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Importance of Including Use and Passive Use Values of River and Lake Restoration

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Restoration is an Economically Important Activity

The restoration of rivers and related riparian areas is now a billion dollar a year business, with at least $15 billion spent since 1990 (Bernhardt et al. 2005). This restoration is taking place coast to coast, from the Penobscot River in Maine to the Elwha River in Washington. Restoration brings hope and optimism to conservationists that some of the past injuries that have arisen from our overzealous development of rivers can be at least partially rectified.

But as river restoration grows into a billion dollar a year effort, certainly there will be individuals that will ask whether the benefits of such efforts are worth the costs. Not every restoration effort such as the Everglades will have the President of the United States' brother to advocate for it. Some proposed large-scale restoration efforts such as the lower Snake River dam removals have yet to be approved, in part because of the perception by politically powerful interests that the costs outweigh the benefits. This paper will show that this perception is in part due to omission of important passive use values of river and salmon restoration such as existence values. These non-use or passive use values of river restoration are critical to include when dealing with restoration of riverine habitat for threatened and endangered (T&E) species. The fact that a species population is so low that it is listed under the Endangered Species Act should suggest that the economic justification for restoration of its habitat will not come from commercial and recreational use values; the current and near future populations are just too low. The near term value to society lies elsewhere, in the passive use value component of total economic value.

What is Total Economic Value of Restoration?

The Total Economic Value (TEV) associated with restoration is made up of the obvious on-site use value, as well as the not so obvious (at least to some) off-site passive use values. The on-site use values of river restoration include a wide variety of ecosystem services such as recreation, fish habitat, water quality, stormwater management and aesthetics. However, restoration also provides widespread benefits to people who obtain satisfaction or utility from knowing that native species exist in their natural habitat (i.e., existence value) or from knowing that restoration today provides native species and their natural habitats to future generations (i.e. a bequest value).

These existence and bequest values have been termed passive use values since they were upheld by the U.S. Court of Appeals for use in natural resource damage assessment. In ruling against the U.S. Department of Interior's (DOI) damage regulations proposal to only allow either use or non-use values to be counted, the U.S. Court of Appeals noted: "Option and existence values may represent 'passive' use, but they nonetheless reflect utility derived by humans from a resource and thus, prima facie, ought to be included in a damage assessment." (U.S. Court of Appeals 1989: 67). In response to this court ruling, DOI agencies include use and passive use values in their natural resource damage assessment (Ward and Duffield 1992, USDOI 1994).

My thesis is that, since passive use values are appropriate for the government to collect when damages occur, passive use values are appropriate to include when estimating the benefits of river restoration as well.

Techniques for Estimating the Use and Passive Use Values of Restoration

Use Values of River Restoration

To estimate use values of river restoration, economists often rely upon actual market behavior to detect how visitors or homeowners value river restoration. Visitors reveal their greater demand and benefits for improved rivers by the increased number of trips they take to restored streams and rivers as compared to degraded ones. The Travel Cost Method (Loomis and Walsh 1997) can be used to estimate the demand curve for restored rivers and allows for the calculation of the visitor's additional net willingness to pay to visit these restored rivers, as compared to degraded ones. For rivers running through residential areas, house price differentials reflect what homeowners will pay for living by a restored or natural stream as compared to a degraded one. This statistical analysis of house price differentials is called the Hedonic Property Method.

Passive Use Values of River Restoration

Existence and bequest values do not leave obvious behavioral trails and so economists have developed constructed or simulated markets to allow people to state what they would pay to know that a restored river exists with native fish. The two types of stated preference approaches are Contingent Valuation Method (CVM) (Mitchell and Carson 1989) and conjoint/choice experiments (Louviere et al. 2000). Both methods involve providing households with a comparison of existing river conditions and improved river conditions and then ask whether they would pay a given increase in cost that varies across households. The varying costs and the response to them allow for tracing out a demand-like relationship for restoration (i.e., the higher the cost, the fewer people would pay). CVM estimates a value for the entire restoration improvement program (Loomis 1996), while conjoint allows for the valuation of each individual ecosystem service provided by the restoration.

While reliance on what people say they would pay has been controversial (Portney 1994), the method has shown to be reliable in test-retest studies (Loomis 1989a 1990, Reiling et al. 1990, Carson et al. 1997). Past comparisons with actual cash have shown that CVM derived values may overstate true WTP. However, a blue ribbon panel appointed by the National Oceanic and Atmospheric Admisnistration (NOAA) that was chaired by two Nobel Laureates concluded that carefully constructed CVM studies are believed to yield reliable enough estimates of existence or non-use value to be a useful starting point for judicial and administrative deliberations (Arrow, et al., 1993).

Empirical Examples of Use Values of River Restoration

The hedonic property method has been frequently employed to estimate the value of river restoration. One of the first applications was by Streiner and Loomis (1995), which showed that houses in northern California along streams that were restored sold for 11 to 12 percent more than houses along unrestored streams. Research in Arizona by Colby and Wishart (2002) and Colby et al. (2005) suggest that riparian areas have a significant positive influence on property values. Netusil (2005) found that publicly owned streams had a positive and significant influence on property values in Oregon. Houses located at greater distances from lakes had lower values in Connecticut, which suggests the importance of water resources to house prices there (Acharya and Bennett 2001). Water quality was found to have a significant effect on house prices at several lakes in Maine (Boyle and Taylor 2001).

Empirical Examples of the Importance of Including Passive Use Values in River Restoration

Restoration of free-flowing rivers and recovery of native species often has existence values that are received by households all across the entire nation (Loomis 2000). Previous studies have shown that existence values make up at least half the benefits of improving water resources (Fisher and Raucher 1984, Sanders et al. 1990), the majority of benefits for many rare bird species (Loomis 1989b), along with T&E species. It is important to include these passive use or non-use benefits when calculating the benefits of restoration. The empirical importance of doing so is illustrated with two case studies. The first one involves removal of the Elwha dam and Glines dam to open up 70 miles of the Elwha River to native salmon.

Elwha Case Study

The removal of two dams from the Elwha River near Olympic National Park in Washington is an expensive proposition with costs of nearly $250 million. It will take decades before significant increases in harvestable fish return to support appreciable commercial and recreational fishing. But the restoration of the river and return of the natural migration of the salmon is expected to occur within the first decade. Thus, most of the near term benefits to Washington residents are existence values or passive use values, not use values. In order to estimate the passive use values associated with the dam removal and river/salmon restoration, a CVM survey was conducted in which Washington households were asked about their willingness to pay for dam removal and salmon recovery. The willingness to pay question was framed as a voter referendum question, asking whether they would vote in favor of dam removal and salmon restoration at a specific increase in cost. This cost, ($X), varied from $3 to $190 across the sample. The increase in salmon populations with dam removal versus fish ladders was illustrated with a bar chart. The wording of the willingness to pay question was:

> If a majority are not willing to pay, the dams remain and fish populations are as shown for "Dams."
>
> If a majority agree to pay the cost, the dams would be removed, river restored and fish populations would increase as shown in "Dam Removal."
>
> If an increase in your federal taxes for the next 10 years cost your household $X each year would you vote in favor? YES NO

The survey response rate was 68 percent for Washington residents, and their average WTP was $73 (with a 90 percent confidence interval of $60-$99). This translates into about $94 million in passive use values to Washington households each year. Including these passive use value results in positive net benefits (benefits in excess of cost) for dam removal.

Lower Snake River Dam Removal

The U.S. Army Corps of Engineers conducted a study on whether dam removal was a reasonable and prudent alternative for salmon recovery on the lower Snake River. This 140-mile stretch of the Snake River has four dams, which essentially convert this 140-miles into four slack water reservoir pools. This slack water greatly slows out-migration of smolts to the Columbia River and to the Pacific Ocean. The net result is higher than natural mortality for the salmon, and three of the Snake River salmon species are listed as either threatened or endangered.

Unfortunately, the official benefit-cost guidelines of the COE, the U.S. Water Resources Council Principles and Guidelines, were last updated in 1983. This was several years before the measurement of passive use value was routine or mandated by the U.S. Court of Appeals for Interior agencies. Including only the recreation use and commercial fishing values for salmon and steelhead populations results in dam removal having a large negative net benefit (-$267 million) relative to artificially transporting fish around the dams (+$13.5 million)—see U.S. Army Corps of Engineers (2002).

The COE originally planned to include a non-use value question in its economic analysis, but intervention by then Washington Senator Slade Gorton (who supported dam retention) resulted in the question being removed from the survey. Calculation of the non-use value for salmon and free flowing rivers was done using benefit transfer from existing non-use valuation studies. Using a variety of benefit transfer protocols, the passive use value of salmon was estimated for the dam removal alternative at between $22.8 and $310.5 million (U.S. Army Corps of Engineers 2002: 42). The passive use value of restoring the free flowing river was estimated at $420 million (U.S. Army Corps of Engineers 2002: 42).

As shown by including the passive use values of the free-flowing river and salmon restoration, this would make dam removal economically efficient, which yields the highest net benefits. The omission of the passive use values may have contributed to the Corps of Engineers decision to keep the dams in place.

Conclusions

As the two case studies illustrate, calculating the total economic values of restoration including passive use values is necessary so as to not understate the benefits of river restoration. The passive use or non use values often make up a majority of the benefits, and their omission can often lead to the impression that the restoration is uneconomic. As these two case studies indicate, the inclusion of passive use values demonstrates that restoration was economically efficient, with the benefits exceeding costs. While economics should not be the sole determinant of whether to restore an area or not, as restoration projects expand in frequency and scale, some prioritization of restoration projects becomes inevitable. In sorting through restoration projects that compete for scarce funding, having information about the use and passive use values of the restoration project can aid decision-makers in selecting restoration projects that provide the greatest benefits to society as a whole.

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