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How to Value Environmental and Non-Market Goods: A Guide for Legal Professionals

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HOW TO VALUE ENVIRONMENTAL AND NON-MARKET GOODS: A GUIDE FOR LEGAL PROFESSIONALS

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Putting a price on environmental goods may seem impossible. Without a market, how does anyone determine the value of a good? Complicating matters, some environmental "non-market" goods such as pristine wilderness or endangered species may at first seem "priceless." Nevertheless, people will have conflicts that involve environmental goods without markets. Imputing no value at all for environmental goods or declaring them priceless does not allow for negotiation. However, valuing environmental goods is routine for environmental economists, who are equipped with a "toolbox" of valuation and statistical approaches. While damage compensation awards often reflect loss of use, for legal purposes, a complete economic valuation may also include a good's "indirect use," "nonuse," and "existence" values.

This article serves to inform legal professionals about methods that can be used to value the environment, including non-market goods. An in-depth discussion about how to use "stated preference" valuation methodology, is also provided. The take-home message is that accounting stance (that is, who is viewing the problem) matters. For full accounting of an environmental or non-market good, both use and non-use values should be considered. However, each case is different, and it is up to the legal professional to decide what additions and subtractions to make to the ledger and to which side the adjustment should be made.

Use, Nonuse, and Option Values

Environmental goods consist of "use" and "nonuse" values. There are a variety of different methods that can be used to measure each of these dimensions. General examples are provided in Figure 1. Figure 1 is further described in the text that follows, and the concepts described in Figure 1 are provided in a threaded example using petroleum.

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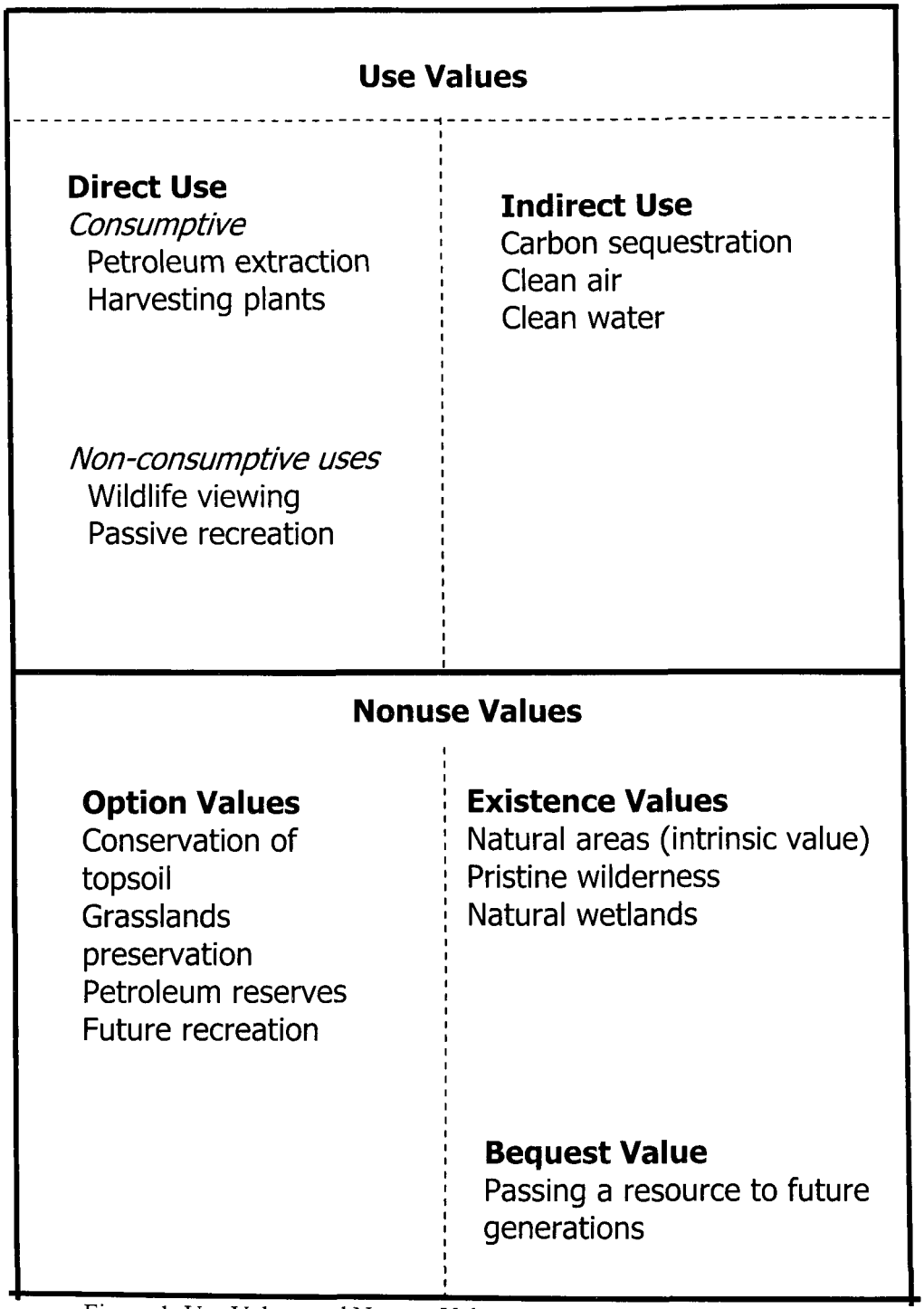

Figure 1. Use Values and Nonuse Values.

Use Values

Use values reflect the most intuitive measure of an environmental good. As shown in Figure 1, the use dimension is divided into two classes: direct use and indirect use. It is critical to recognize that environmental economists use the terms direct and indirect slightly differently when they are dealing with an ecosystem, rather than a regional or national economy.[1] This article refers to "use value" the way it is presented in Figure 1, and in a manner that is consistent with the environmental economics literature.

Direct use in environmental economics occurs when humans utilize a resource. Direct use can be either consumptive or non-consumptive. Economists value direct uses when raw materials are extracted, developed, or cultivated for human ends.[2] Use value is measured as the quantity of the good produced multiplied by the price of the good.[3] A simple example is a forest, where the value of the property is reflected in the number of trees that are harvested multiplied by the price per tree. Determining a good's direct use value is relatively straight forward when there are prices and quantities that are associated with the resource.

The concept of direct use should be relatively intuitive to legal practitioners, who often use this method to determine lost income or wages in damage claims. In the BP oil leak in the Gulf of Mexico, environmental damages could be calculated by lost revenues to BP, whose commodity skimmed the Gulf's shores rather than filling fuel tanks. Likewise, lost income to shrimpers who are no longer able to catch shrimp could also be calculated as damages. With direct use values, the circle of those who experience a loss of use can be greatly expanded. But how big should that circle be? Tongue in cheek, it is only limited by the number of attorneys willing to become involved, which relates to the concept of *transaction costs*. If the value of the lost use is less than the cost of pursuing compensation (which includes costs associated with retaining counsel), then the transaction costs are greater than the amount of the damages and damage claims won't be pursued. Realistically, in the case of large, catastrophic environmental damage, it is likely that a number of legal practitioners will argue that their clients should be included in those who have experienced a direct loss of "use value," because the transactions costs are relatively lower than non-catastrophic events.[4] However,

1. Traditional regional economic valuation studies further break down categories of "use" into direct, indirect and induced values, in order to reflect various economic sectors. In traditional economic studies, direct values stem from the production of a good, such as corn. Indirect values refer to the associate industries, like fertilizer and farm equipment companies. Induced values reflect overall economic health related to the direct and indirect effects, such as an increase in overall household income in a region.

2. *See* JAN G. LAITOS, SANDRA B. ZELLMER, MARY C. WOOD & DAN H. COLE, NATURAL RESOURCES LAW 729-31, 839-41, 922-25 (2006).

3. *See* Valuation of Ecosystem Services, ECOSYSTEMVALUATION.ORG, http://www.ecosystemvaluation.org/1-02.htm (last visited Feb. 17, 2011).

4. FRANKLIN J. STERMOLE & JOHN M. STERMOLE, ECONOMIC EVALUATION AND INVESTMENT

when other economic values are considered, the total economic value may rise significantly higher than the transactions costs.

"*Non-consumptive uses*" are a sub-category of direct uses. These values typically reflect aesthetic quality and recreation. Non-consumptive uses can be quantified, and these values can be considered in addition to direct use values.[5] "Non-consumptive uses such as recreation are generally thought not to be outwardly destructive, but at large enough levels of use, environmental damage may occur."[6] To expand upon the Gulf of Mexico example, non-consumptive uses might include visits to the beach. Valuation of non-consumptive uses consists of two elements:[7] visitor expenditures and local income generated (also known as "value added").

> *Visitor expenditures* include things like food, gas, lodging, and other costs. Most recreation studies calculate expenditures made for that particular trip. Often times the researcher will distinguish whether the expenditures were made close to the recreation site (20-30 mile radius) or in a larger geographical space. It is generally accepted that the further people live from the attraction, the more money people will spend on the activity.
>
> *Local income generated, or "value added"* is a bit more complex, but it is an important measure of economic activity. The purchase of an energy bar at a local convenience store before heading out to the beach adds value to the economy in several different sectors. The purchase has helped pay for the convenience store clerk's wages. This is a gain to the local economy. The transport of the food to the convenience store, the production of the energy bar and the growing of the raw ingredients used to make the sports bar are contributions to the state economy where the energy bar is produced. In other words, almost every purchase that is made is part of a "domino effect" or "multiplier effect" The multiplier effect can be measured on the local, state or national level.[8]

DECISION METHODS 6-7 (12th ed. 2009) (explaining that when use values are considered over time, the time value of money should also be considered. In other words, the loss of $1000 today has a greater impact than the loss of $1000 next year, because of the opportunity cost of the money. For example, one could invest the $1000 today and at a 10% rate of interest, earn $1100. Likewise, a $1000 loss next year is worth less than a $1000 loss this year. Methods such as discounted cash flow can help to determine the time value of money).

5. Catherine M.H. Keske, *High Mountain Ecosystems: How Much Love Can They Sustain?*, *in* ENVIRONMENTAL MANAGEMENT 189, 191 (Santosh Kuman Sarkar ed., 2010), *available at* http://www.intechopen.com/books/show/title/environmental-management.

6. *Id.* at 192.

7. *See* NATURE'S SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS 41 (Gretchen C. Daily ed., 1997).

8. J. B. RUHL, STEVEN E. KRAFT & CHRISTOPHER L. LANT, The LAW AND POLICY OF ECOSYSTEM SERVICES 27-32 (2007). In contrast to regional economic studies, environmental economists don't refer to indirect uses as supporting economic sectors.

Resource use also encompasses "*indirect uses*" derived from an ecosystem, such as carbon sequestration, clear air, or clean water. Indirect use refers to supporting ecosystem functions that are only indirectly related to output. For example, ecosystem services such as the capacity of the Gulf of Mexico to assimilate an oil spill, or a forest to sequester carbon, can provide life-giving services and functions even when humans do not directly use the resource.[9] It would be ideal to know the indirect value of an ecosystem function itself, but this is often not possible.[10] Instead, indirect values are often measured by their affect on direct values.[11] For example, the ability of the Gulf of Mexico to assimilate the 2010 BP oil spill affects direct values that can be measured, such as beach visits, ocean front home prices and shrimp harvests. New and emerging environmental markets, such as the carbon market or conservation easement market, can help with environmental valuation, but they may yield inconsistent price data, making it very difficult to analyze the statistical effect of an environmental good.[12] Therefore, economic valuation of indirect uses often requires supplemental techniques, such as stated preference surveys.[13]

Nonuse values

In contrast to use values, nonuse values arise when humans want to maintain the option of using a resource in the future (otherwise known as "*option value*"), or preserve a resource for the sake of its existence, otherwise known as "*existence value.*"[14] Resource nonuse generates the indirect resources that are received and enjoyed by humans,[15] now or in the future.

Option value refers to the future use value of a resource, whether or not that resource is actually used by humans.[16] For the sake of example, consider Alaska's Arctic National Wildlife Refuge (ANWR). The use value of the petroleum reflects the present price and quantity of petroleum in that reserve.[17] If the petroleum reserve were to be declared off-limits to extraction, the value of ANWR could be measured by the petroleum that could be (but is not) extracted and sold. In the ANWR case, the option value is determined by multiplying the estimated price per

9. *Id.*

10. V. Kerry Smith & Ju Chin Huang, *Hedonic Models and Air Pollution: Twenty-Five Years and Counting*, 3 ENVTL. & RESOURCE ECON. 381, 381-394 (1993).

11. *See, e.g.*, *id.*

12. Catherine M. Keske, Dana L. Hoag & Christopher T. Bastian, *Can the Conservation Easements Market Evolve from Emerging to Efficient?*, 8 W. ECON. F. 10, 10-17 (2009).

13. *Id.* at 13.

14. John V. Krutilla, *Conservation Reconsidered*, 57 AM. ECON. REV. 777, 779-81 (1967).

15. NATURE'S SERVICES, *supra* note 7, at 34-35.

16. There are differences in opinion among economists as to whether "option value" is a sub-category of nonuse or whether it should comprise a third category by itself. *See* NATURE'S SERVICES, *supra* note 7, at 297.

17. The quantity of petroleum available in that reserve may increase over time, as new technology develops to extract marginal petroleum reserves. Likewise, quantity may decrease over time as petroleum is extracted. Price also factors into the supply and demand for petroleum, and hence the value of the oil reserve. *See* STERMOLE & STERMOLE, *supra* note 4, at 133-141.

barrel by the number of barrels that are no longer available in the protected area, and then adjusting for the value of money across time[18] and for risk.[19]

Two other nonuse values are *existence value* and *bequest value*. Existence value refers to the intrinsic value that an environmental good offers a human. This is a challenging, but feasible, measurement. For example, people who donate money to protect wildlife in ANWR or water in the Gulf of Mexico can provide a measure of value for something that they want to have the option to see later, or perhaps will never have a chance to see. Likewise, individuals may state what they are willing to pay to protect environmental quality. In the case of a bequest value, an individual places value on a resource with the intention that the resource will be enjoyed by future generations. Like existence value, measurement of bequest values may be obtained through revealed behavior (such as a donation) or stated behavior (willingness to pay). The U.S. National Park system is an example of a bequest value from previous generations.[20]

Using Stated and Revealed Preference Techniques to Measure Environmental Values: The Case of Colorado Fourteeners

This next section provides an example of how to value non-market, environmental goods using stated and revealed preference techniques. Stated preference approaches consist of methodical, scientifically developed surveys used to extract the choices that individuals make for selecting a good. In contrast, revealed preference methodology illustrates the actual choices that individuals make when spending money. A revealed preference study might use hedonic statistical techniques to measure how much people have paid for an environmental attribute, the same way appraisers put a value on the fireplace of a home.[21] Travel cost models, which measure the value of the time and money visitors spend at a recreation site, are another example of a revealed preference approach.[22] In the case study that is presented below, visitor expenditure data is collected—an example of a revealed preference approach. With stated preference methodology, individuals state how they would spend their money. In the case example, a contingent valuation question is presented in a stated preference approach. When properly implemented, both methods are regarded as possessing high scientific integrity.[23]

Both stated and revealed preference methodologies have limitations. One advantage of stated preference methodology is that the choices may be better controlled by the scientist. Revealed preference methodology may introduce "noise" due to macroeconomic disruptions like a relatively short-lived change in

18. Graham Davis, *A Review of Option Valuation*, *in* EVALUATING MINERAL PROJECTS: APPLICATIONS AND MISCONCEPTIONS 117, 117-123 (1998).

19. Id.

20. *See* NATURE'S SERVICES, *supra* note 7, at 297.

21. *See, e.g.*, Smith & Huang, *supra* note 10.

22. *See* NATURE'S SERVICES, *supra* note 7, at 33.

23. *See* IAN J. BATEMAN ET AL., ECONOMIC VALUATION WITH STATED PREFERENCE TECHNIQUES: A MANUAL 20-21 (2002).

interest rates, rather than focusing on the decision-making process. However, because stated preference methodology tests hypothetical, rather than actual, decisions, there is also room for bias. Many environmental economists believe that a combination of revealed and stated preference studies is an effective approach to environmental valuation.[24]

Decision making processes can be implemented using various sophisticated stated preference designs and statistical analyses.[25] Contingent valuation is one example of a stated preference technique that can be used to determine the economic value of a non-market good. Contingent valuation methodology enables researchers to determine the value that individuals would be willing to pay to protect (or access) a resource in addition to the amount of money that the individual has already paid.[26] This willingness to pay (WTP) is defined by economists as "consumer surplus."[27] When a proper sample size is obtained, economists can determine the average WTP, or average consumer surplus for that particular resource, and use this information as a measure of "economic value."[28] Like all methods, contingent valuation has its limitations. For example, contingent valuation measures what an individual states that he or she is willing to pay rather than what he or she actually does pay. However, contingent valuation is a generally accepted method for valuing environmental goods, particularly when there is not a market for that good.[29]

Contingent valuation lends itself well to example. The case of Colorado Fourteeners (peaks above 14,000 feet) reflects use of both stated and revealed preference techniques. Although the following example measures indirect environmental use, the survey could have been adapted to reflect nonuse values such as existence value or bequest value. Values obtained from this contingent valuation study of high mountain peaks reflect the value that hikers and recreators place on their mountain experience, in addition to what they already spent (revealed preference survey).[30]

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24. W. Adamowicz, J. Louviere, & M. Williams, *Combining Revealed and Stated Preference Methods for Valuing Environmental Amenities*, 26 JOURNAL OF ENVTL. ECONS. & MGMT. 271, 273-74 (1994).

25. JORDAN J. LOUVIERE, DAVID A. HENSHER, & JOFFRE D. SWAIT, STATED CHOICE METHODS: ANALYSIS AND APPLICATION 2 (2000).

26. Nelson Goodell, *Making the "Intangibles" Tangible: The Need to Use Contingent Valuation Methodology in Environmental Impact Statements*, 22 TUL. ENVTL. L. J. 441, 442-43 (2009).

27. *See* Adrian Mihalache, *To Tax or Not to Tax? What is it Worth?*, 3 MASARYK U. J.L & TECH. 335, 339 (2009).

28. *See* Pete Morton, *The Economic Benefits of Wilderness: Theory and Practice*, 76 DENV. U. L. REV. 465, 496 (1999).

29. *See id.* at 471.

30. Keske, *supra* note 5, at 193.

Economic Valuation of Colorado Fourteeners Using Stated and Revealed Preference Methodology:

Sampling for both 2006 and 2009 was conducted at Quandary Peak, a recreation area that is southwest of Denver, Colorado. Quandary Peak is approximately 15 kilometers directly south of the resort town of Breckenridge, and 10 kilometers north of Alma.[31] In 2006, surveys were distributed over three days, on two separate non-holiday weekends during August and September 2006. The mail back survey booklet was designed in accordance with Dillman's Tailored Design Method.[32] The 2006 mail back surveys were distributed by two volunteers trained on survey distribution procedures. Hikers were approached at trailheads and in parking lots at the conclusion of their recreation activity. There were no refusals to take the survey in 2006. After providing the visitors with the survey and a postage paid return envelope, names and addresses were also collected so that a second survey could be mailed to non-respondents. Of the 199 mail back surveys handed out, 129 surveys were returned, for a response rate of 65%. Based on a comparison of group sizes from our survey data collected during these three weekend days to group sizes from U.S. Forest Service data collected by a non-government organization during the majority of weekends, it appears as though the 2006 data was representative of the summer season.

The 2009 data collection process, including trailhead location and survey distribution procedures, mirrored the 2006 data collection process. In 2009, two individuals were trained in the distribution of surveys: a graduate student, and one of the same volunteers instrumental in the distribution of the surveys in the 2006 study. As with the 2006 study, visitors were provided with the mail back survey and a postage paid return envelope. Three weeks later, replacement surveys were mailed to non-respondents. A total of 345 surveys were distributed over five weekend days during July and August 2009. A total of 248 surveys were returned for a response rate of 72%.

Visitors were asked their actual expenditures (revealed preference approach), as well as willingness to pay for their future experience (stated preference approach). The dichotomous choice (WTP) contingent valuation question was:

> *As you know, some of the costs of travel such as gasoline, campgrounds, and hotels often increase. If the **total cost** of this most recent trip to the recreation area where you were contacted had been $X **higher**, would you have made this trip to **this** Fourteener? Circle one: YES / NO*

The $X bid amount had values ranging from $2 to $950, randomly varied across all surveys distributed. This data was aggregated and statistically analyzed to determine the average per person WTP.

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31. *Quandary Peak*, 14ERS.COM, http://www/14ers.com/photos/peakmain.php?peak=Quandary+Peak (last visited Mar. 1, 2011).

32. DON A. DILLMAN, MAIL AND INTERNET SURVEYS: THE TAILORED DESIGN METHOD 9 (2d ed. 2000).

There was no statistical difference between visitor expenditures in 2006 and 2009 at the 5% level of significance, with the exception of gasoline purchases, which is significantly different at the 10% level. The decreased expenditures on gasoline may be attributable to the fact that visitors, on average, traveled fewer miles to the recreation site in 2009 compared to 2006. Therefore, Fourteener recreation was unaffected by the recession. This is summarized in Figure 3, and presented in 2007 dollars to correct for inflation.

Category	2006 Mean	2009 Mean	T-Statistic (P-value)
Miles Driven	264	214	1.12 (.267)
Gasoline Purchases	$61.04	$42.00	1.69 (.092)
Retail Supplies	$13.24	$15.85	-.363 (.717)
Equipment Purchases	$25.14	$28.28	-.441 (.659)
Hotel	$81.62	$129.40	-1.29 (.196)
Food in Restaurants	$78.32	$80.48	-.401 (.689)

Figure 3. Comparison of 2006 and 2009 Per Trip Hiker Expenditures in Colorado ($2007).

Figure 4 presents the WTP estimates obtained from the 2006 data and the 2009 data to calculate mean WTP and the associated 90% confidence intervals. In 2006 dollars, the mean WTP per person per trip in 2009 is $139 which is 9% below the WTP per person in 2006 of $152. However, as shown in Table 4, the 90% confidence intervals in 2006 overlap the mean WTP in 2009 and vice versa. This indicates there is no statistical difference between the WTP per person per trip in 2006 and 2009. This is further illustrated in Figure 5, which demonstrates no significant difference in the mean willingness to pay, and the overlapping confidence intervals. Thus, we fail to reject the hypothesis of no difference in mean WTP between the two time periods. This implies that visitors place the same value on their recreation experience when the economy is struggling, in general, compared to times when the economy is doing well.

	Mean WTP	90% Lower CI	90% Upper CI
2006 data	$152	$123	$190
2009 data	$139	$119	$167

Figure 4. Mean Willingness To Pay, Per Person Per Trip, and 90% Confidence Intervals.

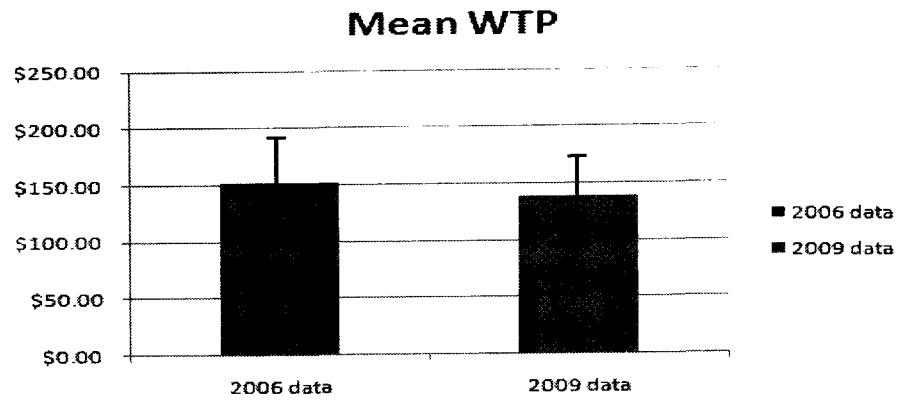

Figure 5. Results of the contingent valuation model, with non-overlapping confidence intervals between 2006 and 2009. Results indicate that recreators have a similar consumer surplus between 2006 and 2009.

The seemingly "recession proof" nature of high mountain recreation reveals that visitors spend a great deal of money to climb Fourteeners, regardless of whether the economy is rocky or vibrant, and they are willing to spend even more. The values that recreators place on high alpine recreation, by comparison, is more than that of other hiking and rock climbing studies. Several rock climbing studies serve as comparison, including one in Colorado by Ekstrand.[33] He asked rock climbers at Eldorado Canyon outside of Boulder, Colorado what they would pay to do similar climbs but at remote wilderness locations.[34] His value of $27.95 per day in 1991 is equivalent to $40 when adjusting for inflation to 2006.[35] Grijalva and Berrens[36] estimated a value of rock climbing in Texas at between $47 and $56 per day trip. More comparable is a 2002 study by Grijalva, et al.[37] that involves climbing in USDA U.S. Forest Service designated wilderness areas. These authors found a WTP of only $18 to $26 per person to avoid closing climbing sites in several National Forest, National Park and BLM Wilderness areas, depending on the travel cost variable.[38]

It is believed that the remarkably high consumer surplus can be attributed to the fact that Fourteeners are considered "special" environmental icons that provide place attachment to Colorado residents and tourists alike.[39] There are no

33. Earl R. Ekstrand, Economic Benefits of Resources Used for Rock Climbing at Eldorado Canyon State Park, Colorado (1994) (unpublished Ph.D. dissertation, Colorado State University).

34. *Id.* at 16-17, 126.

35. *See id.* at 107-08.

36. Therese Grijalva & Robert P. Berrens, *Valuing Rock Climbing and Bouldering Access*, *in* THE NEW ECONOMICS OF OUTDOOR RECREATION 21, 35 (Nick Hanley et al. eds., 2003).

37. Therese C. Grijalva et al., *Valuing the Loss of Rock Climbing Access in Wilderness Areas: A National-Level, Random-Utility Model*, 78 Land Economics 103 (2002).

38. *Id.* at 117.

39. John B. Loomis & Catherine M. Keske, *Mountain Substitutability and Peak Load Pricing of High Alpine Peaks as a Management Tool to Reduce Environmental Damage: A Contingent Valuation Study*, 90 J. ENVTL. MGMT. 1751, 1757 (2009).

close substitutes. Place attachment theory, developed in sociology,[40] environmental psychology,[41] and geography,[42] postulates that there can be a psychological connection between a community and a natural resource. Research by Blake[43] (1999, 2002, 2008) suggests that Fourteeners are synonymous with Colorado's identity, and that Fourteener references are ubiquitous—appearing on everything from Chamber of Commerce information and local festivals to print advertisements and postcards. Blake's research indicates that more easily recognizable Fourteeners such as Long's Peak in Rocky Mountain National Park and Pikes Peak in Colorado Springs also provide a state identity.[44] Thus, the economic findings are consistent with other disciplines that have recognized that there is something unique about Fourteeners. This study attaches economic value to the Fourteeners, to reflect the uniqueness of the experience, and the study may serve as an example for how stated preference surveys may be used to measure an environmental good.

Discussion and Legal Applications for Environmental Valuation

In the case of Colorado Fourteeners, recreators demonstrated a higher WTP for their recreation experience than what they already spent. In other words, this study calculated the non-consumptive use value of the recreation using both a revealed preference and a stated preference approach. If the question is phrased appropriately, stated preference methodology may also be used to determine the existence or bequest value of an environmental good. In fact, contingent valuation was applied to determine the value of indirect and nonuse damage claims in the 1989 Exxon Valdez oil spill off the shore of Prince William Sound.[45] Although most legal and economic practitioners agree that the values determined in the Exxon Valdez case were far from perfect, courts have consistently validated the merit of contingent valuation methodology in environmental damage cases.[46] The

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40. *See, e.g.*, Jennifer E. Cross, Private Property Rights Versus Scenic Views: A Battle Over Place Attachments (Oct. 2001) (presented at Human Dimensions of Natural Resources in Western U.S., Regional Conference), *available at* http://lamar.colostate.edu/~jecross/research/conference.html. Jennifer E. Cross et al., *Adoption of Conservation Easements Among Agricultural Landowners in Colorado and Wyoming: The Role of Economic Dependence and Sense of Place* 101 LANDSCAPE AND URBAN PLANNING 1, 1 (2011) *available at* http://dx.doi.org/10.1016/j.landurbplan.2011.01.005.

41. *See, e.g.*, Gerard Kyle et al., *Effects of Place Attachment on Users' Perceptions of Social and Environmental Conditions in a Natural Setting*, 24 J. OF ENVTL PSYCHOL. 213 (2004).

42. *See, e.g.*, Lynne C. Manzo & David D. Perkins, *Finding Common Ground: The Importance of Place Attachment to Community Participation and Planning*, 20 J. PLAN. LIT. 335 (2006).

43. Kevin Blake, *Peaks of Identity in Colorado's San Juan Mountains*, 18 J. CULTURAL GEOGRAPHY, no. 2, 1999 at 29; Kevin Blake, *Colorado Fourteeners and the Nature of Place Identity*, 92 GEOGRAPHICAL REV. 155 (2002)[hereinafter *Nature of Place Identity*]; Kevin Blake, *Imagining Heaven and Earth at Mount of the Holy Cross, Colorado*, 25 J. CULTURAL GEOGRAPHY 1 (2008).

44. *See Nature of Place Identity*, *supra* note 43, at 174.

45. Report of the NOAA Panel on Contingent Valuation, 58 Fed. Reg. 4601, 4612 (Jan. 15, 1993) [hereinafter NOAA Report].

46. Carol Adaire Jones, *Use of Non-Market Valuation Methods in the Courtroom: Recent Affirmative Precedents in Natural Resource Damage Assessments*, 109 WATER RESOURCES UPDATE, no. 109, 1997 at 10, 16, *available at* http://www.ecy.wa.gov/PROGRAMS/wr/hq/pdf/nmvm_jones.pdf; Paul R. Portney, *The Contingent Valuation Debate: Why Economists Should Care*, 8 J. ECON. PERSP., no. 4, 1994 at 3, 11.

federal government also uses contingent valuation in determining the value of environmental goods and non-market goods on public lands.[47] Further publications from the Exxon Valdez resulted in standardized guidelines for contingent valuation methodology.[48] It is likely that contingent valuation will be utilized in the valuation of damages stemming from the 2010 BP oil spill in the Gulf of Mexico using updated techniques, compared to 20 years earlier.

Stated preference techniques such as contingent valuation can provide a measure of direct use, indirect use, existence values, and bequest values. However, whether or not these approaches are appropriate for the case is up to the legal practitioner. A properly implemented stated preference survey will cost a minimum of $25,000 in 2010 U.S. dollars. Furthermore, a stated preference study may not be in the practitioner's best interest, depending upon the industry that the practitioner is representing. The following is a summary of five items for legal practitioners to consider when conducting a stated preference study:

1) *Hire an expert who has experience conducting stated choice studies.* Given the high stakes in environmental cases, a well-trained professional is critical to conduct a valid study that minimizes error. The lead economist who valued the Exxon Valdez oil spill, Kenneth J. Arrow, won the Nobel Prize in economics in 1972. Although a Nobel Laureate is not a pre-requisite for a valuation study, it is important to ensure that the expert has a background in stated choice methodology, including a record of publishing in peer reviewed journals.

2) *Determine precisely what it is being measured.* Contingent valuation can be used to measure direct use, indirect use and nonuse; however, these are separate items in the accounting ledger. If the existence value of a good is being measured (e.g. prohibiting drilling in ANWR permanently), it needs to be stated as such.

3) *Minimize bias.* An experienced economist understands how to minimize bias with a well-executed survey. However, legal practitioners must always be aware that bias is a vulnerability of any stated preference technique. Ensuring the use of appropriate language, an adequate response rate (a good benchmark is 50%), and that the "proper" audience is being surveyed are all considerations for the legal practitioner.

4) *Use secondary data rather than collection of primary data.* Primary data collection using a dedicated survey is the ideal approach, for reasons described throughout the article. However, given the price tag and room for potential bias, sometimes primary data collection is not feasible. Secondary data collection, consisting of a meta-analysis of previously conducted and relevant studies may be a good alternative. This may be particularly

47. JOHN B. LOOMIS, INTEGRATED PUBLIC LANDS MANAGEMENT 212 (2d ed. 2002).

48. NOAA Report, *supra* note 48, at 4608; Richard T. Carson et al., *Contingent Valuation and Lost Passive Use: Damages from the Exxon Valdez Oil Spill*, 25 ENVTL. & RESOURCE ECON. 257, 259 (2003).

appropriate if the previously published studies are in the same geographical region as the environmental good in question. For example, one recent study showed that secondary data of wildlife damage in the western United States effectively reflected both use and nonuse values of Colorado agricultural lands that support wildlife.[49]

5) *Consider all aspects of environmental valuation.* A practitioner representing a client with an interest in the environment may push for a stated preference study. However, when the practitioner represents a client accused of causing environmental damage, it may not be in the practitioner's best interest to conduct a full valuation of the environmental benefits. Regardless of the situation, it is in the practitioner's best interest to be informed of all components that could potentially be included in an environmental valuation study. A knowledgeable expert will understand the strengths and weaknesses of each technique, better enabling legal counsel to defend or dismantle a particular study.

In summary, valuation of non-market goods is both feasible and worthy of scientific merit. A complete valuation of environmental goods should consist of use, nonuse, and option values. Environmental economists employ a number of different scientifically sound methods that can be used to measure each of these dimensions. This article provides legal practitioners with options for determining the value of an environmental good, although the accounting stance taken by the legal practitioner will vary on a case-by-case basis.

49. Dana Hoag, The Agricultural Cost to Support Wildlife in Colorado (Sept. 2009), *available at* http://www.wcirm.colostate.edu/pub_outreach/Hoag_Wildlife%20and%20Ag_Final.pdf. Dana Hoag, Randall Boone & Catharine M. H. Keske, 16 *The Agricultural Cost to Coexist with Wildlife in Colorado Human Dimensions of Wildlife* (forthcoming 2011).