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Ways to Make Stated Preference Methods More Valuable to Public Land Managers

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Introduction

Federal public lands such as National Forests, National Parks/Monuments, National Wildlife Refuges, lands administered by the Bureau of Land Management and military lands represent one-third of our nation's lands and natural resources. When state public lands (e.g., state parks, state forests) and county public lands (e.g. open space areas) are added to this, it is clear that public land management has a profound effect on the quality of the environment and quality of lives of tens of millions of people. In this article, I will use the term public lands to collectively refer to all these types of lands.

With some starts and stops due to changes in administrations in Washington DC, the two largest public land management agencies, the U.S. Forest Service (USFS) and the Bureau of Land Management (BLM), have evolved from solely multiple use management philosophy to that which also includes an ecosystem management perspective over the last two decades. The growing emphasis on ecosystem management among all federal land managers has brought recognition of the need to value ecosystem services in their land management plans, including Department of Defense for its military bases, Bureau of Land Management (BLM), National Forests, and National Wildlife Refuges (see Rhul, 2010 for a summary). The newly released final National Forest System Land and Management Planning rule brings this to the fore: *“This planning rule sets forth process and content requirements to guide the development, amendment, and revision of land management plans to maintain and restore NFS land and water ecosystems while providing for ecosystem services and multiple uses. The planning rule is designed to ensure that plans provide for the sustainability of ecosystems and resources.”* (Federal Register, 2012: 21162). While jobs are also mentioned further on in the summary, the reader can see that the USFS planning and management is not focused solely on multiple use and jobs.

Unfortunately, much of the economic analysis performed by and for public land management agencies on a day to day basis is often limited to standard regional economic analyses they have been conducting for decades. While regional economic models such as IMPLAN provide insights on one dimension of the public land-economic interface, it often does not reflect the increasingly dominate values of public lands. In particular, recreation and wildlife/fish now constitute 95% of the economic values generated by National Forests (Bergrstrom et al. 2005), as calculated using a scientifically sound sampling design of visitor use on all National Forests conducted every year, on a five year cycle (e.g., the National Visitor Use Model—NVUM). When passive use values such as existence and bequest values are added to the non-market use values of recreation and wildlife, it is easy to see why federal agencies are being increasingly criticized for incomplete economic analysis of public land management alternatives when they fail to provide an adequate analysis of non market values.

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However, the agencies have begun to broaden their thinking on economic analysis. In the last ten years both BLM and USFS have been putting their staffs through economics training courses that focus as much on non-market valuation as on regional economic analysis. This has been done via BLM's National Training Center (first as a series of training courses around the west and now on-line), and USFS's cooperative agreement with University of Georgia and Portland State University for its Resource Policy Values and Economics training (<http://www.fs.fed.us/biology/education/workshops/rpve/index.html>). Agencies such as BLM's Washington Office has been circulating a draft Instruction Memorandum on non market values in preparation for issuing to the field (email from Robert Winthrop, Washington DC, April 9, 2011).

In part the increased recognition of non market and ecosystem values is in response to increased number of public comments the agencies are receiving on their management plans and EIS's to provide more balanced economic analysis of commodity production versus recreational, wildlife and amenity values. One such recent example has been the revision of the U.S. Forest Service EIS on the Rosemont Copper Mine, south of Tucson, Arizona. Here the agency has had to significantly broaden the economic analysis in response to public comments ranging from individuals to Pima county commissioners (Pima County, 2011). In particular, the Pima county commissioners asked the USFS to perform a more complete economic analysis of the mining proposal that would go beyond only displaying the income and employment effects of the copper mine but also consider recreation and tourism as well as non-market environmental values such air quality, groundwater, scenery, and health that would be adversely affected due to the copper mine. This request and those of conservation organizations resulting in the USFS hiring a consulting firm to address many of these issues using USFS visitation data, literature review and benefit transfer.

In the last decade, public land management agencies have begun to make forays into incorporating non-market valuation into their EIS's and management plans. What the notable examples often share is making valuation more holistic and in most cases valuing the discrete management alternatives, rather than the separately valuing multiple use outputs of each of those alternatives. This article makes the case that tying non-market valuation to either total economic valuation of the plan or EIS alternatives or valuing the characteristics of that alternative, would aid in integrating non-market values into agency decision making. I start by elaborating the concept of valuing entire management alternatives (often reflecting the agency's decisions on allocation of lands to various uses). I then provide an example where BLM requested and used a CVM study on valuation of broad land management alternatives.

Agencies Compare Management Alternatives: This is What Economists Need to Value

Since the advent of ecosystem management, the USFS has largely moved in the direction of BLM's long-standing approach of describing how many acres of their land will be in particular management zone (e.g., open or closed to off highway vehicles, open or closed to mineral leasing) or management class (e.g., type of timber management—clear cut or select cut, recreation management objective) with each alternative. There is very little attention to quantifying how much multiple use outputs will be produced with each alternative, in each decade (e.g. little information is provided concerning how many visitor days, tons of coal, acre feet of water).

Given the current and apparent future direction of public land management agency plans and EIS's, if economic dimensions are to be considered, economists need to adapt their valuation techniques. There are two approaches that economists could offer managers. The first, is to

provide a more holistic valuation of an entire management plan alternative. That is, provide a single total economic valuation of an entire management plan elicited from the public via a single contingent valuation WTP question. This would require one CVM -WTP question for each management alternative. However, sometimes the particular types and levels of ecosystem services in a given plan alternative maybe subject to change due to either public comments or new information obtained during the long time periods between draft and final management plans. In this case, the manager may wish to know the value each ecosystem services. If this is the situation, then a choice experiment format may be more useful to the manager.

These requirements suggest that Stated Preference methods in general, and perhaps Choice Experiments in particular, would be ideally suited to provide public land managers economic information within the current ecosystem management paradigm.

Example of using CVM to Value Alternatives in BLM Resource Management Plan

As part of its Resource Management Plan (RMP), BLM requested an economic analysis of alternative management scenarios for its scattered tracts of public land along the Snake River south of Grand Teton National Park in Jackson Hole, Wyoming. Since the majority of the lands along the river outside the National Park are in private ownership, the BLM lands provide some of the only public access to the Snake River for rafting and fishing. These lands provide some of the only publicly accessible lands for wildlife viewing, especially bald eagle watching. It was also grazed by a few livestock, and provided some sand/gravel for the Town of Jackson and Teton County.

The CVM survey was designed jointly by the BLM and the author, to value, what was at the time, the basic themes of the four alternatives to be considered by BLM in their RMP. The first alternative (#1) analyzed was developed in response to pressure from some corners of the Federal Government for BLM to sell the lands. Given the multi-million dollar real estate value of the lands this might very well have the highest financial return. A second alternative (#2) was retention of the public land and BLM accommodating increasing recreation use of the river corridor via increasing number of boating permits offered, adding a new boat ramp and allowing boat-in camping. A third alternative (#3) was to emphasize wildlife management with BLM and Wyoming Game and Fish retaining the public lands, and slightly reducing current recreation use. Finally, a fourth alternative (#4) was to open up more parcels for leasing for sand and gravel along the river channel and make available additional parcels for livestock grazing.

BLM was interested in the economic values to the public, broadly defined to include Teton County, rest of Wyoming and because of the national prominence of these lands, the rest of the U.S. As part of the agency's public involvement process, a survey was developed through focus groups and pretests and then mailed to a sample of residents in each of the three geographic areas.

The Contingent Valuation Method (CVM) survey valued Alternatives #2, #3 and #4 against Alternative #1, which was sale of the lands to private landowners (with inevitable development). Each alternative was compared on 7 criteria: (1) amount of land in public and private ownership; (2) Recreation (including amount of permitted use, whether motorized access allowed, and provision of boat-in camping); (3) whether additional livestock grazing was permitted; (4) whether sand and gravel mining would continue; (5) whether wildlife habitat for raptors and other species (e.g., elk) would be less than current or maintaining current levels; (6) financial (revenue to federal government and change in BLM management costs); (7) cost to each household in the form of an increase in federal income taxes for managing the lands according to that alternative (i.e., either 2, 3, or 4 depending on the scenario).

While this has all the makings of a choice experiment, the expense of printing the necessary versions of a color mail survey to perform a main effects orthogonal design ruled out a full choice experiment. In fact it was more intuitive to the agency to simply value each alternative, in its entirety. Nonetheless, a WTP function was estimated that related the probability of a yes vote to the bid amount, acres of public land retained, and amount of recreation allowed in visitor days (see Nahuelhual, Louriero and Loomis, 2004 for more details).

The results of the survey indicated that there was a similar ranking of WTP in all three samples (Teton County residents, rest of Wyoming residents and rest of US residents) for the top two management alternatives: The highest WTP for all three samples was for Alternative #3 emphasizing wildlife management, followed by Alternative #2 for recreation. In the end, BLM kept all the parcels in public ownership, but to be managed by other state and county agencies with more of a physical presence in the area than BLM (whose office was about 100 miles away).

Agency's Manage for Desired Future Condition of Landscape & How Economists Might Value This

Another commonly used approach in public land management in the last decade has been management of public lands toward a "desired" future condition. This is often interpreted as moving the forest or ecosystem to a more sustainable, self regulating, and resilient ecosystems capable of accommodating natural variations in weather (e.g., droughts) and native pests, and natural disturbance (e.g., lightning caused fires). The Interior Columbia Basin Ecosystem Management Plan (ICEBMP) the land management alternatives are typical of what many of the newer federal land management plans reflect. Alternatives range from very active restoration efforts (e.g., forest thinning, prescribed fire, replanting riparian vegetation, re-contouring stream beds) to a slow and steady adaptive management approach to designation of lands as protective reserves with a "hands off" management style (Loomis, 2002: 553)). Economists have had some experience with valuing management actions that involve protective reserves such as Wilderness designations (Walsh, et al., 1984; Keith, et al., 1996) or Wild and Scenic River designations (Sanders, et al, 1990).

The "outputs" of the desired future condition plan alternatives generally emphasized restored acres of forest and rangeland, stream miles restored, and incidental production of livestock grazing AUM's or board feet of timber. However, what the key "outputs" embody is progress toward the desired future condition of the landscape. Comparison of these alternatives is often made spatially and visually with GIS maps, and in some cases photo-simulations or drawings of aspects of the landscape by decade.

For economic valuation to be relevant to this conceptualization of public land management planning, contingent valuation surveys need to be designed to allow people to value different landscapes. The landscape characteristics should include more than their visual elements and also include their ecological characteristics. This should not be too challenging as economists have experience with valuation of restoration programs (Loomis, et al. 2000; Brookshire, et al. 2010). Simplifications of the agency's GIS maps by alternatives, their photo-simulations, and their graphics may prove a starting point for survey design and pretesting.

Valuing alternatives involving adaptive management is even more challenging, as adaptive management is an evolving learning process. With adaptive management, there are different conditional management paths, the choice of which depends on the outcome of the initial

management, and the knowledge gained about the system response. In particular, adaptive management conducts initial management actions as experiments to learn more about ecosystem response to the management actions, e.g., does the action result in the anticipated level of species recovery or not. If yes, the manager continues the management action, if not a different management action is selected, often based upon what was learned from implementation of the first one. Part of the challenge for economists, is that the disciplinary specialists may not know enough to assign probabilities to the various possible outcomes or management paths. In this case, economists' usual tool of expected value calculations cannot be used. However, simulation models like agent based modeling may offer some hope in attempting to value these possible series of potential management actions (Loomis, Bond and Harpman, 2009). In particular, agent based modeling may be a useful tool for simulating the many alternative conditional management paths. From each of these paths, economists can then value the likely outcomes of each path. This array of values, associated with each path, provides another information input on the economic consequences of that path to the manager for informing the task of selecting the initial adaptive management path.

Economists have the basic stated preference methods that can be applied to valuation of a landscape approach to public land management. What is required is for us to re-think how they are to be tailored to these new approaches to public land management. However, the advantage of stated preference methods is their flexibility to be applied to future hypothetical scenarios. This is just what planning is all about: ex ante evaluation of possible alternatives. Hence there is a good match between what the agencies need to value with landscape management and the valuation tools available to economists.

Ultimately, what I believe agencies would find most useful is to have values per acre for different landscape conditions (e.g., old growth forests, second growth forests, healthy rangelands, open space) that are site specific. While contingent valuation methods and their applications have certainly generated values for many different landscape types (e.g., wetlands), obtaining site specific values that can be spatially mapped onto a GIS layer will be far more challenging. As economists has been discovering this last decade, spatial details such as contiguity matters. A wetland next to or near a campground may have far more use value than a wetland in the interior of a large wilderness area with no trails nearby. Software packages such as InVEST (Integrated Valuation of Environmental Services and Tradeoffs) have values per acre derived from benefit transfer, and then using GIS of land cover types to place them on the landscape, noting their proximity to human population centers. InVEST serves as an example of the type of valuation system that may be popular with land managers, especially those that seek "turn-key" valuation of ecosystem services. For example, Department of Defense has begun to test InVEST as a way to measure the economic value of ecosystem services on military lands. Much like the testing that has taken place to measure benefit transfer errors, there is a need to test the relative error with using secondary data approaches like InVEST against primary contingent valuation applications. Unfortunately, this has yet to begin and offers an important research opportunity to learn more about trade-offs between ecosystem valuation transfer and original valuation. For more information on InVEST go to Stanford University's Natural Capital Project, InVEST website (<http://www.naturalcapitalproject.org/InVEST.html#How>).

Open Space Value of Public Lands at the Wildland Urban Interface

The other growing value of public lands is in the open space these lands provide to sprawling cities and suburbs in the west. Public lands not only provide the many values of open space themselves (e.g., scenic, recreational) but also provide the “last stand” against further sprawl in many cases. This buffering capability of public lands exists in numerous cities including Salt Lake City, Tucson, and Portland, for example. While economists have performed dozens of studies on the economic values of open space (Bergstrom and Ready, 2008) nearly all of this has focused on agricultural land preservation or private land preservation, with much of this being done in the eastern U.S. These private land open space values may, at best, provide some insights on the economic values of public land open space near urban areas. In addition, the techniques “perfected” in valuing open space elsewhere provide an excellent starting point for valuing open space adjacent to public lands in the wildland urban interfaces of the west. To date there have only been a few studies that have addressed the economic values that undeveloped lands provide to nearby residential and urban areas (Banzhaf, 2007). While stated preference studies can be used, hedonic property studies are clearly appropriate here as well. See Thorsnes (2002) and Bolitzer and Netusil, (2000) in general, and particularly, Phillips (2000), who looked at the value of nearby Wilderness on property values.

Implications for the Future

Economists need to keep abreast of the changing paradigms used by public land managers in their planning and resource allocations on public lands. While this is no easy task (e.g., the U.S. Forest Service has been struggling with draft planning regulations on a seemingly perpetual cycle every five years but has now issued final planning rules—see Federal Register 2012), economists risk being less and less relevant to public land managers and management if our tools are rooted in old paradigms of multiple use. In my opinion, stated preference methods offer useful tools to value entire resource management alternatives and desired future conditions of landscapes.

How to proceed? Clearly we need for more demonstration projects such as the San Pedro River where an attempt was made to value an entire water dependent ecosystem (e.g., riparian wildlife habitat—see Brookshire, et al. 2010) and Department of Defense’s recent funding of an ecosystem service valuation research on its military bases using Stanford University’s INVEST.

Certainly barriers such as budgets, time and sometimes U.S. Office Management and Budget (OMB) survey review often stand in the way. At least the time limitations can be overcome by early involvement of economists in agency planning processes. If economic issues are raised at the scoping stage of land management plans and Environmental Impact Statements (EIS’s), then sufficient time would be available for conducting stated preference surveys of users and the public. There are several successful solutions to the OMB survey clearance problem whereby obtaining official permission for a federal agency to conduct a survey can take a minimum of 6 months. Perhaps the most promising and frequently used is to build upon the increasing involvement of stakeholder groups participation in public land and resource management planning. The composition of stakeholder groups often reflects industry associations, conservation groups, county and state governments and their agencies. None of these groups are required to follow OMB guidelines if they fund a survey effort. Using the collective resources of these groups to actually fund the survey implementation and data collection, with the federal agencies paying for the data analysis and report writing has proven successful in at least three cases the author is aware of. This joint federal and state collaboration and division of labor fits the public land agency’s stakeholder collaborative model

and often ties to existing data collections routinely performed by state agencies such as a wildlife management agency.

Another option that has proven successful in the past is for the agency to indicate that a survey is part of its public involvement process to gauge public preferences for land management alternatives. Administration of contingent valuation surveys in group settings has been successfully done in the past, and may provide a way to cost effectively administer surveys. Of course the agency would need to select a representative sample of the public for such meetings. But this is a much needed supplement to traditional public meetings where only those with strong vested interests show up, each claiming to represent the public's views.

Certainly, stated preference methods are not the only way to value the numerous outputs of public lands. Public land open space adjacent to towns and suburbs can be valued with hedonic property methods. Recreation valued with travel cost models. Benefit transfer can be used to value wetlands. But stated preference methods are probably the most comprehensive tool to provide holistic values entire land management plans or desired future conditions of landscapes. Economists have the basic tools, but to make a contribution to improving natural resource management on one-third of our nation's land we must be more proactive and make known our willingness to engage early in the planning process. Economists must continue to educate managers and their staffs that stated preference methods are available to provide the more complete economic analysis of public lands that stakeholders are increasingly asking the agencies to perform.

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