Recreational Demand in Bird Sanctuary:

The Case of Kapar Bird Sanctuary, Kelang, Malaysia

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Abstract

This study investigates the willingness to pay (WTP) for recreational resources at Kapar Bird Sanctuary (KBS), Kelang, Malaysia. The relevant values were estimated by utilizing dichotomous choice form of contingent valuation method (CVM). The logit models were used to analyze the data collected. Open-ended elicitation questions were used to induce respondents to state their maximum WTP, and the OLS model was employed to determine the WTP values. For the purpose of this study, a total 220 respondents were interviewed and asked their WTP for the conservation of KPS as an excitement place for recreational site. The findings of the study showed that the mean willingness to pay ranges from RM12.06 to RM60.94. This study implies that non-use value should be considered in policy making associated with recreational resources. The findings of this study are important in assists policy maker in management and development of recreational sites in Malaysia.

Keywords: Economic valuation, Contingent valuation, Willingness to pay, Bird sanctuary, Recreation, Bird watching, Shorebirds

1. Introduction

In general, there are eight broad Migratory Bird Flyways in the world. One of these is Asia Australian Flyway. Birds in their flight path from northern to southern hemispheres (at the East Asia Australian Flyway) pass through Malaysia (Anon, 2005 and Boere *et al.*, 2006). Hence, Malaysia becomes a conducive stop over area because it has a tropical climate and the west coast of Peninsular Malaysia is protected from strong winds and wave erosion (Jasmi, 2003). These allow Malaysia to be a bird watching haven and thus, bird watching activity is available throughout the year.

Wildlife such as birds is an environmental good which is unique and non-renewable. The importance of conserving and protecting the wildlife and habitat can be viewed from the following perspectives: they are non-renewable resources

which from common properties of all people including the generation yet to come. Also, their contributions to the human welfare extend to the local, national and global levels such as creating opportunities for recreation, leisure and education. Expenditure by visitors on wildlife will create linkages and multiple effects to the economy.

In addition, bird sanctuaries have ecological, economic and aesthetic effects. The benefits of having wild bird sanctuaries include providing environment for healthy living, controlling the population of harmless insects, pollinating flowers and disseminating seeds, and providing early warning of impending disasters to humans (Anon, 2005). However, Ahmad (2004) indicates that, wildlife activities normally bring long-term benefits and there might be economic impacts in the near future. Human activities if done in excess, may threaten and destroy landscapes and cultures, as well as cause instability in the ecological system.

Birds are examples of goods that lack value in the market and generally their value to the society is unmeasured. Nevertheless, a bird sanctuary is an important habitat to support the bird population. At present, users lack the incentive to reveal the benefits they obtain from their visits to the sanctuary because there are currently no limitations to the access and no entrance fee being charged. Furthermore, because the benefits are measured in qualitative form, like social benefits, the benefits of the bird sanctuary are usually underestimated. Thus, there is no motive to protect the sanctuary. Perhaps economic valuation is one way that these areas may be properly valued in monetary units.

The objective of the study is to estimate the economic benefits of bird watching activities in KBS and to determine the factors that influence users' willingness to pay for bird watching activities. This paper is organized into five sections. Section one is the introduction to the study, followed by section two which describes the concept of natural capital and economic valuation. Section three explains the methodology and source of data used in the study. Empirical results are presented in section four while the last section offers some discussion and concluding comments with regard to non-market valuation work in Malaysia.

2. Natural Capital, Economic Value and Economic Valuation

Ecosystem services such as the production of oxygen, water filter, erosion preventer and other providers are produced by mineral, plant, and animal formation of the Earth's biosphere which is called natural capital. Now, environmental resources which are part of natural capital are added to production factors. They have important roles on economic development and have been known as great economic assets (Barbier, 2005). The basic relationship among natural, physical and human capital, and economic system (human welfare) is depicted in Figure 1.

Direct contribution for instance physical capitals (K_P) include all touchable factors used in production directly such as investment goods, tools, equipments, and machinery, also indirectly such as other physical components of cultural heritage and fine architecture. Natural capitals (K_P) are direct inputs into production such as material and energy that also acts as a sink for waste emissions from the economic process. Climate regulation, watershed protection, and wetland are samples from variety of ecological services provided by natural capitals to sustain production that are essential for supporting life. In addition, aesthetically pleasing natural landscapes are essential. Advanced production process and research and development activities lead to technical innovation that for these human skills are essential, and increase in the overall stock of human knowledge related to increase in human capital (K_H) to seek at the environment which has a basic and essential role in protecting human welfare. To ensure that future welfare is not worsened by natural capital depletion today, the natural capital sources be used widely. The various economic value that arise by current natural ecosystem needs to be examined in order to justify the conservation or protection of the natural resources, and as a result measure, multiple benefits, or values generated by most natural ecosystem.

Insert Figure 1 about here

The economic value associated with activities at the bird sanctuaries like conservation or recreation can be examined in the form of use and nonuse values (see Figure 2). Use value includes non consumptive use value such as sightseeing, bird watching, photographing, and education. The effects of birds on ecology may include being enemies of many insects, pollinators of flowers, and disseminators of seeds. These can be referred to as indirect use value which are unmeasured by conventional market mechanisms. Furthermore, bird sanctuaries have other values, for instance, option value which refers to an option of utilizing in the future. In this case, it consists of two -maintaining the sanctuaries for future generation is referred to as procedure bequest, while the existence value for the present generation is referred to as procuring the existence.

Insert Figure 2 about here

There are several techniques for measuring environmental and resource values. The respondent's willingness to pay could be elicited by using a survey in order to drive this value (Tietenberg, 2000). The contingent valuation method directly asks an individual, through a questionnaire survey about her/his willingness to pay (Hodkinson, 2004). Willingness to pay (WTP) or willingness to accept (WTA) is to value impacts of the changes in the provision (either quantity and/ or quality) of environmental goods. Both of them are in monetary terms (for instance, $ per person, or $ per household). To date, contingent valuation method has been the most widely used technique. This is probably due

to its ability to estimate all types of values in particular non-use value of environmental goods and services. There have been hundreds of contingent valuation applications worldwide (Jamal and Shahariah, 2003).

Open-ended questions, bidding games and dichotomous choice questions are the main elicitation formats. Dichotomous choice, among other formats for contingent valuation study, is the most recommended because of its ability to match the way consumers make choices in the market place. Also, the format improves the reliability of responses (Kanninen, 1993; Jamal and Mohd Shahwahid, 1999).

3. Methodology

3.1 Location of study

This study was conducted in Kapar Bird Sanctuary, Kelang. Kapar Power Station (KPS) or Sultan Salahuddin Abdul Aziz power station is located about 56Km west of Kuala Lumpur, on the west coast of peninsular Malaysia facing the straits of Malacca. It is one of the most important sites for the migratory shorebirds due to presence of the ash ponds produced from the coal fired during the generation of electricity. The ash pond is located about 5Km away from the power generating plants of the station. It covers about 300ha, and has been able to draw migratory shore birds by the hundreds.

Although, in the initial grand design of the power station, the sanctuary was never a part of the purpose but three years after the power station was built, since 1988, more than 60 species of migratory birds have been spotted roosting and resting at the ash ponds. Some of these migrant birds fly more than 24,000 km, from as far as Siberia to Australia, to this ash pond annually. In migratory season from September to March and April, species such as sand plovers, curlews, godwits, common shanks and terns are seen by the thousands (Pingsu, 2005). Also in this accidental sanctuary, threatened species take refuge such as the Nordmann's shank, Asia Dowitcher and far Eastern curlew. In addition, about 30 species of between 5000 and 10000 birds are regularly supported at the ash ponds during migratory and non-breeding seasons (Pingsu, 2005).With this in mind, the researcher chose the KBS because it is one of the many flyways around the world, and the only site in Malaysia along the East Asian- Australasian flyway.

3.2 Survey Procedure

According to the survey objectives and by reviewing the previous studies, an initial questionnaire was prepared. Two pretests were conducted; subsequently a seven-page questionnaire was developed. The questionnaire was divided into four sections which began with an introduction and explanation of purpose of the survey. The first section comprised of questions on people's attitudes and purpose of visit. The second section was an outline of the scenario and market definition of WTP for area protection and recreation with questions that valued the respondents' WTP; the third section was on their reasons for payment; the fourth section consists of questions on the socio-economic background of respondents including education level, income, occupation, age and so on.

In this survey, dichotomous choice and open-ended elicitation formats were combined. The payment vehicle was a donation, in terms of WTP questions that asked if respondents were willing to donate into a bird conservation trust fund each year. In order to motivate the respondents to state their true WTP, the combined elicitation format was used, as is recommended in CVM practices by Tolley and Fabian, (1998) and Puan Chong *et al.,* (2004).

Four sets of the amount was used in this survey : (5, 10, 1), (10, 15, 5), (15,20,10), (20,30,15) where the first element of set (X) correspond to the initial bid, the second element (Y) to the higher bid, and the third element (Z) to the lower bid. The questionnaire was translated into two versions (Malaysia and English) to be chosen by respondents.

This survey was carried out from December 2007 to June 2008 using face to face interviews. On site visitors were conveniently chosen during the period of survey at the KBS, with a sample size of 220 visitors. The survey was carried out on different days and times of visit to ensure that respondents would be selected during high visitation and low visitation times. In developing countries, most contingent valuation studies have relied on this direct approach (FAO, 2000). Furthermore, this procedure has several positive benefits and is more effective than mailed questionnaire and telephone surveys in these countries (Hadker *et al*., 1997 and Bateman *et al*., 2002).

Based on the type of answers, the rate of different WTP responses were obtained which included positive and negative (protest and zero) responses. In the initial stage of model estimation, in order to avoid a discrete lump of probability at zero WTP so that a continuous logistic curve could be obtained, all invalid WTP responses were excluded (Macmilian *et al.*, 2001).

3.3 Estimating Procedure

The general function of WTP for estimating the value for conservation of KBS is expressed in relation to the vector of independent variables as follows:

$$WTP = f(X_i) \tag{1}$$

where, Xi is a vector of independent variables represented by a range of socioeconomic variables of the respondents consisting of age, education, income level and so on. This survey, involved two types of models. Logistic regression models were formulated to closely correspond to WTP by encountering individual's referendum bid given as one of the independent variables. The model was chosen because of its ability to deal with a dichotomous dependent variable. The form of model takes as follows:

$$P_i = \left(E(Y_i = \frac{1}{X_i}) \right) = \frac{1}{1 + \exp^{-(\alpha + \beta_1 BID + \beta_i X_i + \varepsilon_i)}} \qquad [2]$$

where, Pi is a probability that Yi =1 (yes response), BIDi is the amount of bid offered, Xi is a vector of independent variables and i is index of observation while α, β1 and βi are an intercept and a vector of coefficients to be estimated corresponding to a logistic distribution and εi is a random error that follows the normal distribution with mean zero and common variance δ2. By considering the odd ratio and taking a natural logarithm of the above equation,

$$L_i = \ln\left(\frac{P_i}{1 - P_i} \right) = \alpha + \beta_1 BID + \beta_i X_i + \varepsilon_i \qquad [3]$$

where, Li which is called logit is the log of the odd ratio and in both independent variable and parameters is linear. The maximum likelihood is the estimation method. Interpretation of each coefficient is stated as the change in the log odds associated with a one unit change in the independent variable; and coefficients are consistent.

The logistic model used in the survey followed closely that of Hanemann's (1984) and also binary logit regression was employed similar to the approach in Leong.et al (2004) for analyzing the relevant data. This is a reasonable and widely applied approach for describing binary response (Bateman et al., 2000; Jakobsson and Dragun, 2001). An individual would drive utility from two things, i.e. environmental quality of KBS and money income. Based on elicitation method used, positive valid WTP responses were analyzed. By using maximum WTP figures (open-ended WTP question) as dependent variable against other independent variables, a linear model (OLS) was employed.

$$WTP_i = \alpha + \beta_i X_i + \varepsilon_i \qquad [4]$$

where, Xi is a vector of independent variables, and εi is an error term that is assumed to be normally distributed with mean zero and common variance σ2, i.e. εi ~ N (0, σ2).The estimation of mean and median WTP for the logit models by using the estimated coefficients from each of the three models was done as in the following (Hanemann et al., 1991; Anon, 1999):

$$\text{Mean WTP} = \frac{ln\left(1 + e^{\hat{\alpha} + \hat{\beta}i\overline{x}i}\right)}{-\overline{\beta}_1} \qquad [5]$$

$$\text{Median WTP} = \frac{\hat{\alpha} + \hat{\beta}_i \overline{x}_i}{-\hat{\beta}_1} \qquad [6]$$

where, $\hat{\beta}_1$ is the coefficient estimate on the bid amount. It is necessary to note that the sign of $\hat{\beta}_1$ is expected to be negative because the bid amount is entered in the database with a positive sign. $\hat{\alpha}$, $\hat{\beta}_i$ are the sum of the estimated intercept plus the product of the other coefficient multiplied by the mean of the respective explanatory variables $\overline{X}_i$. In order to improve the adaptation of the model to data, other variables are included in the model. In obtaining the mean WTP, open-ended questions were inserted into the OLS model to determine the average levels of the socio-economic and other independent variables.

4. Results and discussion

4.1 Profile of Respondents

Useable WTP response rate should be differentiated from the original responses in order to include only actual positive responses for the regression models and the analysis. From the total 220 questionnaires, 192 responses or 87.27% response rate were accepted and used for data analysis. The result of the socio-economic profile of respondents revealed the mean age of 30 years with an average income of RM 1,840 monthly (Table 1). Respondents' occupation indicates that the majority 25.50 % were professional and technician workers; a high percentage (35.40%) had university

education. Also 65.10% of visitors had visited more than once and about 55.20% of visitors knew KBS is one of the famous places for bird watching.

As it is customary in most CVM studies (Mitchell and Carson, 1989), and based on the criteria, the respondents who stated they hold true value for the conservation and recreation programs were used in the WTP analysis with 192 respondents from 220 of the total sample was selected. Therefore, those respondents who were willing to pay for general but not specifically for conservation or recreation programs (40.62%) were excluded from WTP analysis. While other responses comprised of protest bids (3.65%) and non-response.

Insert Table 1 about here

4.2 Estimation of WTP

Variables were included in the basic models to explain the WTP (as economic theory would suggest them to be important). Also the same variables were used in other similar surveys. By using all the independent variables including initial, lower and higher bid assigned as presented in Table 2, the logistics and linear models were estimated.

In general, whether WTP is affected by the variables as suggested by economic theory and whether the signs of the coefficients of the variables are consistent with a priori expectation, the validity of the results of a contingent valuation survey can be ascertained. The results of the estimated models illustrated that near consistencies occurred in terms of the anticipated signs of coefficients (except INC and EDU in few of models).

In the models involving all variables, it was suspected that the differences or inconsistencies in terms of anticipated signs and significance of some coefficient might have arisen due to the correlation within the set of independent variables. Therefore, correlation with AGE, EDU, VISIT and INC was identified at the 1% level (between income and age was higher than the others), by which the initial results obtained could be explained. The results of the selected variables in Table 2 were further confirmed because after removal of the variables, all variables in the models influencing the probability of accepting the bid were in line with the priori expectations.

Insert Table 2 about here

The results of the linear model estimates are presented in Table 2 and 3. All the variables in this model including VISIT, EDU, INC, and FAM that respectively measured number of visits, education level, monthly income and familiarity with the site were in line with anticipated signs in all models. This means that respondents with higher income and education level (as noted by INC, EDU) would be willing to pay more. Also this would lead to the support of the contingent valuation scenario with higher WTP if an increase in terms of the number of visits (VISIT) and to know this site is famous for bird watching (FAM) occurred.

In order to create a series of useful variables, the potential explanatory variables were added and removed considering the correlation between variables. Based on the results in the following Table 3, explanatory variables supporting the conventional theory and including variables which measured number of visits (VISIT), income (INC) and familiarity of site (FAM) are all in the expected direction with WTP responses.

Insert Table 3 about here

Based on the sign given, respondents who visited the area frequently are more likely to pay because the increase in the number of visits (VISIT) also increases the likelihood of accepting a given bid. This is similar to the case of familiarity of site (FAM), the respondents who know that this site is one of the famous places for bird watching are more likely to pay than those who do not know. In the case of income (INC), when monthly income (INC) of the respondents is higher, the probability of accepting a given bid increases.

As expected from the results, the coefficients for bid offered (BID) correlated negatively with the probability of acceptance. This means the amount that respondents were asked to pay was carefully considered. Also the higher the amount those respondents were asked to pay, the less likely they would pay because of the negative and statistically significant coefficients (Model 3) on the bid suggested.

Besides that, referring to the result of the selected variables in OLS model, the coefficient for age has positive relationship with the WTP. This can be the result of the fact that older visitors are generally more environmentally aware than younger generation due to their experience. Also, according to Kramer and Mercer (1997), older people may indicate intergenerational equity motive or a bequest.

Furthermore, a negative coefficient for age in the logit model indicates that the probability of accepting a bid has negative relationship with age. Jamal and Shahariah (2003) and White et al. (2001) obtained the same results. These results may protect the idea that generally, older generation is less sensitive and environmentally aware than younger people. Moreover, it may imply longer life expectancy among younger people, which means longer future non-use benefits of the area.

Proportion or percentage of the total variation in the dependent variable (WTP) explained by the independent variables (indicated by R2), is similar to other CVM studies. The low explanatory power found 25% that WTP is relatively well explained; according to Mitchell and Carson (1989), a minimum adjusted R2 of 15% is considered acceptable. In addition, the overall behavior of a respondent against his or her socio- economic background, is rather indicative of the parameters of the models (Du, 1998). One of the pseudo R2 introduced is count R2 (number of correct predications divided to total number of observation) which almost in all of the selected estimate Logit models, was more than the initial estimate Logit models (Table 4).

Relationship between the probability of accepting the bid and the bid offered is illustrated in Figure 3. In general, as bid levels increased, the probability of acceptance decreased. This emphasizes that the amount the respondents were offered to pay was reasonably considered by them. And summary statistic of variables employed to models estimation is indicated in Table 4.

Insert Table 2 about here

4.3 Mean and Median WTP

In general, to estimate the mean and median of WTP, two approaches were employed - the nominated logistic and liner regression analysis. Mean and median WTP values were calculated from the estimated selected variables with the formula mentioned in the earlier section. The results of calculated mean and median values are illustrated in table 4, with respect to estimated procedure. Moreover, Fam presents a dummy variable for familiarity of site - when respondents know this site is one of the famous sites for birdwatching (i.e. answer is YES) equals to 1 and equals to 0 if they don't know (i.e. answer is NO). The sign of this variable in all estimated models (overall and selected variables) is consistent with the priori expectation.

Obviously, mean WTP in logit models were higher than median and when familiarity of the site is equal to zero, mean and median were less than the mean if familiarity is equal to one. The mean and median WTP estimated from logit models ranged from a minimum of -RM14.36, when higher bid was used to a maximum RM60.94. OLS estimation provides similar estimate where mean value ranges from RM14.91 to RM 18.48. The mean for willingness to pay for recreation measure is argued to be more than median for the WTP measure in this study which is similar to Nik Mustapha's (1993) finding.

Furthermore, in relation to question format, the dichotomous choice questions produced higher estimates of WTP in comparison to the open-ended WTP question; which corresponds to the result of other studies (Loomis and White, 1996; Boman and Bostedt, 1999). Although respondents were induced to state their true WTP by using the open-ended question, the WTP values obtained from open-ended question were conditional on the values obtained from the dichotomous choice question. Therefore, in terms of the consistency in the WTP values estimated from the open-ended questions, it seems that the combined form of these two formats is possible and reliable for construct validity of CVM instrument and may bring about important implications.

Insert Table 4 about here

4.4 Aggregation of WTP

To estimate the aggregate WTP of individuals, WTP obtained from analysis was employed. It should be noted however that protest bids were considered low. Therefore, these samples were assumed to be the representatives for the whole population. As the factors influencing WTP in the samples corresponded to what was expected for the population, the proportion of the sample groups can remain constant over time.

Visitors who visit the site in a particular year (actual number of visitors is not available), based on signs and observations, are supposed to be 1500. For estimation, the individual WTP obtained from the analysis was multiplied by the respective population size. For sample per year, aggregate recreation (or conservation) value or benefit of KBS ranged from RM22, 365 to RM27,510 annually. By using social discount rate of 5%, it ranges from RM0.447 million to RM0.550 million in terms of the present value (Table 5).

Insert Table 5 about here

5. Conclusion and Recommendation

The results of the study indicated that respondents have positive attitudes toward bird watching and recreational activities. Majority of the respondents stated that their purpose for visiting the site was bird watching .Contributions to conservation or recreation trust funds with an amount specified by responses were associated with their socio-economic backgrounds, i.e. Income and age. Those who visit the site frequently and have known that this site is a famous place for bird watching are more likely to pay for such recreation activities. Also, the amount of visitors' willingness to pay to conserve the bird sanctuary and the bird population are derived from the estimated models - these values ranged from RM14.91 to RM18.34 for per visit.

Although the creation of more conservational and recreational facilities attracts more visitors, it may also create problems. The management and local authority must pay attention to the fragility of the site's environment so as to make ecotourism a viable option that could benefit all stakeholders. It is suggested that the management of KPB should be separated from KPS in order to allow a scientific and effective management of the natural resources. The study shows the majority of respondents (70%) believe that the Department of Wildlife and National Parks in Malaysia should be responsible or assigned in managing the conservation or recreation activities of KBS.

Furthermore, the findings reveal that the majority of respondents (96%) believe that KBS should be maintained for birds. Therefore, considering habitat conservation and keeping aesthetic and biological aspects of the environment together, it can be retained with the use of opportunities such as good planning, good management of ecotourism and financial saving on the restoration and rehabilitation of environmental damage.

As the only site in Malaysia included in the East-Asia Australasian Flyway, KBS is an internationally well known bird watching site and one of the few premier areas for shorebird watching in peninsular Malaysia. Indeed, this perfect opportunity can provide a suitable situation to promote and educate the public about birds, their significance and site importance. Unfortunately, there is a lack of training centers at the site. Furthermore, awareness campaigns on the bird sanctuary must extend through the mass media so that future generations can be persuaded to pay for conservation and recreation at the sanctuary. KBS is valuable to both people and birds, and thus should be maintained and conserved.

Moreover, in a cost benefit analysis, opportunity expenses created by environmental sensitive areas should not be ignored. In other words, management of these areas should not only be on ecological resources but also as an economic object. Environmental valuation can be used as a result of increased public awareness on environmental quality (Jamal and Shahariah, 2003). The results obtained from the estimated economic benefits of conservation and recreation can be transferred to the similar sites in order to make policies, decisions and management. Where the national boundaries in which the ecosystem, policies and economic factors are the same, high expenditure is necessary in order to estimate such economic benefits.

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Table 1. Socioeconomic profile of Respondents

Variables	Attributes	Visitors (N=192)	
		Freq	Percentage
Gender	Male	130	67.70
	Female	62	32.30
Age	Under 20	12	6.25
	20-30	112	58.33
	31-40	39	20.31
	41-50	26	13.50
	More than 50	3	1.56
Education level	Informal education	2	1.0
	Primary school	7	3.60
	Secondary school	39	20.3
	Pre-university	22	11.5
	Diploma	54	28.1
	University degree	68	35.4
0ccupation	Professional &technician	49	25.5
	Administration &management	35	18.2
	Sales	15	7.8
	Services	24	12.5
	Business	15	7.8
	Laboure	14	7.3
	Housewife	9	4.7
	Retired	4	2.1
	Student	24	12.5
	Others	3	1.6
Monthly income(RM)	Under 1,000	48	25.0
	1,000-2,000	59	30.7
	2,001-3,000	56	29.2
	3,001-4,000	25	13.0
	More than 4,000	4	2.1
Number of visit	First time visit	69	35.9
	More than one time visit	123	64.1

Table 2. Logistic and OLS models estimated with overall variables (positive WTP responses)

Variables	Regression coefficients			
	Model 1:	**Model 2:**	**Model3:**	**Model 4:**
	WTP_A (Logit)	**WTP_B (Logit)**	**WTP_C (Logit)**	**WTP_{MAX} (OLS)**
VISIT	0.487 (0.637)	1.050 (0.416)**	0.288 (0.315)	0.275 (1.108)
AGE	-0.089 (0.095)	0.066 (0.055)	0.213 (0.063)*	0.701 (0.185)*
EDU	0.102 (0.198)	-0.044 (0.102)	0.001 (0.103)	0.070 (0.411)
INC	0.000 (0.000)	0.001 (0.000)**	-0.000 (0.000)	0.001 (0.001)
FAM	1.136 (0.946)	0.990 (0.627)	0.858 (0.728)	2.634 (2.589)
INTERCEPT	2.785 (4.337)	-1.945 (2.212)	-6.951 (2.423)*	-9.630 (8.196)
BID 1	-0.214 (0.109)**			
BID 2		-0.117 (0.053)**		
BID 3			-0.046 (0.047)	
Adj R^2				0.246
Log likelihood	-17.057	-38.179	-28.301	
Pseudo R^2	0.19	0.35	0.38	
Count R^2	0.7	0.76	0.79	
n	33	99	66	99

Note: Figure in parenthesea are standard error

  ＊ significance at the 1% level

  ＊＊ significance at the 5% level

Table 3. Logistic and OLS models estimated with selected variables (positive WTP responses)

Variables	Regression coefficients			
	Model 1:	**Model 2:**	**Model3:**	**Model 4:**
	WTP_A (Logit)	**WTP_B (Logit)**	**WTP_C (Logit)**	**WTP_{MAX} (OLS)**
VISIT	0.519(0.651)	1.046(0.388)*	0.317(0.246)	0.315(1.077)
AGE	-0.105(0.090)			0.693(0.179)*
EDU				
INC	0.0002(0.0004)	0.001(0.000)*	0.001(0.000)**	0.001(0.001)
FAM	1.216(0.935)	1.158(0.607)***	1.314(0.579)**	2.582(2.557)
INTERCEPT	4.550(2.738)***	-1.375(0.955)	-2.866(1.160)**	-8.455(4.474)***
BID 1	-0.214(0.107)**			
BID 2		-0.107(0.0511)**		
BID 3		-39.248	-0.019(0.038)	
Adj R^2				0.254
Loglikelihood	-17.192	0.38	-37.757	
Pseudo R^2-R^2_{McF}	0.18		0.17	
Count R^2	0.73	0.82	0.74	
n	33	99	66	99

Note: Figure in parentheses is standard error

  ＊ indicates statistical significance at the 1% level

  ＊＊ indicates statistical significance at the 5% level

  ＊＊＊ indicates statistical significance at the 10% level

Table 4. Mean and median WTP (selected variables)

Selected variables	Model 1: WTPA		Model 2: WTPB		Model 3: WTPC		Model 4: WTP Max	
	Fam=1	Fam=0	Fam=1	Fam=0	Fam=1	Fam=0	Fam=1	Fam=0
Mean WTP	16.67	12.06	29.48	21.12	29.79	60.94	18.34	14.91
Median WTP	16.54	11.7	29.07	20.08	-14.36	41.09	N/A	N/A

N/A: not applicable

Table 5. Recreation and Conservation Values

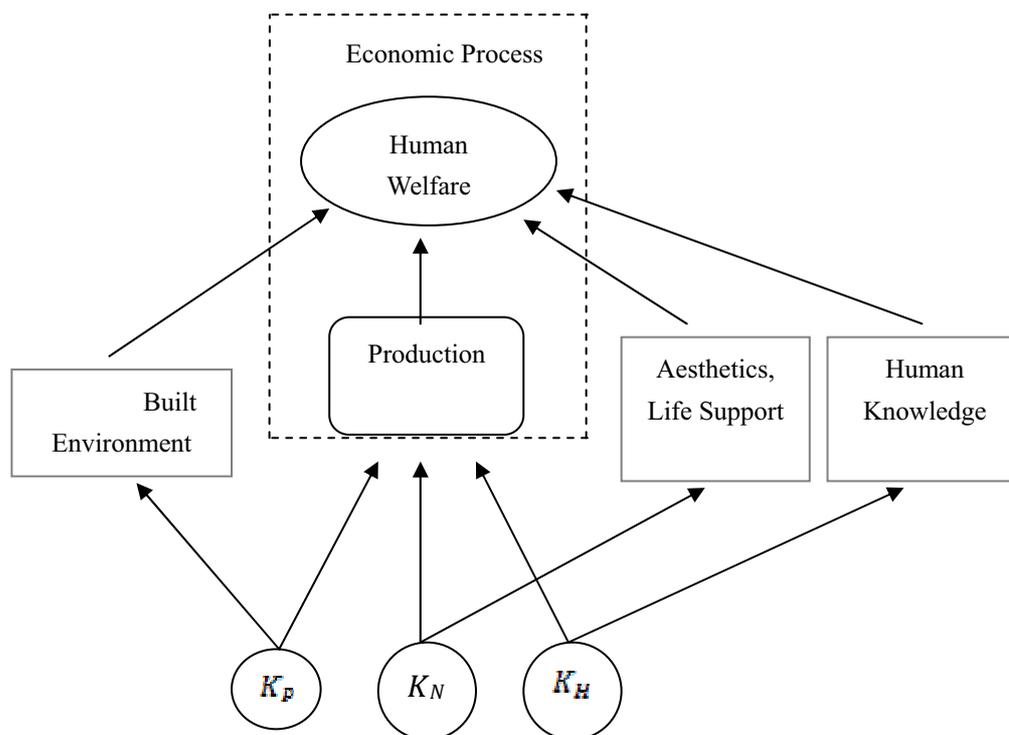|	Visitor(N=1,500)	
	Fam =0	Fam=1
Mean WTP(RM)	14.91	18.34
Recreation value(RM)	22,365	27,510
Present value(RM)[a]	447300	550200

Note: a 5% discount rate

Figure 1. The Natural, Physical and Human Capital and Economic System
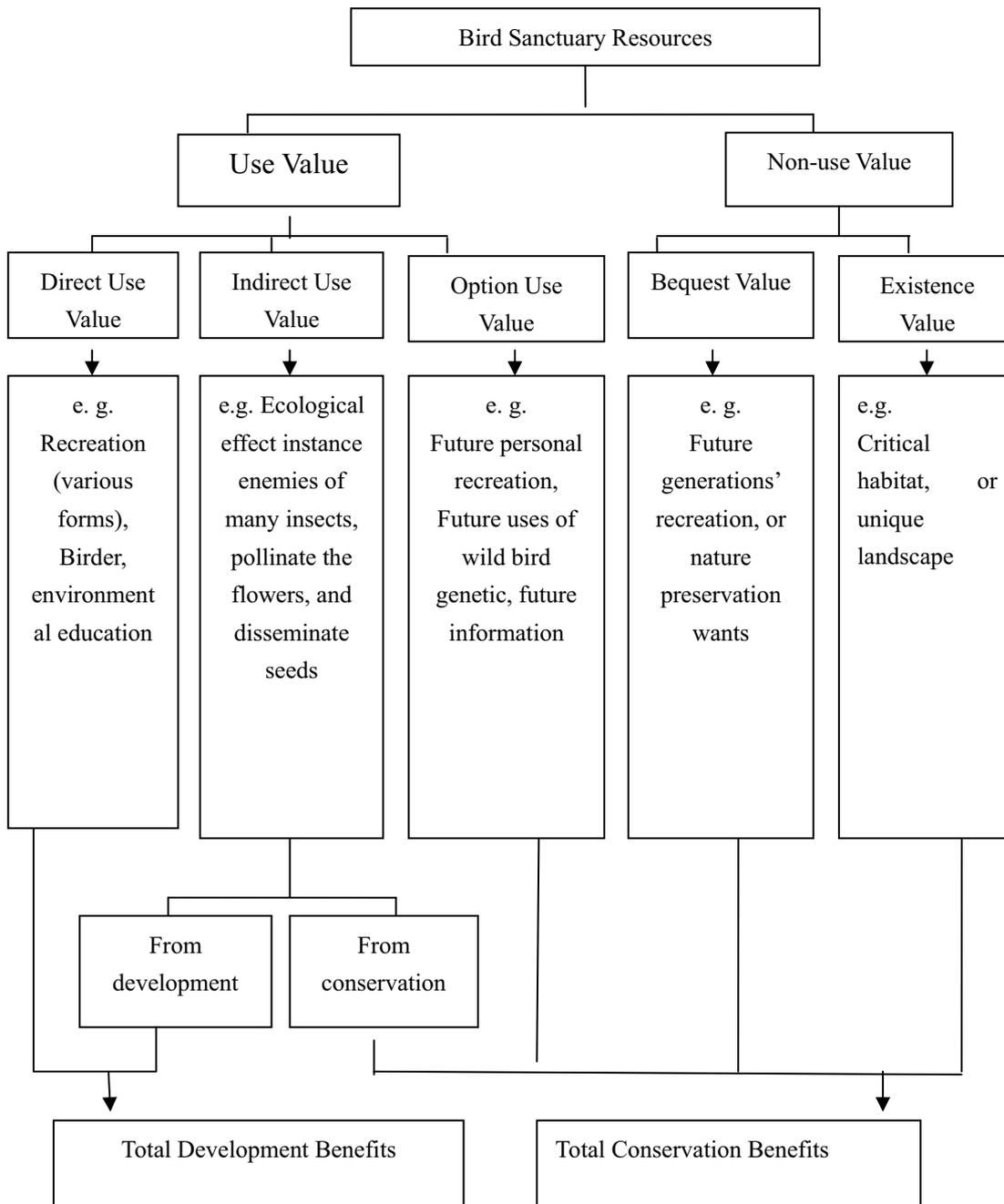
(Source: Pearce and Barbier, 2000)

Figure 2. The Total Economic Value of Bird Sanctuary
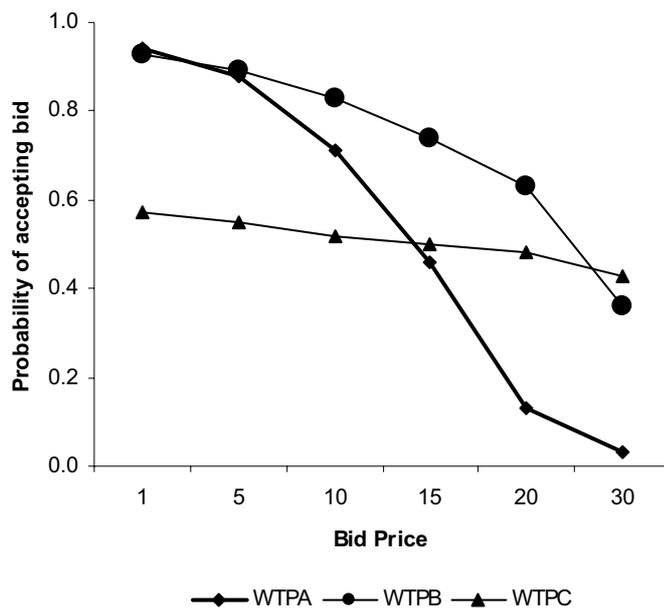
Source: (Adapted from Bateman and Turner, 1995).

Figure 3. Cumulative Distribution Function in Dichotomous Choice Question