Estimating Nonmarket Environmental Values

Purpose. This guidance describes when and how to consider nonmarket environmental values in the Bureau of Land Management's (BLM) resource management plans (RMP) and environmental impact statements (EIS).

Background. Nonmarket environmental values (or simply "nonmarket values") provide estimates of the benefits individuals attribute to experiences of the environment or uses of natural resources that do not involve market transactions and therefore lack prices. Examples include the benefits received from hiking in a wilderness or fishing for subsistence rather than commercial purposes. While nonmarket values are commonly expressed in monetary terms, this is not always practical or appropriate. Many environmental values, such as the spiritual significance of the San Francisco Peaks for the Hopi Tribe, should be characterized in other ways, for example by conducting interviews with tribal members. The focus of this guidance, however, is on the estimation of such values through economic techniques. In a recreation context, for example, nonmarket values can be estimated through *revealed preference* methods, which examine recreationists' behavior, such as the time spent and distance travelled to visit specific recreation sites. Such values can also be estimated through a variety of *stated preference* methods that ask users directly or indirectly what they would have been willing to pay for particular recreational experiences.

The estimation of nonmarket values is not new to the BLM. The BLM's first director, the economist Marion Clawson, contributed to the development of the travel cost method of nonmarket valuation. The BLM issued guidance on the use of nonmarket values in 1982, if not earlier. Litigation over compensation for the 1989 *Exxon Valdez* oil spill in the Gulf of Alaska created a prominent role for nonmarket valuation as a basis for estimating the losses to the native subsistence fishery, and stimulated extensive academic research. Nonmarket valuation has a prominent place in the Department of the Interior's regulations for conducting Natural Resource Damage Assessments of events such as oil spills, which were revised in 2008 in part to provide better guidance on selecting valuation methods (43 CFR 11.83). Over the past 20 years, nonmarket valuation has been used in a variety of federal resource decision contexts.

The BLM's Land Use Planning Handbook Appendix D encourages inclusion of information on nonmarket values, but does not provide detail. A growing number of public comments on RMPs and project-level EISs emphasize the need for nonmarket valuation to supplement market-based estimates of income and employment. As a result, BLM planners and other staff have requested guidance on the use of nonmarket values.

This guidance explains the use of nonmarket values in resource management decisions, suggests criteria for including consideration of nonmarket values, provides information on selecting the most appropriate valuation method, offers recommendations on using nonmarket values effectively, and provides a list of resources and examples.

Market and nonmarket environmental values. The request that the BLM identify nonmarket values when assessing plans and projects reflects a concern regarding the economic benefits of

commodity production (oil and gas, coal, hard rock mining, grazing, and timber), commonly identified and quantified in RMPs and EISs. Economic methods are readily available for measuring the flow of income and employment resulting from the extraction of commodities. For example, an oil and gas development EIS presumes a certain number of wells developed over a specified period of time and operated by a workforce that can be estimated reasonably well. Through economic impact models, economists can then work "upstream" to estimate the purchases that oil and gas operators will make from other firms, and "downstream" to estimate how much their employees' wages will contribute to other businesses throughout the local economy.

To follow this example, if oil and gas development represents a new use, then the "no action" alternative most likely involves managing for some combination of habitat conservation and recreation. While this may be straightforward from a management standpoint, for economics this is problematic. Herds of antelope do not pay user fees to graze on the public lands. Visiting fishers, hunters, and climbers may spend money on motels and restaurants, but for the most part recreation on BLM-managed lands comes free or at a nominal charge. Thus, much of the value that humans might place on maintaining lands for conservation and recreation is never measured in the market economy. Those asking the BLM to consider nonmarket values are, in effect, saying that we should replace that "zero" with a more useful number.

Be cautious in comparing market and nonmarket economic values. Nonmarket data can assist resource decisionmaking in several ways. These include revealing the magnitude of non-commodity values, clarifying the range of non-commodity values potentially affected by management decisions, identifying tradeoffs, and better differentiating stakeholder groups. But dollar estimates of willingness to pay for a non-commodity benefit are not directly comparable to dollar estimates of personal income to be generated by a commodity use. A strict cost-benefit comparison is not appropriate between these dissimilar types of economic data.

When to analyze nonmarket values. Given the variety of proposed actions and environmental contexts analyzed in RMPs and EISs, there are no criteria that should invariably trigger the analysis of nonmarket values. The following factors support the consideration of nonmarket values.

- A proposed action is likely to have a significant direct or indirect effect (as defined at 40 CFR 1508.8 and 1508.27), and the quality or magnitude of the effect can be clarified through the analysis of nonmarket values. For example, a proposed wind energy installation may affect the viewshed of a nearby community in ways that alter scenic values.

- The alternatives to be considered present a strong contrast between commodity and non-commodity uses of land and resources, for example between managing lands primarily for oil and gas development or habitat conservation, or if the magnitude of the proposed change is large.

- The use of nonmarket economic valuation methods would contribute to the analysis of an issue to be addressed in the RMP or EIS (see BLM National Environmental Policy Act Handbook, H-1790-1, Section 6.4).

Choosing the appropriate valuation method. Select an approach to quantifying nonmarket economic values that is appropriate for the type of information needed, well recognized in economic theory, and cost-effective. *Note that all studies of nonmarket values, whether involving revealed or stated preference methods, require economic expertise to design and interpret.* See References 1, 2, and 3 for information on nonmarket valuation methods. Here are some guidelines for their use.

(1) Emphasize the analysis of use values rather than non-use values, whenever feasible. In the terminology of environmental economics, *use value* refers to the benefits an individual derives from some direct experience or activity, such as climbing a spectacular peak. In contrast, *non-use value* refers to the utility or psychological benefit a person derives from the existence of some environmental condition that may never be directly experienced: an unspoiled Grand Canyon or the reintroduction of wolves to the Rockies. Use values have a behavioral dimension: people *do* things that reflect the values they place on certain environmental goods, qualities, or experiences. This is far less true of non-use values. The estimation of non-use values has a recognized place in the environmental economics literature, but for purposes of estimating the benefits of proposed resource management actions, focus on use values whenever possible.

Data concerning use values will be better grounded empirically and thus easier to justify than data on non-use values. For example, combining individual responses to estimate the total nonmarket benefit resulting from an environmental decision (the average value times the estimated population "willing to pay" for the specific environmental benefit) is far more arbitrary if there is no clearly identifiable group of users. The issue of whether to open the Arctic National Wildlife Refuge (ANWR) for oil and gas development attracted attention world wide. It is not clear whether the total non-use (existence) value of preserving ANWR as wilderness should be estimated for the population of the state of Alaska, the United States, or the world.

(2) Both revealed and stated preference methods can be useful, but revealed preference methods are often simpler to implement and less contestable. Revealed preference methods derive economic value from an individual's behavior. Stated preference methods use an individual's stated "willingness to pay" for an environmental use (or "willingness to accept" the loss of a use) to calculate value. In some cases stated preference approaches can more precisely target the nonmarket values of interest than can revealed preference approaches. The decisions to be made, the values to be estimated, and the ease of obtaining the data will determine which approach—and which specific technique—to use.

Revealed preference methods include travel cost and hedonic pricing.

- The *travel cost method* examines data on visitor travel patterns to a particular recreation site (considering expenses incurred and time spent) to estimate the value visitors place on that experience.

- The *hedonic method* looks for price differences among otherwise similar goods that differ in a particular environmental attribute. For example, the difference in sale price for otherwise similar homes in the same general location but with very different views (a parking lot versus an undeveloped mountain meadow) provides an indirect way to estimate the value placed on views of mountain meadows.

Stated preference methods, which can be used to quantify both use and non-use values, include contingent valuation and choice experiments.

- *Contingent valuation* uses surveys to identify the dollar value individuals would hypothetically be willing to pay to preserve some environmental benefit. Such questions can be posed in a variety of ways.

- *Choice experiments* also use surveys to elicit willingness to pay, but here the choices are made among sets of multiple attributes. For example, a questionnaire on forest management might describe alternative management prescriptions with different options for the spacing of roads, treatment of dead and dying trees, and techniques of riparian protection, as well as the hypothetical payment the respondent would make to value each alternative. This method elicits economic values for sets of choices that more closely resemble the BLM's management decisions than do the simpler questions used in contingent valuation, but such surveys are correspondingly more complex to design and interpret.

Stated preference methods such as contingent valuation are widely used in environmental economics, but remain controversial, particularly when applied to quantifying non-use values. There are, however, generally accepted guidelines for how best to design stated preference surveys to maximize their reliability.

(3) Consider applying estimates of nonmarket values from existing studies. Unlike conventional economic data on prices, income, and employment, which are routinely compiled by the federal government, nonmarket valuation studies are produced on a case-by-case basis. This can be a lengthy and expensive process. A faster, cheaper way to obtain nonmarket values is to apply a figure representative of the nonmarket values documented for comparable sites and activities. This approach, termed *benefit transfer*, is most practical for estimating values associated with recreational activities, which have been studied extensively. Unfortunately, unless the environment and use for which nonmarket values are available are truly similar to those for which values are needed, benefit transfer can be very inaccurate. (See Reference 4.)

Other recommendations. Considering the following points in developing and utilizing data on nonmarket values.

(1) Ensure that there is a clear relationship between the nonmarket values sought and the issues to be resolved. Here are some examples of the use of nonmarket values for resource management.

- The King Range National Conservation Area's resource management plan has a short discussion of nonmarket values of recreation to supplement market information in the socio-economic portion of Affected Environment chapter. (See Reference 5.)

- In developing an RMP to manage scattered tracts along the Little Snake River, the Wyoming State Office obtained nonmarket values "to quantify attitudes and economic values toward alternative ways of managing, selling or trading scattered tracts of BLM-

administered lands." The management alternatives included increased recreation, enhanced wildlife habitat, and increased mining and grazing. (See Reference 6.)

- The California State Office assessed the social and environmental benefits associated with the BLM's Community Assistance and Hazardous Fuel Programs, considering "*both* the market-based and nonmarket values that are at risk from wildfire." (See Reference 7.)

- The National Park Service is proposing to analyze nonmarket values to better understand how water allocation decisions would affect the resources of Park System units along the stretch of Colorado River that includes Glen Canyon National Recreation Area, Grand Canyon National Park, and Lake Mead National Recreation Area. (See Reference 8.)

(2) Get professional support. Nonmarket valuation studies require appropriate economic expertise. For those state offices without an economist on staff, there are two alternatives: (a) The BLM's National Operations Center has established interagency agreements with the Forest Service and the U.S. Geological Survey to provide social and economic assistance to state and field offices. Contact the Division of Resource Services for information. (b) The Cooperative Ecological Studies Units (CESU), regional networks of federal agencies and universities in which the BLM participates, provide access to many faculty members with expertise in environmental or ecological economics. Information is available at: http://www.cesu.psu.edu/.

(3) Take a collaborative approach in designing an analysis of nonmarket values. Seek buy-in from cooperating agencies and other key stakeholders on the objectives and methods of the study. This may forestall a challenge by commodity users or others who may be skeptical about the fairness and validity of nonmarket analyses.

(4) Allow adequate lead times when planning to use nonmarket value surveys. Identical questions administered to 10 or more members of the public require approval by the Office of Management and Budget (OMB). In estimating project schedules involving stated preference surveys, assume 9-12 months for OMB clearance, in addition to the time needed to develop the questionnaire, administer it, and analyze the results. In some cases, it may be feasible to utilize the results of nonmarket value studies commissioned by other organizations, such as a stakeholder group, without a requirement for survey clearance by OMB. Contact the social science staff at the Division of Decision Support, Planning and NEPA (Washington Office) or the Division of Resource Services (National Operations Center) for further information.

(5) Consider using an ecosystem services framework in estimating the nonmarket values affected by a plan or project. The phrase "ecosystem services" includes a broad range of human benefits resulting from healthy ecosystem conditions and functions. These benefits include potable water from groundwater recharge, flood control from intact wetlands, and carbon sequestration from healthy forests, as well as the individual environmental experiences and uses considered above. Therefore, an ecosystem services framework encourages the analysis of a broader range of non-commodity environmental benefits than those usually considered as nonmarket values. The BLM is currently partnering with the U.S. Geological Survey to assess the feasibility of incorporating ecosystem services values into RMPs and EISs using the San Pedro watershed in southeast Arizona as the pilot area. (See Reference 9.)

Other ways to characterize non-commodity values. The basic challenge in providing a balanced economic assessment is to describe the economic impacts of commodity production in relation to a wider range of economic costs and benefits, not merely nonmarket values. Because obtaining information on nonmarket values usually requires new data collection and analysis, it makes sense to look first for more readily available data on non-commodity values.

(1) Include estimates of expenditures related to recreation and amenity values of BLM-managed lands. The National Visitor Use Monitoring surveys, which the BLM has piloted at a number of field offices, collect data on visitor expenditures. Many gateway communities adjacent to BLM-managed lands can also provide information on recreational visitors and their expenditures.

(2) Identify other sources of income in the local or regional economy associated with amenity values of BLM-managed lands. Non-labor income is one example, a category that includes dividends, rents, interest, and transfer payments such as Social Security. Many areas attracting amenity-based migration experience a growing proportion of non-labor income within the total income stream. This information appears in the reports produced by the Economic Profile System. (See Reference 10.)

(3) Use ethnographic approaches to capture environmental values. One way to identify the values associated with places, landscapes, or resources without trying to quantify nonmarket values is to ask people about them. Federal agencies often use interviews to assess Native American environmental and cultural resource values, documenting how an area or resource is used and why. The same approach can be applied to any community's place-based values. Standard anthropological or sociological techniques provide a good roadmap for designing, conducting, and analyzing a program of interviews on environmental values. (See References 11 and 12.)

References

(1) *Ecosystem Valuation* is a website offering extensive information and case studies on nonmarket valuation techniques, sponsored by the Natural Resources Conservation Service and the National Oceanographic and Atmospheric Administration. Link: http://www.ecosystemvaluation.org/.

(2) For an accessible but technically thorough guide to nonmarket valuation, see Patricia A. Champ, Kevin J. Boyle, and Thomas C. Brown, eds., *A Primer on Nonmarket Valuation*, Springer, 2005, 592 pages. Economists from the Forest Service's Rocky Mountain Research Station have developed a companion website, providing examples of survey instruments, data sets, and relevant articles. Link: http://www.fs.fed.us/nonmarketprimerdata/index.html.

(3) The BLM's course *Socio-Economic Aspects of Planning* is available in a webcast version, and includes a section on the use of nonmarket values. Use the link below to reach the course, select Step 6 (Effects), then select "Valuing Resources." Link: http://www.ntc.blm.gov/krc/uploads/249/social_econ.html.

(4) Randall Rosenberger and John Loomis, *Benefit Transfer of Outdoor Recreation Use Values*. U.S. Forest Service General Technical Report RMRS-GTR-72, 2001. Link: http://www.fs.fed.us/rm/pubs/rmrs_gtr72.html).

(5) *King Range National Conservation Area Resource Management Plan*, 2005. See pp. 3-47 to 3-49 for discussion of nonmarket values. Link: http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pdfs/arcata_pdfs/kingrangefinal.Par.71c73b19.File.dat/chapter3part3.pdf.

(6) John Loomis, *Final Snake River Contingent Value Methodology Study Report*, 2001. Link**:** http://nwcos.org/Resources/BLM%20Documents/Loomis%20BLM%20Snake%20River%20CVM%20Report.pdf

(7) TSS Consultants, *Assessment of the Efficacy of the California Bureau of Land Management Community Assistance and Hazardous Fuels Programs, 2005*. Prepared for the BLM California State Office.

(8) Bruce Peacock, *Economic Values of National Park System Resources Within the Lower Colorado River Basin: A Compilation of Existing Data and Proposal for Future Work*. National Park Service, Environmental Quality Division, Fort Collins, CO, 2009. Link: http://www.usbr.gov/uc/rm/amp/twg/mtgs/09jun22/NH_WhitePaper.pdf.

(9) For an overview of ecosystem services and their valuation see J. B. Ruhl et al., *The Law and Policy of Ecosystem Services*, Washington, D.C.: Island Press, 2007.

(10) The Economic Profile System (EPS) is a database application sponsored by the BLM and the Forest Service that provides easy access to county- and community-level economic and demographic data. This system is authorized for use on all BLM desktops: see IB 2006–124. In addition, county-level EPS Profiles in PDF format for 11 Western States are available for free download from the Headwaters Economics web site. Link: http://www.headwaterseconomics.org/eps/index.php.

(11) Stewart Allen et al., *Values, Beliefs, And Attitudes Technical Guide for Forest Service Land and Resource Management, Planning, and Decisionmaking*. U.S. Forest Service General Technical Report PNW-GTR-788, 2009. Link: http://www.fs.fed.us/pnw/pubs/pnw_gtr788.pdf.

(12) For information on interviewing as a research tool see the federal Human Dimensions website HD.gov. Use the link below to reach the HD.gov home page, select Methods, then select "Interviewing" and "Ethnography." Link: http://www.hd.gov.

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