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CONTINGENT VALUE MEASUREMENT OF COASTAL WETLANDS: A CASE STUDY OF NEW JERSEY

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ABSTRACT: *The contingent valuation method for non-consumptive uses of ecosystems is becoming an important tool in formulating policies to preserve ecosystems such as wetlands. Through an opinion survey, residents of New Jersey were asked how much they were willing to contribute to preserve and improve coastal wetlands. The median contribution for three consecutive surveys in 1994, '95, '96 remained constant at $25.00. This value multiplied by the number of households in New Jersey provided the contingent valuation of New Jersey Wetlands at $71 million. Survey results reveal that the contributions are significantly higher for respondents who have visited the wetlands; who have higher education; and who live in suburbs and exurbs. Political changes have little effect on respondents' attitudes towards wetlands. Ninety percent of the respondents indicated that the wetlands should remain as an area for fish, shellfish, wildlife; for recreation and for controlling coastal flooding. These uses are consistent with scientific literature. The high degree of support for wetlands will be conducive to the formulation of policies that will improve and preserve the state's wetlands.*

INTRODUCTION

The services that the coastal wetlands of New Jersey provide make them an important ecosystem (NRC, 1992). Like other wetlands, they are a haven for birds, fish and wildlife. Flood protection of coastal areas is another vital service. Their water filtration function keeps the water in estuaries and adjacent beaches clean. Wetlands provide spawning areas for fish and shellfish and nesting areas for birds. On the Atlantic Coastal flyway route for migrating birds, New Jersey wetlands are an important and necessary resting and feeding area (Dunne et al, 1989; Dally, 1997).

Wetlands are rich in biodiversity. They provide human visitors with expansive vistas of scenic landscapes and aesthetic pleasure. The protection of this vital natural resource requires that these services should also be measured in a common currency of monetary value (Costanza et al, 1997). With this objective, the present study was conducted to assess the monetary value of coastal wetlands in New Jersey.

EVALUATION TECHNIQUES

The services that ecosystems such as wetlands provide are outside the market price system. This makes the measurement of monetary value difficult and susceptible to questions. However, various techniques have been developed to measure the dollar value of ecosystem services. These techniques are: benefit-cost analysis, travel cost method and contingent valuation method (Goulder and Kennedy, 1997; Loomis, 1995).

Benefit-Cost Analysis (BCA)

The application of benefit-cost analysis to environmental decision making is akin to profit and loss analysis to a business firm. The method was developed by economists to evaluate environmental decisions and was also used for the valuation of ecosystems. The BCA involves four steps. First, clearly specify the basic objectives. Second, list inputs and outputs in quantitative terms. Third, estimate social costs and benefits to these inputs and outputs. Fourth, add the benefits and costs and compare (Mishan, 1988).

In environmental decision making, the market price system is not, in all instances, helpful to quantify costs to and benefits of the environment. Therefore, to ascertain costs and benefits, the BCA methodology becomes similar to voting. All persons are asked to list costs as well as benefits that will accrue to them for each policy option. All the benefits and costs are converted into monetary value and then aggregated. A policy option with high benefits to costs is considered a desirable policy option (Gramlich, 1990).

The Federal Government for the first time required benefit-cost analysis in the Flood Control Act of 1936. Soon after this, the BCA was applied to justify water development and irrigation projects, dam and levee construction, and hosts of other public sector projects. In this period of economic depression, no attention was

given to environmental impacts. The emphasis was to provide employment with public sector investments and to increase the production of commodities.

The criticism of the BCA has been that it does not fully take into account all the costs to the environment. Either because of the difficulty of measuring in monetary terms all the environmental costs or simple bias or ignorance or a combination of the above factors the environment is considered to be undervalued. Another concern with BCA is that the group or individuals receiving the benefits of a project are not necessarily the same people who bear the cost of environmental degradation. Like this distributional inequity there is a generational inequity. The benefits are enjoyed by the current generations and environmental costs have to be borne by future generations. The storage of radioactive waste that will require a safe keeping for a very long time by future generations is an often cited powerful example of generational inequity.

In 1950, the Federal Inter-Agency River Basin Commission produced guidelines in a report known as the "Green Book" that included non-marketed benefits in the BCA. The report specifically mentioned recreational values and values of saving human lives as the non-marketed benefits of water resource projects. Though this was a step in the right direction, the agency's decision-making was closed to public input and scrutiny. With the enactment of the National Environmental Policy Act (NEPA) in 1970, environmental protection was elevated to the center stage of federal decision-making. According to NEPA the impact on the environment has to be considered and minimized in all major federal projects. An Environmental Impact Statement (EIS) has to be prepared. The EIS must include the following analyses: the environmental impacts and unavoidable adverse effects; alternatives to the proposed actions; relationships between short-term versus long-term uses of the environment, and the irreversible and irretrievable commitment of resources. A detailed EIS must accompany all major federal project plans. The preparation of EIS is an open process. All agencies concerned are involved in its preparation. It is also open to the public for review. The NEPA provides "standing" to the public to petition the courts to redress an inadequate or incomplete EIS. As a result, the number of court cases pertaining to EIS skyrocketed. The opponents of the environment considered EIS to be an obstacle to economic growth and efficiency. To overcome this obstacle, President Reagan issued the Executive Order (EO-12291) to conduct BCA of all federal regulations. The Office of Management and Budget was authorized to review these analyses before giving agency approval to proceed with promulgation. President Clinton, through the Executive Order (EO-12866) made the reduction of environmental risk as part of the benefits to be included in BCA and corrected the anti-environment bias. Thus, the NEPA forced the inclusion of protection of the environment into all federal decision making and brought into prominence other valuation techniques to measure various facets of the environment.

Travel Cost Method

Travel Cost Method (TCM) became the method of choice as a result of the requirement to include recreational value in federal water projects (Clawson and Knetsch, 1966). The premise underlying the method is that the recreationalists are willing to pay over and above their immediate expenditures. The total expenditures can be measured in dollars using the travel cost method. This expenditure will be the recreational value of the natural resources. The travel cost is measured by adding costs of travel, hotels, meals and other fees. This figure is multiplied by the number of visitors. This method requires detailed information on the origin and destination of a journey, duration of the stay, and estimates of other expenses. It is a useful method to assess the monetary value of scenic areas, national parks, recreational uses of rivers, etc. Most of these sites require registration of visitors so they can easily collect information to measure the dollar value of these sites. In the absence of registration, the information has to be collected through sampling techniques.

Contingent Valuation

What the Contingent Valuation Method (CVM) is and how it is applied is central to the methodology of this paper. The willingness to pay is the basis of contingent valuation. Through an opinion survey, people are asked how much they are willing to pay for the protection of an ecosystem. The respondents are generally given a range of choices, for example: $10, $20, $30, $40 and $50 or more. From this data a median value is calculated. Median value multiplied with the number of households provide the contingent valuation for the ecosystem or eco-resource. Median value is preferred over the mean because it indicates that the majority of respondents are willing to pay this amount. The households are selected because contributions are generally made for the household as a whole. The contingent valuation method along with TCM was the method of choice in the valuation of recreational uses of federal water projects (Loomis, 1995). The use of CVM has expanded. Now the method is used to assess the existence value of whole ecosystems. Existence value is

a measure of people's willingness to pay for a resource sothat it will continue to exist in its current state into the future. During the litigation to seek compensation for the damages to Prince William Sound due to the Exxon Valdez Oil Spill in 1989, the existence value of the Sound became the central issue. Both the Federal Government and the State of Alaska wanted to use CVM to measure the existence value. Unsurprisingly, Exxon objected to this methodology as unreliable and subject to bias. Exxon persuaded the National Oceanic and Atmospheric Administration (NOAA) (which has jurisdiction over the Sound) to establish a blue ribbon panel to review the use of CVM for measurement of existence value. The panel included two economic Nobel Laureates, a policy economist and a survey research expert. The panel concluded in 1993 that CVM provides reliable results for non-use or existence value of resources. The panel also recommended that in person interviews or telephone surveys are preferable to mail surveys (Arrow and Solow , 1993).

The existence value of Prince William Sound using CVM was calculated at $2.8 billion. The Exxon Corporation reached a court settlement with the State of Alaska for this amount. (Passell, 1993). The CVM has emerged as the method of choice for the valuation of whole ecosystems.

SURVEY OF NEW JERSEY WETLANDS

National environmental policy recognizes that wetlands are an important ecosystem that needs priority protection. This principle is reflected in the "No Net Loss of Wetlands Policy" initiated by the Bush Administration (EQ, 1990). New Jersey has 18 percent of its area under wetlands. In the coastal counties, along the Atlantic shore and the Delaware Bay, the proportion of wetlands reaches above 25 percent. A combination of factors such as the Alaskan case study, no net loss of wetland policy goal, the constitutional debate on the "taking clause" as it pertains to wetlands (Lucas, 1996), an electoral swing to conservative politics in the 1994 congressional election heightened our intellectual interest to measure New Jersey residents' willingness to pay for the preservation of wetlands.

A questionnaire containing five questions was developed. The graduate students in my Research Methods classes conducted three annual opinion surveys. The randomly selected respondents were 877 in October, 1994, 929 in October, 1995 and 823 in October, 1996. To refine the final wording of the questionnaire, a pre-survey was conducted in 1994. The surveys were conducted by telephone. Telephone numbers were generated through a random sampling technique. Care was taken to make the sample representative of New Jersey population. Nineteen ninety-four was a watershed year in national politics. The Republican Party, with an anti-environment and socially conservative agenda, took control of both houses of Congress for the first time in a generation. Conducting a survey on an environmental issue at the height of this changing period, in October, 1994, and comparing these results with sample surveys conducted in '95 and '96 would provide an indication of whether the attitude towards environment has changed corresponding to political change. The results of the survey are shown in Table 1.

SURVEY RESULTS AND ESTIMATE OF VALUATION

The three consecutive surveys revealed a consistent trend of continuous support for wetlands. The proportion of respondents who visited the wetlands remained fairly constant. When asked, "What is the best use of the coastal wetlands?", only a small proportion, less than eight percent, chose real estate. The respondents choice of the best use of the wetlands as the home for wildlife, recreation and flood protection, are consistent with the scientific literature and the eco-services that the wetlands provide (NRC, 1992). When asked, "How much will your family be willing to make as a one-time contribution to improve and preserve the quality of the wetlands?", the median value remained consistent for three consecutive years at $25. This question is at the heart of the contingent valuation technique. This median contribution multiplied by 2.8 million households in New Jersey comes to $71 million. This is the estimated contingent value of coastal wetlands in New Jersey. It must be emphasized that the contingent valuation of $71 million for the wetlands in New Jersey is not the total value of the wetlands. People in New Jersey are willing to spend this amount to maintain and preserve the wetlands.

The study hypothesized that the visit to the wetlands, educational level and the nature of the residential community of the respondents have an effect on the amount of contribution they are willing to make to preserve wetlands. To measure this relationship, the variable contribution was cross-tabulated with visit, education and community type separately for '94, '95 and '96. Nine chi square values were calculated (three for

Table 1. Opinion Surveys of Wetlands in New Jersey 1994, 1995, 1996

		Oct., 1994 N=877	Oct., 1995 N=929	Oct. 1996 N=823	
Visit:	Yes	64**	56	63	Q: Have you ever visited the coastal wetlands?*
	No	36	44	37	
Best Use:	Home for Wildlife	44	47	31	Q: What in your opinion is the best use of the coastal wetlands?
	Recreation	27	21	35	
	Protection from Floods	25	25	26	
	Real Estate	4	6	8	
Contributions:	$10 or Less	14	14	7	Q: If asked, how much would your family be willing to make as a one-time contribution to improve and preserve the quality of the wetlands?
	$15	29	28	26	
	$25	26	27	22	
	$50	14	18	20	
	$75	6	5	13	
	$100	8	8	11	
Education:	Some High School	2	5	3	Q: What level of education best describes you?
	H.S. Diploma	18	25	23	
	Some College	25	22	23	
	College Degree	40	35	39	
	Advanced Degree	14	13	12	
Community:	City	15	15	8	Q: How would you classify your community?
	Suburb	53	50	60	
	Small Town	27	28	29	
	Countryside (Exurbs)	6	7	3	

*The questions that were asked in the survey are listed on the right. The responses to the questions are listed on the left.
**Figures in Percentage of Total Respondents

each sample for three yearly samples) for the above cross-tabs. The significance level (P value) for nine chi square values is less than P=.001. Generally a P value lower than 0.05 is an acceptable significance level. Therefore this study's P values which are statistically highly significant, are interpreted as that there are real differences in the amount of contributions for people who visit versus those who do not visit wetlands. Similarly there are real differences in the amount of contributions by educational level and by the type of community. Combining this information with the nine cross-tabs, the analysis shows a consistent pattern that persons who have visited wetlands are willing to contribute a higher amount. Similar is the influence of education. The higher the educational level of persons, the higher are their contributions. The residents of suburbs and exurbs/countryside are willing to contribute a higher amount than the residents of cities and small towns.

RELEVANCE OF RESULTS

The contingent valuation of $71 million for wetlands of New Jersey is an impressive sum. A comparison with federal spending clearly demonstrates this fact. For example, the 1992 federal budget request for all wetland activities was $709 million, a 48 percent increase over the enacted 1991 level. New Jersey has 0.89 percent of nation's wetland acreage and its proportionate share of the federal spending comes to $6.3 million (EQ, 1990). In 1993 the Army Corps of Engineers expended $46 million on wetland mitigation, restoration and protection throughout the country (EQ, 1993). A comparison with the Alaska study shows that the New Jersey median contribution of $25 per household is in line with the median contribution of $31 in the Alaska study. This study indicates that the valuation of wetlands will increase in the coming years because of two factors. First, an increasing proportion of the population

will be college educated. Second, suburbanization will further expand. These two trends are shown to have a positive impact on valuation. The formulation of public policy to protect wetlands must include residents' visits to the area. The residents' support increases after the visit as the study demonstrates. Nineteen ninety-four was the start of the "Republican Revolution" in Congress and New Jersey had just elected a Republican Governor. Despite the official anti-environmental attitude at the federal and state level, New Jersey residents in 1994, 1995 and 1996, have demonstrated a consistent pattern of strong commitment to protect wetlands.

LITERATURE CITED

Arrow, K., Solow, R. , Portney, P., Leamer, E., Radner, R. and Schuman, H. 1993. *Report of the NOAA Panel on Contingent Valuation*, Washington, D.C., National Oceanic and Atmospheric Administration.

Clawson, M. and Knetsch, J. 1966. *Economics of Outdoor Recreation*, Baltimore: The Johns Hopkins Press.

Costanza, R. et al, 1997. The Value of the World's Ecosystem Services and Natural Capital. *Nature* 387: 253-260.

Dally, G. C. 1997. Valuing and Safeguarding Earth's Life Support System in *Nature's Services* ed., C. Dally,Washington D. C.:Island Press.

Dunne, P., Kane, R. and Kerlinger,P. 1989. New Jersey at the Crossroads of Migration. *New Jersey Audubon Society*, Franklin Lakes, New Jersey.

(EQ) Environmental Quality, 1990. 21 Annual Report. *The Council on Environmental Quality*:p. 8, p. 42, U. S. Government Printing Office, Washington, D.C.

(EQ) Environmental Quality, 1993. Twenty-fourth Annual Report. *The Council on Environmental Quality*,p. 107, U. S. Government Printing Office, Washington, D.C.

Goulder, L. and Kennedy, D. 1997. Valuing Ecosystem Services: Philosophical Bases and Empirical Methods in *Nature's Services*,ed. C. Dally, Washington, D. C.:Island Press.

Gramlich, E., 1990. *A Guide to Benefit- Cost Analysis of Government Programs*, 2nd Ed., Englewood Cliffs:Prentice Hall

Loomis, D., and John, B., 1995. Shifting and Broadening the Economic Paradigm Towards Natural Resources, In *A New Century for Natural Resources Management*, ed., Knight and Bates,Washington, D.C:Island Press

Lucas, V. South Carolina Coastal Service, 1992. U. S. Supreme Court, June, 1992. Lucas was a case regarding the Fifth Amendment to the U.S. Constitution that says that private property shall not "be taken without just compensation." Supreme Court ruled in Lucas' favor that the state of South Carolina by denying Mr. Lucas the development rights to his coastal property has taken his property without just compensation.

Mishan, E.J., 1988. *Cost-Benefit Analysis: An Informal Introduction*, 4th*ed.*, Boston:Unwin Hyman.

NRC (National Research Council), 1992. *Restoration of Aquatic Ecosystems*. National Academy Press. (Section on Wetlands, pp 262-332).

Passell, P., 1993. *Disputed New Role For Polls, Putting a Price Tag on Nature*. New York Times, Monday, September 5, 1993.