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**VALUING THE RECREATIONAL BENEFITS
OF THE SALE WETLANDS USING THE
CONTINGENT VALUATION METHOD**

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Any further errors that remain are entirely mine.

Binhur Sappideen

VALUING THE RECREATIONAL BENEFITS OF THE SALE WETLANDS USING THE CONTINGENT VALUATION METHOD¹

1. Introduction

Salinity is often claimed to be Victoria's greatest environmental challenge. To meet this challenge, the Victorian Government is committed to a salinity management program initiated in 1985 and endorsed through the strategy *Salt Action: Joint Action* in 1988. Under *Salt Action: Joint Action*, 18 sub-regional salinity management plans (SMPs) are being prepared to combat salinity throughout the State.

Traditionally, the economic impacts of salinity have been determined by estimating agricultural productivity losses, while social and environmental effects have been addressed only in qualitative terms. However, the Guidelines for the Preparation of Salinity Management Plans in Victoria (1988:18), state: "Environmental effects considered to be significant should be costed in dollar terms and included in the economic account wherever possible...". A major limitation in the preparation of SMPs has been the inability to account for the impact of salinity on the environment.

The development of methodologies such as the Hedonic Pricing, Travel Cost and Contingent Valuation enables the valuation of environmental amenities. In this study the Contingent Valuation Method (CVM) is used to estimate the recreational values of the Sale wetlands.

2. Theoretical concepts

The impact of catchment driven salinity on the Sale wetlands is an externality imposed on the community that uses these wetlands for its various amenities. Preventing this externality is a positive benefit of the SMP being prepared for the catchment.

To determine the "total economic value" of an environmental amenity, one has to account for both use and non-use values. Use values include direct productive values such as the commercial harvesting of a resource and on-site recreation values (angling, hunting, camping, etc.). Non-use or intrinsic values include *option value*², *existence value*³ and a *bequest value*⁴. The CVM has the capacity to measure both use and non-use

¹ This is a revised version of a paper presented at a workshop on "Valuing Natural Areas", held at the Johnstone Centre of Parks, Recreation and Heritage, Charles Sturt University, Albury, NSW, on 29 and 30 June 1992.

² *Option value* is the value attributable to the option of being able to make future use of an amenity (see Bishop (1982), for an exposition of this concept).

³ *Existence value* is '...the utility that people receive from simply knowing that something exists'. See Mitchell and Carson (1989:63) for a discussion of this concept.

⁴ *Bequest value* is the value derived by individuals from knowing that future generations will be able to enjoy the existence or use of a resource.

values. It creates a hypothetical market and uses survey questions to elicit consumers preferences for public goods by finding out what they would be willing to pay for specified increases (or avoidance of decreases) in them. In this study only the use values (on-site recreation) of the Sale wetlands are determined.

There are two theoretically appropriate measures to determine a change in an environmental amenity; the Hicksian compensating surplus and the Hicksian equivalent surplus. According to Mitchell and Carson (1990), consumer property rights determine the most appropriate measure to be used. In the case of the Sale wetlands, the community in the Gippsland region in eastern Victoria currently enjoys a level of environmental amenity which is higher than would be the case if the Sale wetlands degraded due to catchment driven salinity. The theoretically appropriate welfare measure to determine a decrease in the level of environmental amenity in this case is the Hicksian equivalent surplus. This is measured by the consumer's maximum willingness to pay (WTP) to avoid a decrease in (i.e. conserve) the environmental values of the Sale wetlands.

The theoretical measure of WTP, B is defined as;

$$V(P, e'', Y - B) = V(P, e', Y) = U \quad (1)$$

where $V(.)$ is an indirect utility function, P is vector of prices, e'' is the existing level of wetlands environmental values, Y is income, e' is a degraded level of the wetlands environmental values and U is the defined level of utility. B is the Hicksian equivalent surplus measure.

3. The Study

3.1 Study area

A SMP is under preparation for the Lake Wellington Catchment (catchment), a salinity sub-region in the Gippsland region in eastern Victoria. There are a number of wetlands in the catchment. Four of these wetlands are located in the lower reaches of the catchment (salinity discharge zones) and are under threat from the impacts of catchment driven salinity. These wetlands, collectively identified as the Sale wetlands, are deep freshwater marsh wetlands. They include the Clydebank Morass, Dowd Morass, Heart Morass and Sale Common. In total they cover about 3,600 ha. All these wetlands are of regional zoological significance supporting large breeding colonies of five species of water bird. A large number of other land and water bird species (196 in all) also visit and some of these species breed at these wetlands. These wetlands are all listed under the RAMSAR Convention, as well as being recognised under the Japan Australia Migratory Birds Agreement (JAMBA) and the China Australia Migratory Birds Agreement (CAMBA). The Sale wetlands are also very popular for recreational activities such as game hunting, bird watching, bush walking, camping, etc.

Although there have not been any regular or consistent salinity measurements in any of these wetlands, preliminary investigations indicate that salinity levels are increasing, primarily due to catchment effects (Nash 1991). If this increasing trend in salinity

continues, it is feared that the internationally significant Sale wetlands will become further degraded, resulting in significant losses in fauna and flora habitats and other environmental values.

3.2 Study objective

There are two major groups of consumers who benefit from the environmental amenities provided by the Sale wetlands. The general community enjoy the environmental amenities of the Sale wetlands through camping, bushwalking, bird watching, fishing, etc. The Sale wetlands also provide recreational benefits to game bird hunters who hunt ducks and other game birds in the area. The objective of the study was to determine the recreational benefits of the environmental amenities provided by the Sale wetlands to these two groups of consumers.

Due to resource constraints, the scope of the study was limited to the statistical region of eastern Victoria comprising the electoral divisions of McMillan and Gippsland.

3.3 The Contingent Valuation survey

The CVM presents the consumer with a hypothetical market in which to buy the good in question. The main criticisms of the CVM are the number of biases that are associated with the method. These are starting point bias, hypothetical bias, information bias, payment vehicle bias and strategic bias. In recent years, the CVM has been refined considerably to overcome the above biases to a large degree (Bishop and Boyle 1988; Mitchell and Carson 1981).

Hypothetical and information bias can be reduced by describing the market as completely as possible. Payment vehicle bias can be overcome by using a realistic payment vehicle with which the consumer is familiar.

3.3.1 Description of the hypothetical market

The hypothetical market presented to the consumer in this study was a description as complete as possible of the Sale wetlands based on five key characteristics portraying its current environmental value and the impact of an increase in salinity. The characteristics described were; wetland salinity levels, international significance, bird species present, other fauna and flora present and recreational uses.

Two scenarios based on the above characteristics were described (see appendix I for a description of these two scenarios):

- the existing status; and
- a potentially deteriorated status due to the effects of salinity.

3.3.2 Payment vehicle definition

To determine the individual's WTP to conserve the Sale wetlands two payment vehicles were used: i) a wetlands entry fee for the general community; and ii) an increase in game

bird hunting licence fee for the game bird hunters. Victorians regularly pay entry fees to access environmental amenities, while game bird hunters pay an annual game licence fee. Therefore, these were considered as realistic and acceptable payment vehicles.

3.3.3 Value elicitation procedures

In CVM studies, the most common procedure to elicit WTP is the iterative bidding technique with the respondent reacting to a variation in price as posed by the researcher. This technique has the greatest potential to induce starting point bias in a CVM study. To overcome starting point bias, other techniques such as the use of a payment card, dichotomous choice, and open-ended questions have been used.

A study conducted by Seller, Stoll and Chevas (1985) indicate that when consumers are faced with an unfamiliar situation of being asked to place a monetary value on a good currently enjoyed free, they respond better when a range of possible values are provided. For the general community, entry to the Sale wetlands is currently free. Hence, a closed question was used with a range of possible entry fees varying from \$2 to \$10. Consumers however, had the option of making their own bid if they so desired.

Game bird hunters currently pay an annual game bird licence fee of \$40 to hunt ducks. To be consistent with the value elicitation procedure used for the general community, a closed question was used to elicit WTP from game bird hunters ranging from \$2 to \$10, with the option of making their own bid if they so desired.

3.3.4 Eliciting willingness to pay

To elicit the consumer's WTP, the following information was provided:

One way to protect the Sale wetlands so that you may continue to enjoy hunting game birds current recreational values, would be to set up a **Sale Wetlands Conservation Trust Fund**. The contribution to this fund could be made up of two sources: i) a higher game bird licensing fee from game bird hunters; and ii) a wetlands entry fee from all others

All money raised through this Trust Fund would be used to undertake catchment protection programs such as planting trees and educating farmers to better manage their land. These programs would help to mitigate the effects of salinity on the Sale wetlands and prevent their deterioration from their current state as described in scenario one.

This expenditure will be in addition to other funds that will be contributed by land holders in the catchment and by the State Government as part of the Lake Wellington Catchment Salinity Management Plan.

If you are not willing to contribute to the above Trust Fund through a higher game bird licensing fee/wetlands entry fee, the level of expenditure to protect the catchment will be less, and salinity levels in the Sale wetlands will gradually increase over a period of time, resulting in the wetlands being as described in scenario 2 (a deteriorated state).

Given the above information:

"Would you be willing to pay a higher game bird licensing fee/wetlands entry fee to the Sale Wetlands Conservation Trust Fund to protect the environmental values of the Sale wetlands from changing from scenario one (current status) to scenario two (deteriorated status)?"

3.4 Other variables

Individual (*i*'s) WTP (*W*) depends on several factors. In this study it is hypothesised that individual WTP to conserve the Sale wetlands will be influenced by: a) income levels (*Y*); b) knowledge about the Sale wetlands (*K*); c) prior visits to the Sale wetlands (*V*); d) age of respondent (*A*); e) education level (*E*).

The bid curve to be estimated for individual *i* is:

$$W_i = f(K_i, V_i, A_i, E_i, Y_i,) \quad (2)$$

3.5 Sampling

Two sample surveys were conducted to elicit the WTP a wetlands entry fee and a higher game bird licensing fee. Survey one (WTP a wetlands entry fee) focussed on all Victorians in the ABS statistical region of eastern Victoria. The sampling frame consisted of the electoral registers for the divisions of McMillan and Gippsland. A random sample of 600 individuals was drawn for surveying. A second random sample of 600 was selected from licensed game bird hunters registered in the eastern region of Victoria to determine their WTP a higher game bird licensing fee (survey two).

The questionnaire was designed to reflect all the environmental values of the Sale wetlands as described in scenarios 1 and 2 above⁵. A map of the area indicating the location of the Sale wetlands as well as a list of all the important bird species, their status and occurrence in the Sale wetlands was included. Due to the large size of sample and resource constraints the data were collected through a mail survey. The respondents were given three weeks to respond. At the end of three weeks a reminder was sent to those respondents who had not replied giving them a further two weeks to respond.

4 . Study results

4.1 Response rate

The response rate at the end of five weeks (including the follow up period) for survey one and survey two were 31% and 40% respectively, an acceptable response rate for mail surveys.

⁵ Two separate questionnaires were designed, one each for the general community and the game bird hunter populations emphasising the recreational values provided by the Sale wetlands for each of the above consumer groups.

Table 1 - Response rate analysis

Particulars	Survey one	Survey two
No. of questionnaires mailed	600	600
No. of questionnaires undelivered	27	6
Final sample number	573	594
No. of responses received	176	235
Responses rate	31 %	40 %

4.2 The WTP value

Table 2 presents the results of the CV survey. In survey one, of the 176 responses, only 107 (61%) stated a WTP an entry fee to the wetlands. The WTP value ranged from \$1 to \$10 with a modal value of \$2. There were 3 respondents who were prepared to pay an entry fee to the wetlands, but did not give a specific value. Those respondents who did not indicate a WTP may have a genuine zero bid or a protest bid. To distinguish between these two categories, respondents were asked the reasons for their non-willingness to pay a wetlands entry fee. Zero bid respondents are those who did not derive any recreational value from the Sale wetlands or those who could not afford to pay an entry fee to the wetlands. Fifteen percent of bids were zero bids. All other non-WTP bids are categorised as protest bids (24%).

Table 2 Contingent Valuation results

Descriptive statistic	Survey one	Survey two
Modal WTP (\$)	2.00	5.00
Mean WTP (\$)	2.58	4.67
Standard Deviation about the mean	2.17	3.66
Range (\$)	1 to 10	2 to 20
No. of WTP bids with \$ value	104	79
No. of WTP bids without \$ value	3	2
No. of zero bids	27	17
No. of protest bids	42	137
Total no. of bids	176	235

The average WTP in survey one was \$2.58 with a standard deviation of 2.17. The total population of individuals over the age of 18 years in East Gippsland region is 150,433. On average, individuals had made 2 visits to the Sale wetlands in 1991. Using the average WTP figure of \$2.58, the total WTP (consumer surplus) of the adult population in the Gippsland region in eastern Victoria to conserve the environmental values of the Sale wetlands for general recreation is estimated at \$766,234 per year (or \$601,732 if the modal value of WTP is used).

In survey two, of the 235 responses only 81 (35%) stated a WTP an increase in the game bird hunting license fee. The WTP value ranged from \$2 to \$20 with a modal value of \$5 (table 2). There were 2 respondents who were prepared to pay a higher game bird licensing fee, but did not give a specific value. The bids of respondents who did not indicate a WTP were identified as either genuine zero bids or protest bids as described above. There were 7% zero bids and 58% protest bids.

The average WTP in survey two was \$4.67 with a standard deviation of 3.66. The total population of licensed game bird hunters in the Gippsland region is 1451. Using the average WTP figure, the total consumer surplus derived by the game bird hunters for conserving the environmental values of the Sale wetlands to hunt game birds is estimated at \$6,776 per year (or \$7,255 if the modal value of WTP is used).

Using a 4% real discount rate (Victorian Government guidelines) and a 30 year period (SMP horizon), the present value of future benefits for general recreation and game bird hunting of conserving the Sale wetlands is \$13 million (\$10 million using the modal estimate) and \$0.12 million (\$0.13 million using the modal estimate) respectively. However, as this study was confined to the population in the statistical division of Eastern Victoria, the above estimate should be considered as a lower bound of the total value of recreational benefits of conserving the Sale wetlands.

5. Validity of WTP estimates

The validity of the above WTP estimate is dependent on a number of factors. As mentioned before, a number of biases are frequently associated with the CVM. Measures were taken to ensure that hypothetical bias, information bias and payment vehicle bias were minimised as described above. Some other possible biases are discussed below.

5.1 Starting point bias

In a hypothetical market where consumers are unfamiliar with the concept of expressing a value for a non-market commodity, any information on the potential value of the commodity could influence the final bid price for that commodity.

Generally, entry charges to national parks and reserves in Victoria vary between \$2 to \$5 per individual on foot or per vehicle (car or four wheel drive). The cluster of the WTP bid around \$2 in survey one may indicate a starting point bias. Varying the initial and upper values of starting bids would have enabled this bias to be tested, although the study did not attempt to do this.

5.2 Payment vehicle bias

Depending on the payment mechanism for obtaining the willingness to pay, outcomes may vary. Game bird hunting licence fees were introduced in Victoria in 1990 at \$25 per year (50% concession for pensioners and juniors). This fee was increased by 60% in February 1992 to \$40. In survey two, the payment vehicle used was an increase in game bird hunting licence fee. It is possible that payment vehicle bias may be responsible for the large number of protest bids (58%) in survey two compared to survey one (24%). Respondents in survey two indicated that the high level of current game bird licence fee was the main reason for non willingness to pay an increase in game bird hunting licence fee. Payment vehicle bias could have been tested by surveying a sub-sample of game bird hunters using willingness to pay a wetlands entry fee as the payment vehicle.

5.3 Strategic bias

Strategic bias arises where individuals may attempt to influence the outcome of the result by not responding truthfully. The presence of strategic bias was not tested in this study. However, if strategic bias was present we would have expected a large number of zero bids or very high bids relative to the mean. The absence of zero bids (other than genuine zero bids from those not prepared to pay at all) and the small number (3%) of \$10 bids (highest bid) in survey one compared to the mean bid of \$2.58, and a single high bid of \$20 in survey two indicates the virtual absence of strategic bias. Bishop and Herberlein (1985) and Schulze et al (1981) have demonstrated that in several CV studies investigated for this error, strategic bias appears to be more the exception than the rule.

5.4 Establishing the maximum willingness to pay

AS the CVM attempts to determine the maximum WTP to consume a public good, the next step should have been to ask the respondent the following question; *"If the money raised through the Sale Conservation Trust Fund was insufficient to undertake preservation works on the Sale wetlands, would you be prepared to pay a higher wetlands entry fee/bigger increase in the game bird hunting licence fee?"* This question was not asked as the respondents were informed that the money raised for the Trust Fund through entry fees/increased game bird hunting fees would be in addition to government expenditure as well as contributions from landholders in the catchment. The provision of this information would have allowed respondents to decide on the maximum wetlands entry fee/increase in game bird licence fee they would be prepared to pay. It is, therefore, assumed that the above estimate of WTP is a maximum.

5.5 Estimation of the bid curve

Estimation of equation (2) to explain the WTP bid in terms of socio-economic variables gave disappointing results in both surveys. In survey one the explanatory power was low ($R^2 = 0.066$) and the key variables such as age, income and education levels that were thought significant *a priori* were not so. The cluster of bids around the \$2 figure may be the reason for this.

6. The non-use values of the Sale wetlands

In section 2 of this paper it was stated that to determine the "total economic value" of an environmental amenity, one has to account for both use and non-use values. Although this study only estimated the use values, i.e. general recreational and game bird hunting values of the Sale wetlands, the study addressed the non-use values of the wetlands in a descriptive manner. Respondents were requested to rank on a scale varying from not important to very important the reasons for valuing the Sale wetlands. Table 3 presents the results from survey one.

Table 3 Relative importance of non-use values of the Sale wetlands for recreationists (%)

Reason	not important	of some importance	important	very important	don't know	no response
conserving existing values	4	5	19	62	3	6
having the option to visit in future	7	20	32	31	3	6
available for future generations	5	9	17	61	3	6

From table 3 it is clear that although no attempt was made to elicit in monetary terms the non-use values of the Sale wetlands, over 60% of respondents reported that the existence, option and bequest values of the Sale wetlands were important to very important.

7. Conclusion

The objective of this study was to determine the recreational values of the Sale wetlands for the general community and game bird hunters using the CVM. The study was done in the Gippsland region of Victoria. The general community in the Gippsland region of Victoria indicated a willingness to pay a wetlands entry fee of \$2.58 on average, an aggregated annual recreational value of \$766,234. To game bird hunters in this region, the willingness to pay an average increase in game bird hunting licence fee of \$4.67 generated an aggregated benefit of \$6,776 per year. The total present value of these estimated benefits over 30 years using a 4% real discount rate is \$13.12 million. As a measure of the total use values (recreational and hunting) of the Sale wetlands, the above value is a lower bound as the study was confined to the population in the Gippsland region. Furthermore, it should also be noted that the study did not attempt to determine the non-use value of the Sale wetlands. To this extent the above estimate does not reflect the total economic value of the Sale wetlands.

APPENDIX I

Description of hypothetical market

SCENARIO ONE - the environmental values of the Sale WETLANDS at existing salinity levels (*current status*)

- * Wetlands salinity level varying seasonally from 500 up to 5000 ppm.
(parts of salt per million parts of water).
(*the salinity level of sea water is 30,000 to 35,000 ppm*)
- * Many species of birds will continue to use the wetlands for feeding and breeding including migratory birds listed under JAMBA and CAMBA as well as some rare and threatened species.
- * A large diversity of fauna such as frogs, crabs, shrimps, mussels, flat-worms, insects, etc. and freshwater aquatic vegetation will be present.
- * The International significance of wetlands will be maintained.
- * It is possible to continue enjoying the recreational amenities of the wetlands such as camping, bushwalking, fishing, nature observation, etc. at current levels.

SCENARIO TWO - the environmental values of the Sale WETLANDS with increased salinity levels (*deteriorated status*)

- * Wetland salinity levels up to 10,000 to 15,000 ppm.
(parts of salt per million parts of water)
(*the salinity level of sea water is 30,000 to 35,000 ppm*)
- * Reduction in bird species by about two thirds of current levels (see attached list on bird species). Some of the bird species will still feed at the wetlands, but will not breed there. There will be a change in types of bird species. There could also be a reduction in bird population in the wetlands if salinity levels increase to 15,000 ppm.
- * There will be a reduction in fauna species (e.g. up to about 75% of invertebrates such as flat-worms, mussels, insect, etc. will be absent) and significant decline in freshwater aquatic vegetation. Growth and regeneration capabilities of *Swamp Paperback* will be seriously affected.
- * The International significance of wetlands will be lost.
- * Due to the above changes to the ecosystem the opportunity to enjoy the recreational amenities of the wetlands such as camping, bushwalking, fishing, nature observation, etc. may be greatly reduced from existing levels.

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