COST-BENEFIT ANALYSIS

For the Riverside-Corona Resource Conservation District

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RCRCD

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Executive Summary

The following results extend and test the findings of an earlier benefit-cost analysis (Phase I) conducted on behalf of the Riverside Corona Resource Conservation District (RCRCD). Estimates of the survey respondents' "willingness to pay" (WTP) for environmental services are reported from a stated preference approach or contingent valuation model. Survey data gathered from convenience and random sampling methods is summarized. These estimates of WTP are compared with prior estimates of non-market benefits generated by the RCRCD as it pursues its conservation and mitigation work.

The preliminary project used benefit-transfer methods and a hedonic pricing model focused primarily on the mitigation activities of the District in order to estimate the total value (market and non-market) of the District's efforts. The current model draws on qualitative data from a sample of survey responses generated over the past six months. Analysis of these sample survey responses generates an estimated WTP between $15,582 per acre to $28,009 per acre of ecosystem services.

Using the Phase I cost data, the benefit-cost ratio based on this approach is between 2.6 to 4.6. **This means that for every $1 in total cost spent on the RCRCD's goals, survey respondents value the non-market benefits at (and are willing to pay) $2.60 to $4.60 per acre for those services.** When added to the market valuation of the District's mitigation efforts, the revised overall benefit-cost is between 7.3 and 9.4.

This compares to an original figure of 5.1 from the Phase I report.

Project Analysis

Survey Design

Simplicity and brevity were central to the design of the survey. While it may be tempting to ask a larger number of questions or more detailed questions, conventional wisdom with this type of approach indicates 15 minutes is the optimal amount of time to complete a survey. It is possible to extend that time frame if you are able to conduct 100% face-to-face interviews; however, these types of interviews are more labor-intensive and costly. When using convenience and random sampling techniques, shorter and simpler scenarios are more efficient.

The first four questions were “layered” in order to provide for sensitivity testing. In effect, the respondents are asked in four different ways how much they are willing to give-up in order to retain the use of existing environmental benefits or be compensated for the loss of such services or insure future generations have access to the same quality of services. Two questions gauge the respondents’ perception of their preferences in comparison with others and four questions solicit qualitative data about the individual (education level, income and age categories, and zip code).

Sample Characteristics

Close to 300 individuals completed the survey during the sample period. Not all survey responses could be included in the analysis due to missing observations and/or invalid responses (for example, “not sure” versus $1,000). Even so, the sample size is sufficient to conduct statistical analysis.

The mean and standard deviation for WTA (Willingness to Accept) is not atypical. Research indicates that people are generally far more demanding when it comes to accepting damages and being compensated for them (someone else is paying for the loss) versus opening up their wallets to prevent a future loss. WTA responses are usually five to ten times as large as WTP responses. There are some “outlier” responses resulting in this high variation. They could be discarded without loss of overall power in the model.

The means and standard deviations for the sample are included in the table below.

	MEAN	ST DEV.
WTP Q1	113	134
WTP Q2	6533	28008
WTA	253,730	751,700
GIVE	0.187	0.215

The mean value is the average stated “willingness to pay” for benefits from survey question 1 and 2. The mean for WTA is the average amount required by the respondent to accept damages or loss of benefits. The mean for GIVE is the average amount of income in percentage terms respondents are willing to give up to insure sustainable benefits for the next generation. ST. DEV measures the dispersion of the responses around the mean value.

Limitations of Survey Data


Photograph by Cody Snyder

Survey data is subject to more potential bias than quantitative data. Bias can originate in the survey questions themselves (i.e., does the question suggest values to the respondent versus eliciting true values from the respondent's tastes and preferences?)

Bias can also occur as a result of the sampling procedure if, for example, the sample is collected through a non-random process. In general, even with these potential challenges, the contingent valuation approach contributes meaningful information to a thorough benefit-cost study. With a sufficient sample size gathered through a reasonably random process, some statistical inferences can be made about what people are truly willing to pay for non-market benefits and services like those generated by conservation efforts. By comparing these results to other pricing models and/or estimates yielded by benefit-transfer methods, a more complete picture of the overall benefits comes into view.

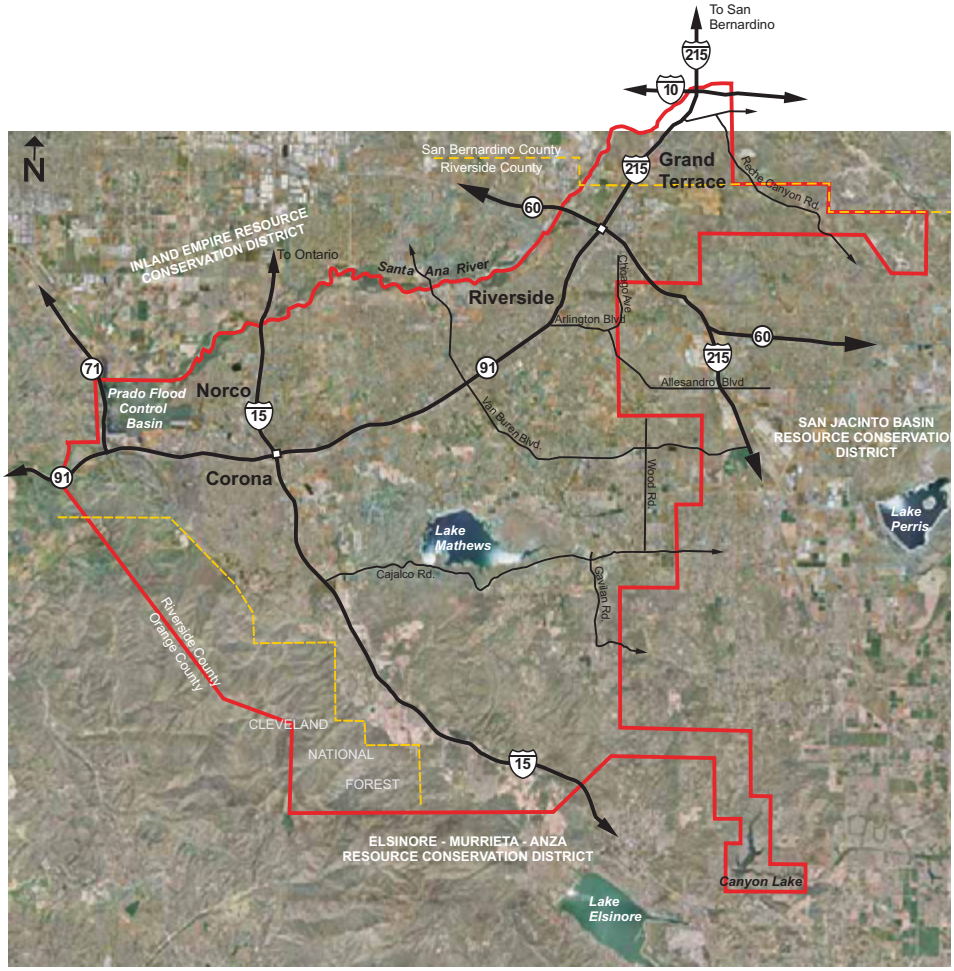
Because the RCRCD influences households in Riverside, Corona, Norco, parts of San Bernardino, Colton, Canyon Lake, and other communities it is challenging to acquire a sample that reflects the characteristics of the actual populations. However, the sample means of the variables surveyed do reflect the overall characteristics of these communities. These sample means are compared to the population means in the table below.

	Sample	Population
EDUCATION	2.64 = some HS	some HS - college
INCOME	2.44 = $50 - $75,000	$59,333
AGE	4.48 = 30 - 39yrs	30 yrs

Results

The sample yields some noteworthy results. WTP is most influenced by AGE. Overall, the older the respondent the higher the WTP. Specifically, for every year older the survey respondent reports an additional $1.90 in WTP is estimated. This is not surprising as the sample distribution is slightly skewed toward 40-49 year olds responding. Education is the least powerful indicator of WTP in the sample. A higher self-reported education level is not statistically significant in explaining WTP.

Zip code influences WTP; however, this correlation could be due to income, education, or age as some of the zip codes include several different census tracts and reflect a variety of underlying demographic variables. This spatial effect on WTP is best understood by using GIS. A map with sample responses is available for viewing at http://www.arcgisonline.com under the title RCRCD project.



Riverside-Corona Resource Conservation District
Portions of Western Riverside and San Bernardino Counties, California

Within the sample, the zip codes with the largest response rates so far are 92501, 92504, 92513 and 92882. Weighting the contingent valuation results with the Phase I results and additional benefit-transfer research produces an estimated WTP conservatively in the range between $15,582 and $28,009 per acre. Since this captures the WTP for non-market benefits (i.e., open space, views, habitat preservation, conservation of resources for future generations, etc) these estimates are then added to the market benefits from Phase I to produce an overall benefit estimation in the range of $43, 817 to $56,264 per acre. These benefit estimates in proportion to costs estimated in Phase I produce a benefit-cost figure between 7.3 to 9.4. **The interpretation is: for each $1 expensed per acre by the RCRCD the total valuation of benefits is $7.30 to $9.40 per acre.**

By comparison, lower-bound estimates of per-acre values of similar ecological goods and services by land type equal $18,873 per acre. This suggests the results described are conservative in nature and should not be perceived as exaggerated or unconventionally biased.

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The Riverside-Corona Resource Conservation District (RCRCD) is an independent, special district enabled under Division 9 of the California Public Resources Code. As defined in Division 9, Resource Conservation Districts are given broad abilities to help sustain natural resources and to protect resources from preventable damage and waste. The scope of work at RCRCD reflects local issues and focuses on sustainable ecosystem management. RCRCD programs specifically address water conservation, soil erosion, storm water quality, habitat restoration, conservation education, and more. RCRCD was created by a vote of the people in 1953.

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