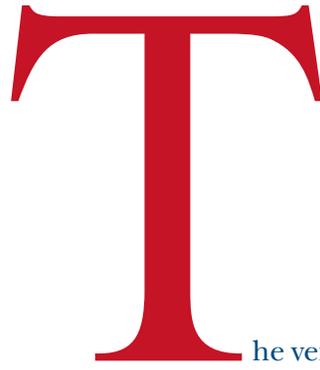
A scenic view of a lake surrounded by dense green trees under a cloudy sky. The lake is in the middle ground, with a forest of tall trees in the background. The sky is filled with large, grey clouds, and the foreground is dominated by the branches and leaves of trees framing the scene.

Forever Wild, But Do We Care?

How New Yorkers Value Natural Resource Improvements

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he very name “Adirondacks” conjures up the image of the famous wood-slatted outdoor chair first made around the turn of the last century, connoting scenic vistas, clean and healthy lakes, and fresh air. Certainly, the Adirondack Park features an abundance of vistas and lakes. Simply put, the park is huge. It covers 20 percent of New York State and is nearly three times the size of Yellowstone National Park. The park encompasses six major river basins, contains almost 3,000 lakes, and is the largest area of old-growth forest east of the Mississippi. One-sixth of the park is designated as wilderness and its status as a “forever wild” forest preserve is enshrined in the New York Constitution.

But the park’s protected status has not made it immune to the effects of pollution. About one-half of the park’s lakes are affected by acid deposition resulting from emissions from power plants and other sources. While the clarity of their water gives the impression that they are clean, the lakes’ ability to support plant and animal life has been greatly diminished. Forest health, particularly at high elevations, and bird populations may also be compromised by acid rain.

Federal and state initiatives to reduce air pollution, including the 1990 Clean Air Act Amendments and the recently promulgated Clean Air Interstate Rule, have cited reduced acid precipitation as a benefit of further reductions in sulfur dioxide (SO₂) and nitrogen oxides (NO_x). But, in fact, these policies have proceeded without making the link between the ecological science and the social science necessary to enable economic valuation of the benefits of these emissions reductions. In particular, no one knows how much people value improving the quality of the Adirondacks ecosystem. This knowledge is a necessary step for determining how much to reduce these pollutants.

Our study is the first to examine values people place on improving this resource. A 1990 study—part of the National Acidic Precipitation Assessment Program (NAPAP)—examined values for recreation opportunities. However, only a relatively small fraction of New Yorkers actually spends time in the park and the political saliency of acid rain damage in the Adirondacks suggests that nonusers may value the park highly.

We found that New Yorkers (users and nonusers alike) place significant value on rectifying damages from acid rain in the park. Depending on the improvement scenario in our survey, they would be willing to pay from \$48 to \$159 per

household each year. With 7 million households in the state, this amounts to benefits of \$336 million to \$1.1 billion annually. The values of nonusers are a large percentage of these totals.

Details of the Study

Our study, entitled *Valuation of Natural Resource Improvements in the Adirondacks*, targeted households living in New York State because they likely would hold a large share of the benefits of any park improvements. To develop an estimate of social willingness to pay (WTP) for improvements to the park we used contingent valuation, a method perhaps best known for estimating the damages after the 1989 Exxon Valdez oil spill. Contingent valuation is done by surveying households to determine whether they are willing to pay various amounts of money for a specific hypothetical project or intervention that, in this case, would lead to improvements in the health of the Adirondacks.

To ensure that the resource changes being valued mapped closely to the current and expected future condition of the park, we initially developed a “summary of the science.” Armed with this information, we conducted numerous focus groups to identify ways to accurately and meaningfully distill this complex information in the survey. Understandably, there is considerable scientific uncertainty as to what the level of pollution at the park will be and how it may change with further emissions reductions. In response, we developed two versions of the survey to span the range of scientific opinion about the future status of the park both with and without further emissions reductions. These two versions also permitted a “scope” test, that is, whether greater improvements to the

resource generate a higher willingness to pay.

One version of the survey depicts the future status of the park as constant in the absence of any interference and as improving with an intervention. In this version, the intervention yields the improvement of 600 lakes over a 10-year period (of about 1,500 currently damaged), and small improvements in the populations of two bird species and one tree species. The other version depicts the situation as worsening without any interference and with greater ecosystem benefits should the intervention be adopted. In contrast, this second version indicates an improvement of 900 lakes and greater benefits to four bird species and three tree species over the same time period.

We convened 31 focus groups and conducted two major pretests to develop and extensively assess alternative text, debriefing questions, and graphics. For example, in explaining the acidity of the lakes, we needed appropriate language that would convey that environmental consequences, not human health, are at issue. To do this, we likened the acidity of the affected lakes to that of orange juice—possibly affecting wildlife relying on the lakes, but harmless to humans. Similarly, in proposing improvements, we needed to ensure that the intervention be plausible and understandable to respondents. They also needed to be reasonably convinced that they would have to pay for this improvement, if the majority of voters agreed. This was a major challenge as the way the park is likely to be improved—through national policy for emissions reductions at eastern and Midwestern power plants—would be mostly paid for by other people. So we introduced an intervention where New York State would run a tax-financed program to drop lime from airplanes onto lakes and affected forests to neutralize the acidity, a necessary ruse that was accepted by respondents.

Hypotheticals and Overestimates

A common criticism of contingent valuation studies is that the hypothetical nature of the exercise tends to yield overestimates of WTP. That is, respondents vote for the hypothetical increase as a sign that they generally care about the issue, not whether they would expect to be better off if the intervention were adopted and their taxes rose accordingly. In response, we followed a cautious or conservative approach in designing the survey and applying statistical methods so that our estimates of social WTP are likely less than the true WTP for the improvements described.

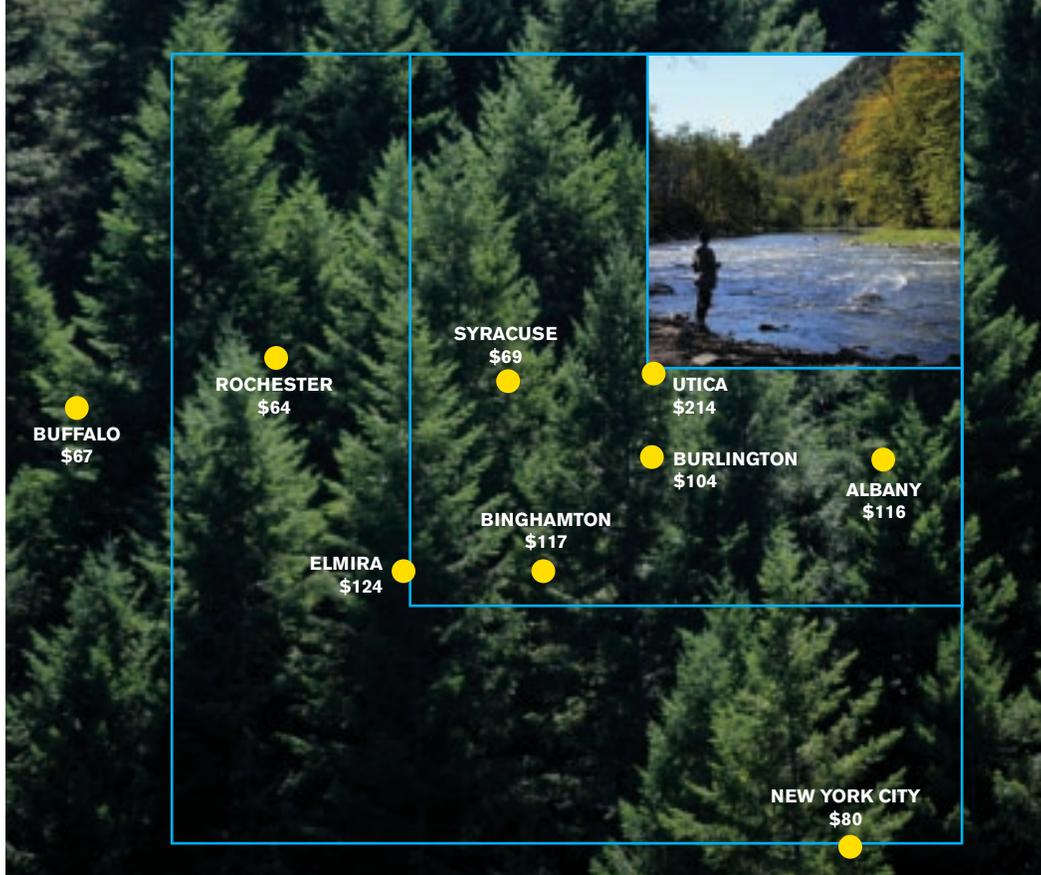
A related concern about overestimates of WTP is the observed tendency of respondents to vote “yes” for a program in a pro forma way, perhaps out of a sense of obligation or

desire to please the survey administrator, but in any case without truly registering the economic trade-offs involved and hence without truly stating preferences. In particular, we wanted to prevent what has been termed a “warm glow,” by which households approve of the policy to satisfy their desire to be generous, rather than out of desire for a better park as such. To avoid this, we purposely reminded respondents of the costs involved, used line drawings rather than more evocative photographs, and otherwise sought to avoid emotional triggers.

Conversely, another potential challenge for measuring WTP is those respondents who vote “no” automatically and reject a program for reasons extraneous to its benefits and costs—for example, because they are reflexively opposed to raising taxes or distrust the government on principle. We were concerned about respondents of this type because the survey elicits WTP by proposing an increase in their New York State income taxes. We used questions about respondents’ feelings toward the government and taxes to eliminate or control for this “cold gloom” effect.

One novel feature of our study is that the survey was administered through several modes. A private research firm administered it from August 2003 through February 2004 to more than 1,800 New York residents. Some of these respondents belong to a panel of regular takers of marketing surveys obtained through techniques designed to obtain a representative sample of the population. Another group consisted of panel dropouts. Both of these groups took the survey on a computer via the web. A third group took it by mail. While there were some differences across the samples (for example, the mail sample had the oldest average age), in general they displayed fairly similar average income, political attitudes, and other characteristics. More importantly, their WTP for the improvement to the Adirondacks was not sensitive to being on the panel or how they took the survey.

So who tended to value the environmental improvements most highly? Households with the highest WTP included those with the highest incomes, those that expected their future income to increase over the next 10 years, and those with children. Measures of personal stake were also important, with households who frequently visit the park (23% of our sample) willing to pay 70% more than those who visit less frequently or not at all. Those living farther from the park were willing to pay less, with WTP falling by about \$.08 per kilometer from the household’s closest vehicle entrance to the park (see figure on page 23). Self-classified environmentalists were more likely to vote for the intervention, just as self-proclaimed conservatives and those who think taxes are too high were more likely to vote against.



Median Willingness to Pay per Year to Protect Adirondack Park, by Region

From Survey to Policy

How can the results of this survey be used by policymakers? Clearly, these numbers have some political value, showing that benefits extend not only to those who live near the park, but also to residents of New York City and elsewhere who have never visited there.

Beyond their political value, these numbers can help guide air pollution policy. For instance, these numbers can be compared against established abatement cost benchmarks to help decide if further emissions reductions are worthwhile. EPA has estimated the costs of its Clean Air Interstate Rule to be \$4.3 billion in 2010, rising to \$6.3 billion by 2020. Given that we excluded populations outside of New York State and made very conservative estimates of benefits, it is clear that the ecosystem benefits are a sizable fraction of costs. Further, we excluded health benefits that would be directly realized from the improvement in air quality. EPA analyses of these benefits find that they are at least 10 times the costs, although uncertainties and controversy about these estimates abound.

Next Steps

Damage to the Adirondacks has been the focus of decades-long debates regarding air pollution control. Further strategies to reduce emissions are being justified, in part, by how they will improve this unique resource. For the

first time, results have been produced that show the value people place on ecological improvements to the park.

As we have discussed, we adopted a careful interpretation of the natural science and made cautious survey design and analytical decisions to measure the value of an ecological outcome that would be achieved at a minimum by forthcoming emissions reductions. The resulting estimates of WTP are, in turn, cautious and therefore very defensible. Our results, we believe, provide long-sought and valuable information about the benefits of air pollution policy.

RFI has won a new grant to extend this work by comparing different methods and applying them in different regions. The exercise will be repeated for the Adirondacks using a "conjoint" survey design, in which respondents are asked to consider different environmental scenarios in a way that enables the researchers to estimate the relative importance individuals place on different aspects of acidification damage. This approach enables us to develop estimates that are more readily transferable to other geographic areas. As part of the project extension, both the contingent valuation and conjoint surveys will be applied to similar problems in the Smoky Mountains of Tennessee and North Carolina. Crosschecking the comparability of benefits in the two regions using different methods can serve as a test of the ability to extrapolate them to still other regions, for purposes of national policymaking. ■