begin with some general remarks about what we take the concept of "value" to mean, and we briefly describe some different proposed methods of valuation or techniques for measuring the value of changes in ecological systems and services.

1. Instrumental and Intrinsic Values

Valuing involves being motivated by attitudes or beliefs that are sensitive to judgment and reason. A reason in this context is simply a consideration in favor of some positive attitude or belief. To value something can involve making judgments about the relative worth of an object, or it can involve recognizing reasons to adopt certain attitudes – for example, caring, admiring, or respecting – and to act in ways that appropriately express those attitudes toward the valued object. Valuing is thus distinguishable from the kinds of desiring and wanting that are not sensitive to judgments or reasons. We can characterize "value" most generally as follows: *To value something is to take oneself to have reasons for holding certain positive attitudes toward that thing and for acting in certain ways in regard to it.*

We call EPA's different approaches for valuing the impacts of its decisions and actions on ecological systems and services "valuation" and take this term to refer to methods or techniques for assessing and measuring the relative worth or importance of valued objects. Valuation is thus an essential component of making decisions involving the allocation of resources to protecting ecological services and systems. A deeper issue is whether or to what extent valuation is compatible with the full range of attitudes people judge to be important in valuing ecological systems. For example, are techniques that attempt to quantify and monetize the value of an ecological system compatible with attitudes of respect and reverence that people deem appropriate for some aspects of nature? This report will be guided by an awareness of some of these philosophical issues, but we will not attempt to discuss them fully or systematically.

We value some things *as means* to achieve other things we value, and we value some things *as ends* for their own sake. When we say that something has *instrumental value*, we mean that we recognize reasons for valuing it as a means to something else. When we say that something has *intrinsic value*, we mean that we have reason to value it as an end. This distinction does not constitute a partition among objects, for we can value some things both as ends and as means to other higher ends. For example, someone might value an ecological system as beautiful and worth preserving in its own right, and also value it for the services it provides. In this way an ecological system might be thought to have both intrinsic and instrumental value.

The distinction between instrumental and intrinsic value suggests a hierarchy of values. At the bottom of the hierarchy are objects that have purely instrumental value; in the middle are objects that have both instrumental and intrinsic value; and at the top are objects that have only intrinsic value or that we value only as ends.

Everyone would agree that some things are reasonable to pursue as ends that are not also means to further ends. Consensus does not exist, however, about whether we should regard one or more than one kind of object as having "pure" intrinsic value (i.e., as being valuable only as an end). Some have argued that there is a single "final end," usually characterized as happiness, well-being, or human welfare. Those who argue for such a single or monistic conception of pure intrinsic value need not deny that we have reasons for pursuing things other than happiness for their own sake. They merely insist that the value of these other activities reduces ultimately to their contribution to happiness or welfare. A monistic conception of pure intrinsic value would imply that the whole value of ecological systems and services is in the end instrumental.

Other people have claimed that there is a plurality of final ends or of pure intrinsic values, and we must try to be true to all of them. These critics of monism argue that although well-being (happiness or welfare) is a pure intrinsic value – i.e., it is valued solely as an end and not also as a means – other intrinsic values also exist, which have no essential connection to happiness. Some people take art, religious values, or nature and ecological systems to have such value. To insist that all valued things must ultimately be understood in terms of their contribution to human well-being involves, in the eyes of these critics, a distortion of intrinsic value. It reduces our different reasons for holding certain attitudes and expressing them through various appropriate actions to reasons to promote happiness.

Valuation applies most clearly to pure instrumental goods. These goods allow for substitution and are exchangeable for other goods that promote valued ends better or more efficiently. This fact provides a sound basis for comparing different instrumental goods or values. By definition, ecological *services* have instrumental value and can be assessed by their contribution to well-being.

Applying valuation techniques to ecological *systems* is more controversial. To those who claim that only human well-being has pure intrinsic value, the value of ecological systems is similar in kind to the value of ecological services. It can (in principle) be measured as a kind of instrumental good, taking account of all the use and non-use values (see below) we might attribute to an ecological system. To those who believe that ecological systems may have pure intrinsic value, however, the situation is more complicated. While some value pluralists insist that different intrinsic values are incommensurable, others believe that it is often possible to make reasonable comparisons of relative importance or worth among different intrinsic values or goods. These comparisons are especially important to making rational decisions for allocating scarce resources to promote and protect different goods or intrinsic values. In these contexts, valuation methods can serve to illustrate how alternative decisions affect various objectives.

They can tell us whether some decision dominates others in regard to all the relevant objectives, and they can inform us about the nature of tradeoffs between different objectives, even if the decision cannot be determined by valuation alone but requires making some other kind of judgment.

2. Use vs. Nonuse Values

Environmental economists make a distinction between *use values* and *nonuse values* (or passive use values) of ecological systems and services. The use value of an ecological system includes the services and commodities it provides, such as food and other resources. Changes in ecological systems that affect these products have direct economic impacts that we can and should use valuation methods to measure. People often value ecological systems for reasons other than the commodities or services that they provide, however, and economists have identified and classified some of these nonuse values. Thus, the *existence value* of an ecological system is the value people place on knowing that the system exists, even if many of the people who value the system in this way never intend to visit or use the services of such a system. An *option value* of an ecological system is the value of knowing that one has the opportunity of using a resource in the future. The *bequest value* of an ecological system is the value people place on being able to pass on a natural resource to one's descendants and to future generations.

Recognizing and measuring the nonuse values of ecological systems marks a significant improvement in the attempt to design valuation methods that reflect what matters to people. But the controversies described in the previous section are not resolved solely by the inclusion of nonuse values. Again, those who claim that there is a single pure intrinsic value – well-being – will interpret the existence value of ecological systems as a kind of instrumental value. It reflects the contribution of simply knowing that an ecological system exists or is being protected to the happiness or welfare of someone. For those who claim that an ecological system (or things that live in an ecological system) has pure intrinsic value, however, measures of existence value might not accurately capture what they regard as important. For example, some people believe that we have duties of stewardship that require us to protect certain ecological systems and pass them on to future generations. The requirements of such duties might not be comprehended by attempts to measure existence, bequest, or other nonuse values of an ecological system, because these values are to be understood as a component of happiness or well-being. The attitudes and actions that people regard as appropriate responses to the belief that we have duties of stewardship to nature might require might require a different kind of assessment.

3. Valuation and Decision Analysis

The value of ecological systems and services must be regarded as a social or collective value, and this fact raises further issues for valuation methods. If someone has a monistic conception of pure intrinsic value that reduces such value to human welfare or happiness, the appropriate valuation methods might try to measure the value of changes in an ecological system and the services it provides to each of the affected individuals, and then aggregate the costs and benefits to determine the social value. If ecological systems are regarded as having intrinsic value, however, then this value may instead be an example of an intrinsic social value, which valuation methods must either attempt to measure directly or leave to other kinds of judgment.

These issues are related to how we understand the proper role of valuation methods in making decisions and policies. If we could agree on a monistic conception of intrinsic value, then it may be possible for valuation to provide a complete ranking of the desirability of all decision alternatives. For example, if the value of all the consequences of different alternatives could be captured on a single scale – e.g., a monetary scale reflecting aggregated willingness to pay for some change – then one could in principle have a ranking of all the alternatives.

There are several reasons to doubt the feasibility of such an ambitious scope for valuation. These include the difficulties of measuring the many kinds of non-marketed goods involved in ecological systems and services; the difficulties of finding ways of aggregating costs and benefits across different individuals and groups; and the challenge of resolving disputes about the plurality and commensurability of different values.

Partly as a response to these difficulties, some people have attempted to develop, use, and defend non-economic approaches to valuation. For example, some ecologists have argued that we could measure the value of an ecological system by estimating the natural capital contributed by ecological systems and their services, or by measuring its embodied energy. Alternatively, some psychologists and political philosophers, for different reasons, have emphasized the need to focus on procedures that enable people, individually or in groups and representative bodies, to construct values and make decisions about tradeoffs by examining the reasons that support different intrinsic values. These methods tend to be less well developed than economic approaches to valuation, and, needless to say, they are no less controversial.

4. Valuation Methods

Economists typically classify the value of *ecological services* in terms of four categories of benefits. They are:

- *Market benefits*, which include how changes in an ecological system affect the supply and quality of products that are bought and sold, e.g., commercial fish or timber;
- *Non-market benefits*, which include consumptive or non-consumptive uses of ecological services that are not directly marketed, e.g., recreational fishing or wildlife viewing;
- *Indirect benefits*, which include services that provide indirect support for ecological resources, e.g., the capacity of wetlands to recharge groundwater, or the capacity of forests to sequester carbon; and
- *Nonuse benefits*, e.g., the existence value of a resource that someone never intends directly to use.

Valuation methods for ecological services can be characterized as ways of measuring these different benefits. These can be broadly classified as follows:

- *Market methods* measure the effects of changes in the quality or stock of a marketed ecological service on price and quantity of output, and the economic consequences of these changes;
- *Revealed preference methods* measure the instrumental value people place on ecological services using data from actual choices individuals make in related markets. These methods include such techniques as recreational demand models, hedonic property models, and averting behavior models; and
- *Stated preference methods* allow economists to measure the instrumental value of ecological services using as data the responses individuals give in surveys and focus groups. These methods attempt to measure a willingness to pay for ecological services through techniques such as contingent valuation or conjoint analysis.

Part of the value of *ecological systems* is the services they provide, and of course this part of the value can be captured by the valuation methods for ecological services. For reasons discussed above, however, the greatest controversy in the use of valuation methods for ecological systems surrounds their non-service component. Economists generally attempt to apply stated preference methods to measure the nonuse values of ecological systems. For example, some research attempts to measure how much better people feel that various wildlife species are alive and well. Other research attempts to elicit a willingness to pay for such benefits as the protection of visibility in national parks. EPA currently uses the results of this and other research to measure the value of changes in ecological systems.

More recently, ecologists have contributed to the development of these methods in other ways. For example, as our knowledge of ecological systems increases, we improve our ability to identify the role of different stressors in a system, the sources of energy within a system, the role of species diversity in a system, and other factors that contribute to the health of an ecological system. We can thus begin to value changes in the components of an ecological system, relative to the health of the system as a whole.

We need also to seek a deeper understanding of the philosophical and psychological issues involved in understanding environmental values and the appropriate methods for expressing and assessing those values. Deciding on these methods is a task for the political process. The goals include finding the appropriate role for valuation methods in procedures for making different kinds of environmental decisions. It requires developing clear ways of communicating not only the nature of the values expressed and included in valuation methods but also the values these methods do not express.

Valuing the Protection of Ecological Systems and Services: Lessons from the Risk Assessment Experience[1]

Dr. Joseph L. Arvai, The Ohio State University and Dr. Paul Slovic, University of Oregon[2]

1. Introduction

Risk is not something that can be "measured" in a traditional sense like the number of trees per hectare of forest or the number of fish in a stretch of river; it is a subjectively derived concept used to provide meaning for "things, forces, or circumstances that pose danger to people of to what they value (National Research Council 1996)". As such, comprehensive appraisals of risk necessarily reflect technical, social, and affective considerations. The technical side has been extensively studied, focusing on the acquisition of scientifically-derived information relating to the probabilities and predicted consequences of exposure in evaluations of the severity of risks (e.g., see Ropeik and Gray 2002 for a recent review). Although these probabilities and consequences have often been assumed to result from physical and natural processes in ways that can be "objectively" quantified, much social science research has rejected this notion, arguing instead that risk is inherently subjective (Slovic, 1999). Even the simplest quantification, based on counting fatalities, is value-laden, as it treats deaths of the old and the young as equivalent as well as neglecting to value pain and suffering or voluntary vs. involuntary exposure to the cause of death.

Research has also shown that the public has a broad conception of risk, qualitative and complex, that incorporates considerations such as uncertainty, dread, catastrophic potential, controllability, equity, risk to future generations, and so forth, into the risk equation. There are legitimate, value-laden issues underlying the multiple dimensions of public risk perceptions. For example, is risk from cancer (a dreaded disease) worse than risk from auto accidents (not dreaded)? Is a risk imposed on a child more serious than a known risk accepted as voluntary by an adult? Are the deaths of 50 passengers in separate automobile accidents equivalent to the deaths of 50 passengers in one airplane crash? Is the risk from a polluted Superfund site worse if the site is located in a neighborhood that has a number of other hazardous facilities nearby? The difficult questions multiply when outcomes other than human health and safety are considered.

Thus experience and analysis have shown the process of risk assessment cannot be free of value judgments. In addition, judgments about the nature and severity of environmental risk inevitably incorporate implicit understandings about such factors as the theoretical basis of a hazard, causality, and uncertainty. These factors are by no means universally shared even within similarly situated expert groups (Jasanoff 1999) but are nevertheless important in how they influence the way in which research is conducted (and conclusions from research are drawn). It is these judgments that lead to the selection and implementation of alternative research approaches by researchers in the same field to learn about the same problem, the collection of data that both supports and refutes identical hypotheses, and the inevitable scientific controversies that follow.

Technical "experts" can also gain insights from the lay public about the types of information about a risk that ought to be collected. Non-scientists routinely have in their possession critical

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[1]Prepared for the EPA Science Advisory Board Committee on Valuing the Protection of Ecological Systems and Services, 13 August 2004.

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information that can be used either to help ascertain the validity of the assumptions that underlie scientific assessments of risk or as data in and of themselves. Wynne's oft-cited study of post-Chernobyl Cumbrian sheep farming (Wynne 1989, Wynne 1992) is perhaps the best example of this observation; Wynne concluded that technical experts committed several errors in analysis leading them to underestimate the risks from the Chernobyl accident. Had local farmers been meaningfully involved in the risk assessment process, a more accurate risk assessment—informed by farmer's specialized, practical knowledge of soil variations in their farming areas—would likely have resulted.

A recognition or these (and other) factors inherent in the identification and measurement of risk leads to the need for more deliberative approaches, which can enable risk assessment—and on a broader scale—environmental decision making to become a more inclusive process, with multiple access points for dissenting or minority views, and local or non-expert perspectives (Jasanoff 1999). This need is best addressed not through the creation of new (or a straightforward switch to alternative) methods for assessing risk but rather through a redefined role for risk characterization. In this more deliberative model (Figure 1), risk characterization is conducted with a diverse group of participants that reflect not only traditional technical expertise (e.g., scientists such as economists and ecologists) but also—dictated by the needs of a specific situation—a broader set of "stakeholders" (e.g., members of interested or potentially affected parties, elected officials, etc.). Throughout this process of risk characterization, the assessment of risk is driven by an "analytic-deliberative" process. Inclusive deliberations help to define the overall risk (i.e., to what or to whom, when, and how) to be assessed and provide insight to analysts about ways in which the assessment and its subsequent interpretation ought to take place. Sound analysis, in turn, provides much needed information on which to base these deliberations. In this sense, risk characterization is not simply a synthesis of the information obtained through risk assessment; it is an important shaper of the risk assessment process (National Research Council 1996).

2. On the Parallel Between Risks and Values

Assessing the value of protecting ecological systems and services is much like assessing risk in many respects. Besides the obvious fact that "valuing protection" necessitates consideration of risk, the value of ecological systems and services is, like risk, multiattribute in its nature. The value of a fishery, for example, reflects many variables including among others the market price of fish, the estimated health and stability of the ecological system from which the fish are drawn, the state of the job market in the fishing industry, and a variety of other social factors that describe quality of life in industry-dependent communities. The relationship between these variables is non-linear, open to interpretation, and subject to dispute. Moreover, one is likely to obtain very different estimates of the value of the resource—fish in this case—when comparing one variable with another (e.g., expert-derived market price vs. equally valid and insightful self-reports of quality of life in industry-dependent communities).

In addition, established markets for many systems (e.g., undeveloped wetlands, scenic vistas, migratory flyways, etc.) and services (e.g., the CO_2 scrubbing potential of a forest, the nutrient filtering capabilities of a wetland, etc.) do not exist. As in the case of risk assessment, the assumptions that underlie judgments about the worth of these systems—or even judgments about how to best measure their value—are value-laden and unlikely to be universally accepted.

Even when established markets for ecological systems do exist (e.g., for timber, energy, etc.), the value of a resource (i.e., the product of an ecological system) is prone to dramatic increases or decreases based on subtle shifts in human perception (or, at risk of confusing terms, *values*). In Oregon, for example, the value of timber from areas that are home to northern spotted owls (*Strix occidentalis caurina*) was judged by many to be eclipsed by the intrinsic habitat value of these forests. In British Columbia, simply giving the label of "old growth" to a forest—regardless of its actual ecological classification—results in its timber being unsaleable regardless of its price in many European markets. More recently, the value of crude oil has risen sharply over concerns about political instability and threats of terrorism (i.e., affective responses) despite nominal shifts in supply and demand.

Overall, alternative viewpoints permeate the assessment of value just as they do the assessment of risk; the value of an ecological system or service reflects judgments from a variety of different actors during many stages of the valuation process (e.g., the identification of the system or service to be valued, choices about methods for analysis, how value will be characterized). As a result, to be comprehensive (to the extent possible) and defensible, estimates of value must go beyond (but not necessarily discount) the judgments of the relatively insulated expert community to also reflect a careful and comprehensive assessment of key concerns of the lay public and interested and affected stakeholders. For these reasons, the lessons from the risk assessment experience seem to apply to the current question of how to improve techniques for valuing the protection of ecological systems and services.

3. An Analytic-Deliberative Approach to Assessing Value

As in the case of contemporary views of risk assessment, the analytic-deliberative approach discussed by the National Research Council (1996) for use in characterizing risk can be adapted to characterize the value of ecological systems and services (Figure 2). In the form of guidance to the EPA, such an approach is a logical step forward as it is an extension of the previously developed framework and guidelines for ecologic risk assessment (Environmental Protection Agency 1992, Environmental Protection Agency 1998). These documents emphasize the importance of stakeholder deliberation (which includes representation from technical experts alongside other interested and affected parties) during the process of problem formulation, which includes the selection of assessment endpoints (i.e., the attributes of risk to be assessed), review of the conceptual models (or key assumptions and uncertainties), and adjustments—as needed—to the analysis plan (through iteration and feedback within the consultative group).

Once again, problem formulation—or in this case, developing an in-depth understanding of the system or service to be valued—is an important component of the valuation process. In order to carry out a defensible assessment, the appropriate attribute(s) that will become the focus of technical analyses must first be identified. As scientific documents, valuations by definition ought to be informed by experts' knowledge about ecological systems and services. In addition, analytical choices for those valuations should also be informed by information and insights from non-expert stakeholders about what attributes of a system or service they value and why. The reason for involving a broad group consisting of experts alongside interested and affected parties is simple: Assessed values will not be of any use if they address attributes of a system or service that are not of interest to those that will be affected by a decision. For example, one of the attributes that describes the value of a fishery is the number of jobs created during the fishing season. To many members of an industry-dependent community, however, the *number* of jobs is of secondary concern to the long-term *stability* of those jobs. Providing the members of such a community with an opportunity to make concerns such as these (a) known to experts designing and implementing a technical analysis and, when appropriate, (b) included as an attribute of value to be formally assessed (by experts) is key to a defensible assessment. It is important to stress that—as noted above—formal valuation exercises are an essential part of an analytic-deliberative approach; bypassing the formal valuation step and moving directly to the decision-making stage without any explicit valuation exercise would be counterproductive. In other words, insight from stakeholders only helps to identify and define the attributes of an ecological system or service. Formal assessments of value in the context of these attributes must still take place[3]. Finally, a defensible valuation process is also contingent upon a process that is open to iteration and feedback; analysis helps to frame deliberations and deliberation informs analysis. As is the case with risk characterization, assessing value in this manner is a process of synthesis that depends upon the previous steps in the process.

Such an approach would draw on research and methods from the social, behavioral, economic, and decision sciences to enhance the usefulness and improve the validity of ecological and economic analyses conducted as part of valuation assessments. Just as the National Research Council's report on risk characterization serves as a set of guidelines for the risk science community, and EPA's risk assessment guidelines inform Agency risk assessment, specific guidelines for the involvement of interested and affected parties in Agency valuation efforts (and consistent implementation of those guidelines) would improve the quality, transparency, and credibility of individual valuations and the Agency's ecological protection actions as a whole.

The Committee's objective in recommending such guidelines is to improve the science basis for valuation by providing important insights to the Agency regarding how to comprehensively conceptualize and assess value, not to shift responsibility for Agency decision making to some yet-to-be-defined policy process. The Committee acknowledges—as the SAB has stated previously (SAB 2001)—that high-quality science-based environmental decisions combine scientific understanding and insights with an appropriate set of value judgments that reflect the preferences and concerns of interested and affected parties, and EPA's obligation to protect environmental health and welfare. To this end, insights from both expert and non-expert participants will be relevant and important to the valuation process, which is only one aspect of the environmental decision making process that follows.

In the end, designing appropriate processes for public involvement in valuation will take effort. The Agency will benefit from research about and subsequent guidelines on how a facilitator structures the problem in a participatory process, selects those chosen to represent various stakeholder interests, and chooses to navigate the process. Indeed, an analytic-deliberative approach for assessing value—like other approaches—will not be free of subjective value judgments, just as any technical economic or ecological analysis will be influenced by the choices made by the expert in defining ecosystem services. The Committee advises the Agency to develop processes to make judgments and choices for all these different approaches to valuation transparent. Finally, the Agency needs to plan for the resources needed to conduct analytic-deliberative valuation efforts. The level of effort that will be required in any given activity will be situation specific. Readers of this brief overview should not leave it with the impression that all cases of value assessment will require lengthy deliberation periods. Indeed, there will be many cases where the attributes that together comprise the value of an ecological

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[3] Of course multiple assessments of value for attributes of the same system or service—when derived—are likely to yield conflicting results. The assessed value for certain attributes might be higher than for others. An analysis of tradeoffs or the creation of a model that incorporates information from these assessments to form a single estimate will be required to reconcile these conflicts.

system or service are straightforward and open to fairly easy analysis. In other cases, the value of the benefits as defined by a defensible metric will so far outweigh the costs (or vise versa) that further analysis is not necessary. Careful attention should be paid, however, to the products of initial deliberations to determine the level of specificity that will be required of the valuation process. The concerns expressed by even a small set of key stakeholders working alongside technical experts will go a long way towards helping to define the level of effort that will be required during the analysis.

4. References

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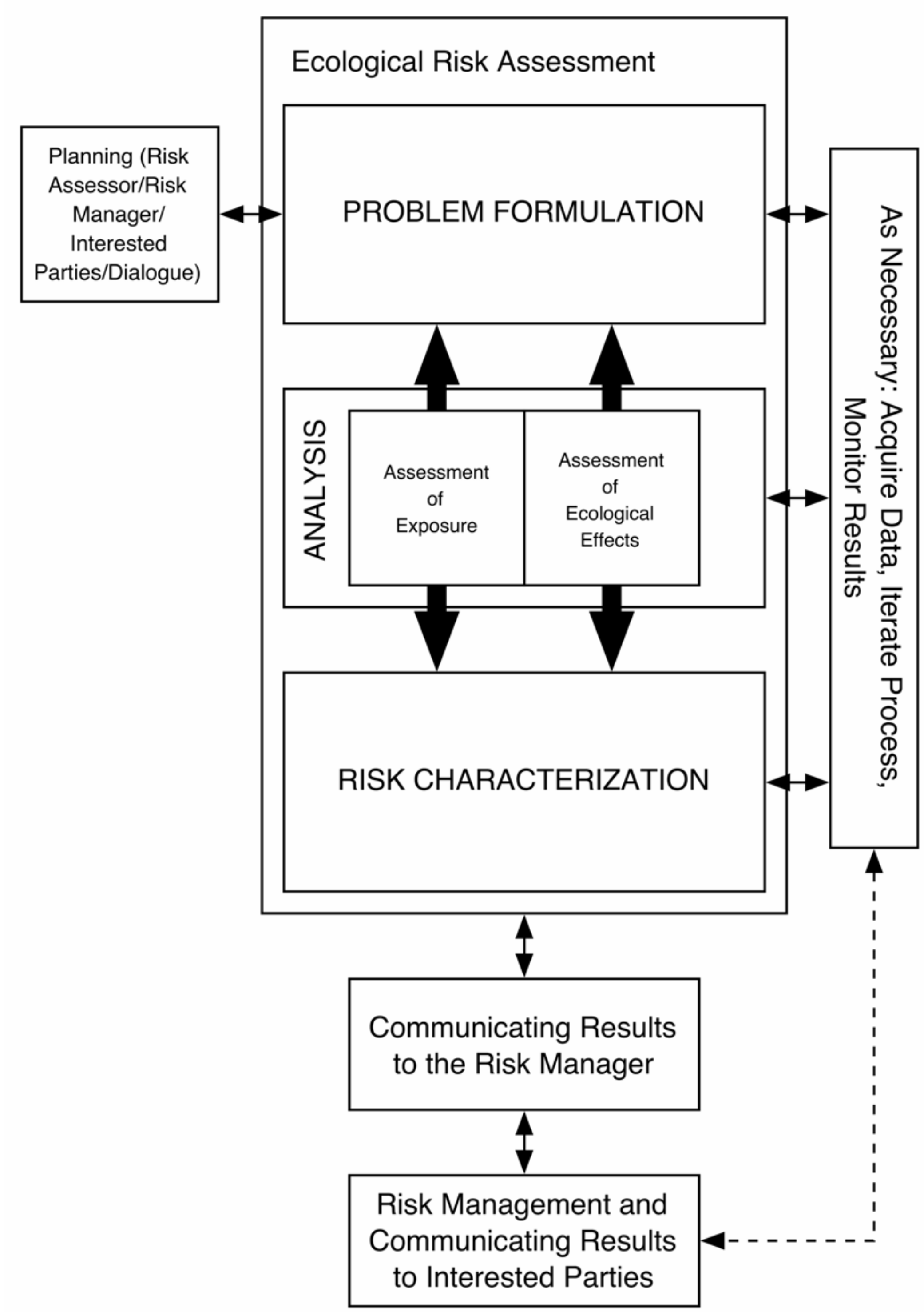

Figure 1. Framework for ecological risk assessment based on the recommendations from the National Research Council (1996) and U.S. EPA (1992). Adapted from U.S. EPA (1992).

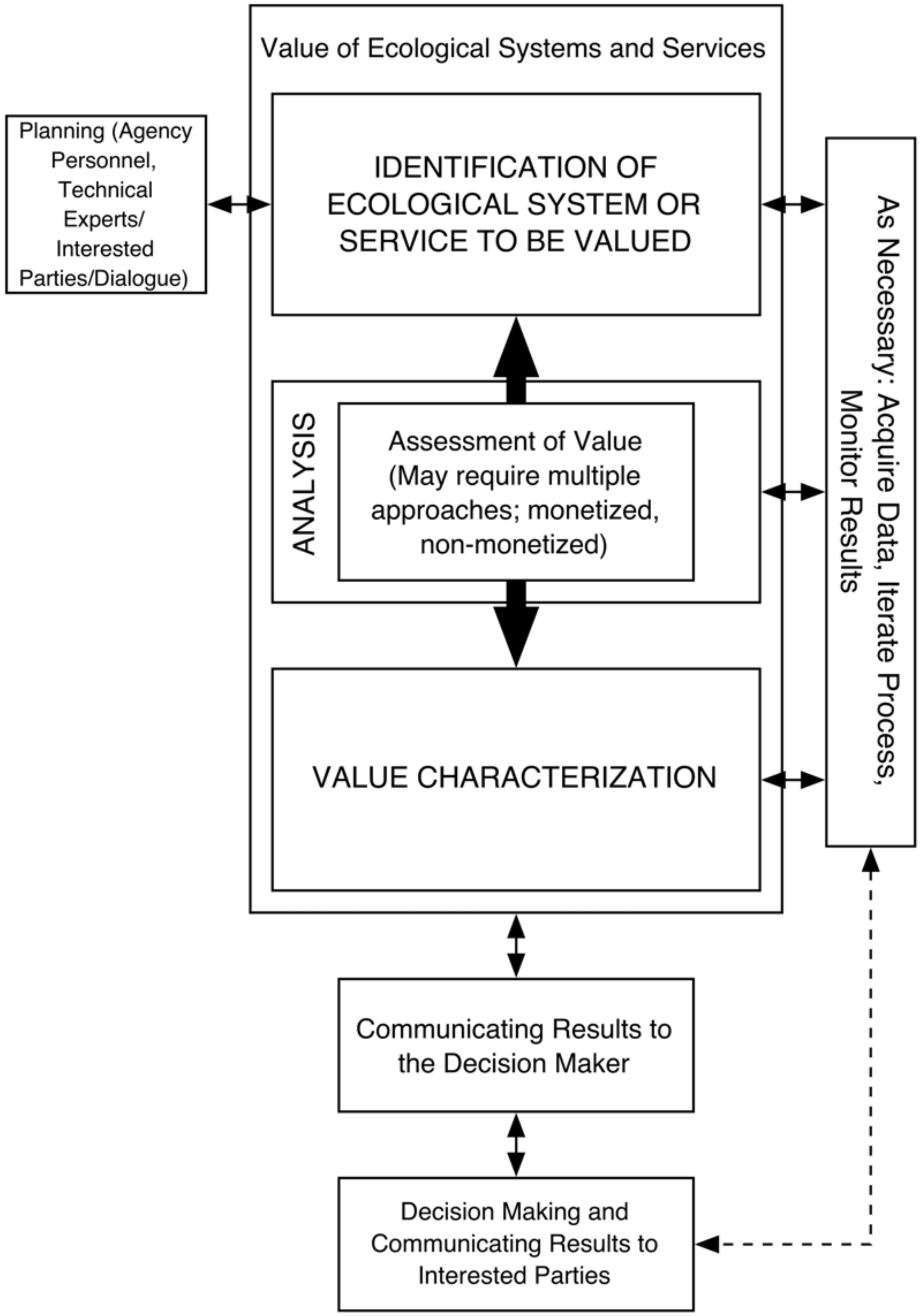

Figure 2. Framework for assessing the value of ecological systems and services based on the recommendations from the National Research Council (1996) and U.S. EPA (1992). Adapted from U.S. EPA (1992).

Draft 8/25/2004
Agenda for 8-25-04 Teleconf no call-in #

Proposed Agenda
EPA Science Advisory Board
Committee on Valuing the Protection of Ecological Systems and Services
Advisory Meeting
Sept. 13, 14, 15, 2004
US EPA Region 9 Headquarters Office, 75 Hawthorne Street, San Francisco, CA 94105

Purpose: The purpose of the meeting is for the Committee to focus on EPA regional science needs, work-products, and activities related to valuing the protection of ecological systems and services by holding panel discussions, briefings, and break-out groups. All of these activities are related to the Committee's overall charge, *to assess Agency needs and the state of the art and science of valuing protection of ecological systems and services, and then to identify key areas for improving knowledge, methodologies, practice, and research.*

Monday, Sept. 13, 2004

1:00-1:10 p.m.	Opening of Meeting and Welcome from the SAB Staff Office	Dr. Angela Nugent, Designated Federal Officer Dr. Anthony Maciorowski, Associate Director for Science
1:10-1:20	Chair's Orientation to the Purpose of the Meeting	Dr. Domenico Grasso, Chair
	Committee Member Introductions	Committee Members
1:20-1:45	Welcome from EPA Region 9 and Questions from the Committee	Ms. Alexis Strauss Director, Water Division
1:45-3:15	Briefings and Committee Discussion Highlighting Some Region 9 Issues	
	1:45-2:30 Agriculture in Region 9	Mr. John Ungvarsky, Water Division, Region 9;
	2:30-3:15 Water Issues in Region 9	Ms. Karen Schwinn, Water Division, Region 9 and Others TBD
3:15-3:30	Break	
3:30-6:00	Field Trip: Arrowhead Marsh	

Draft 8/25/2004
Agenda for 8-25-04 Teleconf no call-in #

Tuesday, Sept. 14, 2004

8:00-8:05	Opening of Meeting	Dr. Angela Nugent
8:05-8:40	Survey Of Regional Needs For Science-Based Information On The Value Of Protecting Ecological Systems And Services And The State Of Practice In The Regions - Briefing and Initial Committee Questions	Ms. Patti Lynne Tyler Regional Science Liaison to ORD U.S. EPA Region 8
8:40-10:15	Briefings on Innovative Methods Addressing Regional Issues	
	Comparative Valuation of Ecosystem Services: Lents Project Case Study	Mr. James Middaugh, Endangered Species Act Program Director, Bureau of Environmental Services, City of Portland and Ms. Gillian Ockner, David Evans and Associates, Inc.
	Science to Inform Policy and Decision Making	Dr. Richard Berhkopf, US Geological Survey Western Geographic Science Center Research Projects
10:15-10:30	Break	
10:30-12:00	Committee Discussion of Survey Of Regional Needs For Science-Based Information On The Value Of Protecting Ecological Systems And Services And The State Of Practice In The Regions	Lead Discussants: Drs. Dennis Grossman, Stephan Polasky, and Ann Bostrom (to be confirmed)
12:00-1:15	Lunch	
1:15-1:45	Briefing on Example Exercise Session 1: Benefit Analyses for Critical Ecosystems in Region 4	Mr. Richard Durbrow, EPA Region 4
1:45-3:30	Example Exercise Break Out Groups, Session 1	Break out Group Leader: Dr. Paul Risser
3:30-3:45	Break	
3:45-5:00	Continuation of Session 1Example Exercise Break Out Groups,	

5:00-5:30	Reports from Session 1 Break-Out Groups	
5:30-6:00	Discussion of Next Day	Dr. Domenico Grasso
6:00	Adjourn	

Wednesday, September 15, 2004

8:00-8:05	Opening of Third Day of Advisory Meeting	Dr. Angela Nugent
8:05-8:30	Briefing on Example Exercise Session 2; Region 9 Topic (Either Johnson Atoll Example or Clean-up Example)	TBD Region 9 Presenter
8:30-10:30	Example Exercise Break Out Groups, Session 2	Break out Group Leader:
10:30-11:00	Reports from Session 2 Break Out Groups	
11:00-11:30	Discussion of Next Steps	Dr. Domenico Grasso
11:30	Adjourn	