SAMPLE STUDY #1

MEDIUM: Land
FOCUS: Economic Valuation of National Parks
COUNTRY: Thailand
VALUATION METHOD(S): Contingent Ranking, Contingent Valuation
UNIT(S): Average Net Benefit, Willingness to Pay
STUDY DATE: 1997
PUBLICATION DATE: 1998

MAJOR RESULT(S):

Category	Resource/Environmental Good	THB, per person (1997)
National Park - CRM	Doi Inthanon	50.48
National Park - CRM	Mae Sa Waterfall*	35.12
National Park - CVM	Doi Inthanon	27.46
National Park - CVM	Mae Sa Waterfall	18.38
Recommended Basic Entrance Fee	Doi Inthanon	40.00
Recommended Basic Entrance Fee	Mae Sa Waterfall	20.00

* Mae Sa Waterfall is a section of Suthep-Pui National Park

FUNCTIONAL TRANSFER:

STUDY NOTE: Since the contingent ranking (CRM) and valuation methods (CVM) yielded different results for the same environmental good, the study interpreted the recreational values obtained from CRM as the maximum amount an average person truly gains from visiting each recreational area within the park, while the recreational value obtained from asking the open-ended WTP question (CVM) as the average amount a person would want to pay for visiting each recreational area within the park. In other words, the true value of the national parks obtained from the CRM will be moderated by what is the socially acceptable value of these parks obtained from the CVM in recommending an appropriate entrance fee.

STUDY DETAILS:
BIBLIOGRAPHICAL ENTRY: Adis Israngkura. 1998. Entrance fee system for national parks in Thailand. EEPSEA Research Report Series, 1, 1-30.

ABSTRACT: The study successfully employed the contingent ranking method to value recreational areas around Chiang Mai City, namely Doi Inthanon National park and Mae Sa Waterfall. CRM addresses the concept of substitutability between recreational areas through analysis, and also systematically determines the recreational value of and hence entrance fees for these recreational areas, since the entrance fee for national parks will reflect the level of recreational services of each recreational area. The CRM simplifies the CVM, in

that respondents find it easier to rank their preferences in the contingent ranking format than having to respond with an exact amount to open-ended WTP questions.

SITE ATTRIBUTES: Doi Inthanon National Park occupies an area of 482 square kilometers and is located about 60 kilometers from Chiang Mai City. It takes about two hours to travel to the site from Chiang Mai City. Another 50 kilometers stretch from the entrance gate near the foot of the mountain to the summit of Doi Inthanon. Doi Inthanon is the highest point of Thailand, where the temperature can drop below 0°C being at 2,565 meters above sea level. Its geography is mountainous, with streams, waterfalls, caves, cliffs and meadows scattered throughout the sea. These features of the area attract both local and foreign visitors. Moreover, Doi Inthanon has ecological importance to Thais in terms of plant species, genetics and biodiversity. On the other hand, Mae Sa Waterfall is a section of Suthep-Pui National Park, and is about 20 kilometers north of Chiang Mai City. The other separate section is Doi Suthep, the value of which is not reported in this database review mainly because the author suggested that a zero entrance fee would be charged as before, given the difficulty of assessing the predominantly spiritual value of the Suthep Temple on the site. Mae Sa Waterfall is the best known among the three waterfalls in the Mae Sa section, though it is limited in terms of recreational activities compared to Doi Inthanon. Visitors to Mae Sa Waterfall can engage in some form of relaxation near the waterfall such as swimming, dining or picnicking in the two to three hours that they could ideally spend in the site. An added attraction of the Mae Sa Waterfall may be the culinary service and ready access to food and drinks in the food stalls located adjacent to the waterfall.

COMMENTS: The open-ended questions might have some strategic bias, since the moderators asked different questions for the same idea during the separate interviews. Thus, the researcher recommended the contingent ranking method as a better choice for valuing resources as it will help to reduce strategic responses and survey error. The CRM analyses ranked data by ordered logit estimation. The study recommended the adoption of a non-linear indirect utility function and hence captured the diminishing marginal utility from any increase in consumption of environmental goods for further research.

SAMPLE STUDY #2

MEDIUM: Land
FOCUS: Environmental Damages from Accident-Induced Mining Pollution
COUNTRY: Philippines
VALUATION METHOD(S): Change in Productivity Approach
UNIT(S): Foregone Income from Affected Activity Reflected in Productivity Losses
STUDY DATE: 1997
PUBLICATION DATE: 1998

MAJOR RESULT(S):

Category	Resource/Environmental Good	PHP, forgone income per household, per annum (1997)
River-Based Livelihood (Number of Households Engaged)	River Fishing (39)	5,599.00
Rice Farming (Number of Households Engaged)	Tenant (14)	11,017.00
Rice Farming (Number of Households Engaged)	Farm Laborer (7)	6,386.00
Rice Farming (Number of Households Engaged)	Land Owner (3)	1,487.00
Rice Farming (Number of Households Engaged)	Crop Trading (55)	23,093.00
Rice Farming (Number of Households Engaged)	Kangkong Farming (16)	3,847.00
Rice Farming (Number of Households Engaged)	Vegetable and Other Crop Farming (9)	2,932.00
Non-River Based Livelihood (Number of Households Engaged)	Laundry (6)	4,954.00
Non-River Based Livelihood (Number of Households Engaged)	Coastal Fishing (35)	17,938.00
Non-River Based Livelihood (Number of Households Engaged)	Fish Retailing (4)	14,540.00

FUNCTIONAL TRANSFER:

STUDY NOTE: It must be taken into consideration that since in this study, one purpose of damage valuation was to serve as a basis for damage compensation, changes in the economic values of environmental goods affected by the pollution were estimated in terms of productivity losses in the affected economic activities. The change-in-productivity approach was seen as an appropriate basis for damage compensation because it provided an objective measure of the pollution damage in terms of forgone income. Thus, the measure of environmental damages due to the mining activity/accident was the foregone income of households from the activity affected by the pollution, as reflected in the productivity loss in that activity. This study did not use the more common methods of valuation (i.e. contingent valuation, travel cost, hedonic pricing) due to the difficulty with or inapplicability of such methods in similar pollution-related events.

STUDY DETAILS:

BIBLIOGRAPHICAL ENTRY: Bennagen, Ma. Eugenia. 1998. Estimation of environmental damages from mining pollution: The Marinduque island mining accident. EEPSEA Research Report Series, 1, 1-46.

ABSTRACT: In terms of direct use values of the river and coastal waters affected by the tailings spill, the present value of the estimated total damages over a 10-year period amounted to PHP 162 M under the "with long-term rehabilitation" scenario and PHP 180 M under the "with short-term rehabilitation" scenario. The estimated foregone income in 1996 of PHP 50.1 M was slightly more than 50% of the total provincial income of PHP 95.0 M and was more than two times the total municipal income of Boac of PHP 21 M in 1996.

SITE ATTRIBUTES: Marinduque Island, having a total land area of 959.2 km^2, is located about 170 kilometers south of Manila. The provincial population in 1995 was 199,910. Almost 25% (44,609) of the population reside in the provincial capital, Boac. Situated in the Island is the Marcopper Mining Corp. (MMC), and has been engaged in open-pit mining in the municipality of Sta. Cruz, Marinduque since the onset of 1970. After moving to another mine site within the island in 1989, the drainage tunnel in the previous pit was plugged with concrete to serve as disposal pond for the mine tailings. Seepage was sighted in 1995, which consequently broke on March 24, 1996, heavily polluting the Boac River at a rate of 5-10 m^3/s. About 1.6 million cubic meters of tailing were deposited along the 27-km span of the river system and the coastal areas near the river mouth west of the island-province. The environmental disaster left Boac River virtually dead, adversely affecting the local residents in Boac whose livelihood activities were river-dependent, not to mention that the Boac River also provided non-economic uses such as recreation.

COMMENTS: Survey and sampling biases for the estimation of impact on household livelihood activities were not discussed, though policy implications were considered. The formation of some guidelines for the conduct of a systematic natural resource damage assessment for events leading to the release of hazardous substances to the environment was recommended based on the values reported in the study.

SAMPLE STUDY #3

MEDIUM: Water
FOCUS: Estimated Demand Function for Water
COUNTRY: Philippines
VALUATION METHOD(S): Prices
UNIT(S):
STUDY DATE: 1995
PUBLICATION DATE: 1998

MAJOR RESULT(S):

FUNCTIONAL TRANSFER: The following demand equation (vended water alone D_{W1}; R^2 = 0.418, DW = 1.893, intercept se = 1.57) for (including free public faucets) in double-log form was estimated by two-stage least squares (2SLS):

$$D_{W1} = 7.092 - 2.092\ APRICE + 0.254\ INCOME + 0.411\ HHSIZE - 2.464\ HOSEF - 1.063\ HOSEC - 2.016\ PKUPMS - 0.257\ PKUPDW - 8.845\ PLFAUCET - 0.074\ DISTANCE + 0.094\ TRBDY + 0.891\ TASTE,$$

while the demand equation (D_{W2}; R^2 = 0.818, DW = 1.937, intercept se = 3.17) for water based on households using both vended water (including free public faucets) and water distributed by Metro Manila's water agency, Metropolitan Waterworks and Sewerage System (MWSS) in double-log form and estimated by 2SLS is shown by the following:

$$D_{W2} = 2.153 - 0.492\ APRICE + 0.173\ INCOME + 0.351\ HHSIZE - 0.851\ HOSEF - 0.419\ HOSEC - 0.642\ PKUPMS - 0.155\ PKUPDW - 2.329\ PLFAUCET - 0.085\ DISTANCE + 0.059\ TRBDY + 0.073\ TASTE,$$

where APRICE is the average price of water (D_{W1} significant at 10%, se = -1.71; D_{W2} significant at 1%, se = -7.58), INCOME is the monthly household income in thousand pesos (D_{W1}significant at 10%, se = 3.17; D_{W2} significant at 1%, se = 3.03), HHSIZE is the household size (D_{W1} significant at 1%, se = 3.93; D_{W2} significant at 1%, se = 4.33), HOSEF is = 1 if by hose at fixed charge and 0 otherwise (D_{W1} significant at 10%, se = -1.90; D_{W2} significant at 1%, se = -6.73), PKUPMS = 1 if picked up from public faucet and 0 otherwise (D_{W1}significant at 10%, se = -1.85; D_{W2} significant at 1%, se = -4.49), PKUPDW = 1 if picked up from households using tubewells and 0 otherwise (D_{W1} se = -1.17; D_{W2} se = -0.85), PLFAUCET = 1 if picked up from public faucet and 0 otherwise (D_{W1} significant at 10%, se = -1.76; D_{W2} significant at 1%, se = -9.05), DISTANCE is the distance from source in meters (D_{W1} se = -1.63; D_{W2} significant at 1%, se = -2.19), TRBDY = 1 if without particles and 0 otherwise (D_{W1} se = 0.79; D_{W2} se = 0.69), and TASTE = 1 if water has good taste and 0 otherwise (D_{W1} se = 1.34; D_{W2} se = 0.38).

Average price, household income, and household size coefficients were all expectedly very significant. The dummy variables representing the mode of vending water were also statistically significant.

STUDY NOTE: The two demand models were estimated using 2SLS to address simultaneity problems that were encountered and to avoid biased and inconsistent estimates with ordinary least squares regression. For the first case, a price equation was estimated in the first stage, followed by specifying the predicted price with

other explanatory variables in the demand equations for the second stage. In the second case, two equations where the marginal price and the difference between the actual water bill and what the bill would have been had all the water been bought at the marginal price were first estimated, followed by the inclusion of the predicted marginal price and difference in the demand equation for the second stage.

STUDY DETAILS:

BIBLIOGRAPHICAL ENTRY: David, Cristina C. & Incoencio, Arlene B. 1998. Understanding household demand for water: The Metro Manila case. EEPSEA Research Report Series, 1, 1-24.

ABSTRACT: The urban water problem has been made a central policy issue by widespread water shortages in Metro Manila. The MWSS inefficiency is attested to by Metro Manila's unfavorable record on ratio of non-revenue water, hours of water availability, and number of personnel per 1000 connections. In order to determine optimal pricing policies, demand and supply functions for water were estimated. The study tried to characterize the household sources of water supply, quality of water service, cost of water, and levels of water demand in relation to household income, and to draw some policy implications based on cross-section household survey data. Results showed that the poor are paying much higher water prices (two to five times more) than the better-off households who typically have MWSS connections, simply because the poor do not have access to MWSS water connections. The study recommended that in setting water prices efforts must be made to determine the price level that will equate the demand for water to the supply of water produced considering the marginal cost of extracting/delivering good water quality, cost of water scarcity, and other externalities involved in the production and consumption of water.

SITE ATTRIBUTES: A 1995 survey on 506 households in Metro Manila covered 95 barangays in 11 major cities and municipalities. The barangays were representative of the different types (private water vending, individual tubewells, private waterworks, MWSS) and qualities (for example water pressure and time availability) of water service, as well as the various household income levels (low, middle and high income groups) within each municipality. The barangays were selected following a brief reconnaissance survey, an examination of the water pressure map of the MWSS, and a review of various profile studies on urban poverty. Based on the information from barangay captains regarding the sources of water supply, nature of private water vending, and characteristics of households in their respective jurisdictions, about five to ten households in each barangay were selected and interviewed.

COMMENTS: The 2SLS estimates provided superior results compared to the OLS ones due to the greater number of statistically significant variables. Also, an unbiased and consistent estimate of price elasticity of water demand (-2.1 for the vended water sample, and -0.5 for the pooled sample) was provided. The estimated price elasticity for the pooled sample fell within the range of estimates for other countries. The results indicated a highly responsive demand function to changes in price, commonly found in low income households dependent on vended water. Such an elastic price response suggested that pricing can be an effective means of more efficiently managing the allocation of limited water supply. On the survey data, it should be noted that the sampling procedure among high income households was not strictly followed in some cases because interviews with such households could only be conducted through personal relationships. As such, fewer households were interviewed in high-income barangays.