A Contingent Valuation of the Mangroves of Benut, Johor State, Malaysia

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Executive Summary

1. Introduction

In order to estimate the biodiversity benefits of the mangroves of Johor, a contingent valuation (CV) study was carried out at Benut mangroves. Benut mangroves were selected for the CV study because, while they have been identified as a 'biodiversity hotspot', their status as Stateland leaves them vulnerable to development and use pressures.

Contingent Valuation is a survey based approach endorsed by a number of international organisations, such as the World Bank, and governments. It is flexible and comprehensive way of estimating the demand for public services, and the economic value of environmental change.

2 Survey Design and Implementation

The questionnaire followed a standard CV format. The main sections of the questionnaire addressed: attitudes towards the environment; current use of the mangrove area; valuation of the mangrove resource; and socio-economic characteristics.

Maps, text and graphics were used to communicate information on the mangroves of Benut, and concepts such as biodiversity.

The current uses of the mangroves of Benut, its global importance as a habitat for rare and endangered birds, and the current threats the area is facing, were presented to respondents. Respondents were subsequently presented with a new management system which would: protect threatened birds and other wildlife; maintain fish stocks and shell-fish; increase protection of earth bunds situated behind the mangroves, which protect an extensive area of agricultural land; and, improved recreational and educational facilities for residents and tourists.

Respondents were asked their willingness to pay (wtp) to a biodiversity fund, for the implementation of the new management plan which would ensure that the mangroves of Benut were protected. Two elicitation approaches were adopted – the payment ladder approach, and a referendum question followed by a double-bounded dichotomous choice question. There were thus two versions of the questionnaire, which were identical in all respects except for the elicitation options. The sample was split equally between the two versions.

The questionnaire was pre-tested on 50 households. Considerable attention was paid to the phrasing of difficult concepts such as biodiversity, so as to make them comprehensible to rural respondents.

For the main survey, a representative sample of 300 households within the defined study area around the Benut mangrove area was randomly selected. Face-to-face household

interviews were conducted by PE Research, a professional survey company with experience in contingent valuation in Malaysia. Due to non-responses, the number of completed surveys totalled 243.

Most of the main recommendations for best contingent valuation practice were followed in the design, implementation and reporting stages of the study.

3 Attitudes on, and Use of Benut Mangroves

The opening section of the survey consisted of a set of attitudinal questions intended to lead respondents into an exploration of their personal views on environmental issues in general, including mangrove habitat and species protection, in preparation for the valuation section. These questions also seek to reveal respondent's underlying motives for supporting protection of the mangroves. Attitudes can be important determinants of wtp, and thus can be used in the interpretation of valuation responses.

In terms of social and environmental problems facing Johor State, protecting natural habitats and wildlife is the social and environmental problem of least concern to respondents. Nonetheless, nearly one-quarter of respondent's cited the protection of natural habitat of primary or secondary concern to them.

In terms of environmental problems, wildlife preservation (taken here as a proxy for biodiversity preservation) is considered to be the fourth most important environmental problem in the State. Overall, however, only 15% of the population cite wildlife preservation as a personal concern.

Respondent's attitudes to mangrove habitat protection were further explored, through a series of statements, to which respondents were asked if they agreed or disagreed. The results show a strong appreciation of the non-use values of the environment. At least 65% of the population are estimated to value the environment for its non-use benefits.

Overall, 75% of respondents had heard of the mangroves of Benut, while 53% of respondents had visited them. The most important direct use values of the mangroves to respondents are forestry products and seafood.

For 85% of respondents, all or part of the information presented on mangrove biodiversity and threats facing the mangroves of Benut was new. The CV survey instrument can, in addition to being a valuation tool, therefore is seen as an effective educational tool.

4 Socio-economic Characteristics of Respondents

The respondents are predominately male (64%) and Malay (90%). Respondent's socio-economic characteristics (age, education, occupations), show no marked differences between version of the questionnaire, and are seen to be representative of the population.

The average household income in 1992 in Johor, was RM1,708 per month. Nearly 90% of respondents report incomes below this. Nearly 37% of respondents earn less than RM500 per month, and may be under the poverty line which is set at RM425 per month for Peninsular Malaysia.

5 Evaluation of Questionnaire

Both respondents and interviewers provided an evaluation of the survey questionnaire. A very high percentage of the respondents found the survey to be interesting (91%), and educational (92%). The educational benefits are assumed to relate to the information presented on mangrove biodiversity and its relevance to the study site. Around a third of respondents found the survey too long and difficult to understand.

Only 1% of respondents were assessed by the interviewers to be 'not at all interested' in the survey process. The interviewers were very confident in 81% of the survey responses.

Overall, therefore, from the point of view of respondents and interviewers the questionnaire worked well in the field.

6 Willingness to Pay

Overall, 56% of respondents reported a positive wtp for the protection of the mangroves of Benut. Just under half, 49%, of zero wtp responses may be classed as protest votes. That is, respondents who do not report genuine economic reasons for not wanting to pay anything for protecting the mangroves, but reject the contingent market nonetheless. These protest voters were removed from the wtp analysis, since it cannot be assumed that their wtp is truly zero.

This means that 52 surveys (21% of the sample) were excluded from the wtp analysis, reducing the overall sample to 191 (i.e., payment ladder- 103 surveys; DBDC - 88 surveys).

A payment ladder is a type of 'payment card' which sequentially lists a range of values from low to high. Respondents are asked to tick the amounts they are sure they would pay and to cross amounts that they are sure they would not pay.

Based on payment ladder responses, the mean of the values ticked, RM1,38, can be taken as the lower bound wtp. That is, the average value respondents were certain they would pay each month for the protection of the mangroves. The mean value of the crosses – RM5.43, may thus be considered as the upper bound wtp. That is, the average amount respondents are certain that they will not pay. The difference between the ticks and crosses marks the range over which respondent's valuations are uncertain.

The mean provides an estimate of what the 'average' household might be wtp. However, since the distribution of wtp is skewed, this would be in excess of the maximum wtp of the majority of the population. For this reason, it may be more appropriate to take a median figure as a reference point. The medium value of the ticks is RM1.00, while the

medium value of the crosses is RM4.00. Given a population of 12, 650 households, this amounts to RM151, 80 per year (US$40,000).

At the end of the wtp section, respondents were asked if the information presented to them had changed their preferences towards the protection of the mangroves of Benut in any way. Overall, the questionnaire affected the preferences of 62% of the respondents. This again illustrates the educational benefits of the CV process, and suggests that initiatives to improve awareness of mangrove goods and services, may allow a more 'reliable' expression of the demand for such assets.

7 Global Values

An additional survey of non-Malaysians was carried out in Kuala Lumpur International Airport (KLIA). As stated above, Benut mangroves are of international importance on account of the habitat they provide for endangered bird species. A survey of non-Malaysians was carried out in order to assess the value of these global benefits to the international community. It can be argued that if the global community want to continue to enjoy the benefits of global resources, such as those found at Benut, then they should pay their share to protect them. A number of studies identify natural resources of global significance, however, valuing these global resources and identifying the mechanisms through which they can be captured remain challenging areas.

The survey instrument used at Benut was adapted so as to be applicable to non-Malaysians. A survey of 120 randomly selected individuals was undertaken over 3 days in April 1999. Respondents came from 28 countries.

Again, a very high percentage of respondents found the questionnaire both interesting and educational (96% and 92% respectively. All sections of the survey were perfectly comprehensible to over 90% of the sample, and interviewers felt that 96% of the survey responses were sincere. Again, clearly the questionnaire worked well in the field.

Over 60% of respondents are wtp to protect the mangroves of Benut. Of the respondents not willing to pay, 25 of these are protest votes, leaving a valid sample of 95.

A high percentage of those not willing to pay (42%) stated that this was because they felt it was Malaysia's responsibility (16% of the total sample).

The number of people visiting Malaysia for ecotourism purposes is expected to reach 1.25 million by the year 2000. Even conservatively defining the global 'population' as the number of ecotourism visitors to Malaysia, and taking the lower bound wtp estimate of US$10 a year (i.e., the median value ticked), the non-use values of Benut may be estimated at USS12.5 million annually. A large part of this non-use value is assumed to represent the option and existence value of Benut's important biodiversity.

Obviously, this biodiversity / habitat protection benefit is relevant if it can, in some way, be 'captured' by Malaysia. This can be through funding from international funds such as the Global Environment Facility (GEF), or higher levies on international tourists.

8 Conclusions and Recommendations

Taking a lower bound wtp of RM1 per household per month, and given a population of 12,650, annual wtp by locals to protect the mangroves of Benut amounts to RM151,800 (US$40,000). On a per hectare bases this represents US$24 a year (the area of Benut mangroves is 1,690 hectares). Up to 40% of total wtp might be taken to represents non-use value attributable to the mangroves of Benut.

The survey of non-Malaysians reveals a very high wtp for the protection of the Benut mangroves and its global biodiversity. This value has been conservatively estimated at U$$12.5 million per year (US$7,500 per hectare). This represents non-use (existence) value. This however, is only relevant to Malaysia if mechanisms can be put in place to 'capture' part of this value.

Despite their high value ecologically and economically, only 0.3% of mangrove areas in Malaysia are protected. Mangrove areas are thus extremely under-represented in Malaysia's protected areas (national parks, wildlife reserves and sanctuaries). With the rapid and continuing loss of mangroves in Malaysia, opportunities to conserve and protect pristine mangrove areas, and areas of high local and global biodiversity value are disappearing quickly.

Given the high biodiversity value of Benut, it is recommended that this site be afforded protection status either as a State park or a protected forest reserve. The local use benefits from protecting the site in terms of capture fisheries, tourism and shoreline protection are seen to be in the region of US$1,375 per hectare (Table 1). These results demonstrate that even without accounting for the high existence value placed on Benut's rare and endangered biodiversity, it is in the Malaysia's interest to protect the site.

Table 1. Benut: Summary of Mangrove Values

Category	Value Estimate	RM /ha	US$/ha
Capture Fisheries		2,000	526
Tourism	17,700	10	3
Shore-line protection	5,424,144	3,209	845
Sub-total		5,330	1,375
Non-use values	US$12,500,000		7,512

TOTAL			8,916

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Map of Study Area

1 Introduction

1.1 The Mangroves of Johor

1.2 Objectives of Study

The primary objective of this study was to estimate the willingness to pay (wtp) for the protection of the mangroves of Benut. Given that mangroves in Johor, and Malaysia in general, are under considerable resource pressure and are likely to suffer further decline, information on the economic value of priority areas for protection, such as Benut, is important. This information is extremely useful to decision makers and planners involved in the design of mangrove management programs[1].

Given the global significance of Benut's mangroves, an indication of the strength of the international demand for protection of the site was also sought. A sample of visitors to Malaysia were interviewed in KLIA airport, and used as a proxy of the international wtp for the protection of the mangroves.

A secondary objective of this study was to educate local communities and resource users, by increasing awareness of the roles and functions of the mangrove resources through the survey process. The survey also served as a means of identifying gaps in public knowledge, both at the local and international level.

1.3 Methodology

Many of the benefits arising from the protection of natural resources such as mangroves, are classified as public goods, and are not traded in markets, e.g., the provision of habitat for rare and endangered birds. Specific valuation techniques such as the Contingent Valuation Method (CVM) have, however, been developed for the economic valuation of such 'non-marketed' goods and services.

Although still somewhat controversial, CVM is widely accepted amongst academics and policy makers. A special panel appointed by the US National Oceanic and Atmospheric Administration (NOAA) in 1993, concluded that correctly structured and implemented CVM studies can produce estimates reliable enough to be used in judicial proceedings assessing natural resource damage.

Theoretically, CVM is the only valuation technique capable of capturing all benefits associated with a good or service (i.e., use and non-use values). This makes it an obvious choice for the valuation of a mangrove resource such as Benut for which the existence and options value components, which can only be capture through the CVM, are believed to be dominant within the total economic value framework.

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[1] See 'An Economic Assessment of the Mangroves of Johor State, Malaysia' Bann, 1999, for information on the economic benefits of the nineteen mangrove sites of Johor.

CVM has been used worldwide to value a wide range of public goods and services such as water supply, sanitation and waste disposal. Few CV studies of biodiversity valuation, particularly in developing countries, have been attempted however, due to the difficulties perceived in conveying complex concepts such as 'biodiversity' to local communities in rural areas with low levels of education. This CVM study of Benut is one of the few known studies in this area.

CVM is a survey-based approach. Through a very carefully constructed questionnaire, a hypothetical market is created in which the non-marketed good in question can be traded (Mitchell and Carson, 1989). A random sample of people are then directly asked their maximum willingness to pay for a hypothetical change in the level of the provision of the good to be valued. For this study the non-marketed good in question is mangrove habitat, on which important global biodiversity is dependent. The CVM therefore enables us to estimate the value of mangrove habitat to the public, based on which we can infer the value placed on mangrove biodiversity. Households were directly asked their maximum wtp for the implementation of a new management plan which would insure the provision of a wide range of mangrove goods and services currently under threat (and thus defined the hypothetical change in the provision of the good). This wtp is a measure of the economic value of the service.

In line with standard economic theory, wtp is considered to be the appropriate measure of the value that a person derives from a particular change. This is because it forces people to take into account the fact that they are being asked to sacrifice some of their limited income to secure the change, and must weigh up the value of what is being offered to them against alternative uses of that income. In this sense, wtp is a much more powerful measure of value than a more general attitudinal question. While people may say in response to an attitudinal question, that they 'care about' many things, in practice they will only be able to pay for a much smaller subset of these things (Mourato, and Day, 1998).

2 Survey Design and Implementation

2.1 Survey Design

The questionnaire was divided into 4 main sections, broadly covering the following areas: attitudes towards the environment; current use of the mangrove area; valuation of the mangrove resource; and, socio-economic characteristics[2]. These four sections are described in more detail below.

[2] Version A of the Benut survey is provided in Appendix 1

2.1.1 Section A: General Attitudes

The survey opened with three 'general' questions on the environment (i.e., not specifically related to mangroves). The purpose of this section was to:

(i) help respondents explore their personal thoughts and attitudes towards the environment, and mangrove related issue, in preparation for responding to the valuation question;

(ii) reveal important underlying factors determining respondents support, or otherwise, for a mangrove protection scheme, which can be usefully included in the interpretation of the valuation responses.

(iii) identify respondent's level of environmental commitment

Other 'attitudinal' questions were also included in Sections B and C (see below).

A range of question formats were adopted such as: Lickert 5-point scales; statements to agree of disagree with; and. rankings.

2.1.2 Section B: Use of Mangroves and Background Information

This section collected information on respondent's current use of, and benefits from, the mangrove. It also sought to uncover respondent's awareness of the importance of the mangrove, and the threats it was currently under. Much of the information pertinent to the creation of the hypothetical market was also covered in Section B of the survey.

A contingent market has three key components: (i) a 'scenario' which presents the respondent with a clear description of the good he/she will be asked to value; (ii) a *policy* or project that will be undertaken to ensure that the respondent receives the good; and. (iii) a *payment vehicle* representing the mechanism through which respondents will be expected to pay for the policy or project.

The scenario, policy and payment vehicle together form a 'hypothetical market' for the non-marketed good in question, by means of which respondents can express their wtp to 'purchase' the good. This is the so-called *contingent market*. Good CV design requires creating realistic scenarios, clear policies, and a credible and accepted payment vehicle.

The hypothetical market set in this study is described in detail below.

(i) The respondent were first presented with a *scenario*, which provided a clear description of the mangrove of Benut, that is the 'good' that they were to be asked to value.

Information on Benut's mangroves was present through maps, text and graphics. Visual aids were found to be an effective means of communicating information in the pre-test survey, and were consequently heavily relied upon in the final survey. The showcards

were read to respondents and complemented by seventeen illustrations of: mangroves in good and bad condition; and mangrove benefits (fish, shellfish, mangrove wood and charcoal, recreation, shoreline protection, and biodiversity). The text used was 'simplified' in order that complex concepts such as biodiversity could be successfully communicated to local respondents.

Respondents were initially shown a series of maps. Map 1 indicated the nineteen mangrove areas found around Johor's coastline and highlighted the study area. The purpose of this map was to clearly show the study area in relation to Johor State, and to impress upon respondents that the mangroves of Benut are just one of many mangrove sites found within the State. A second map defined the Benut study area, indicating local towns and villages, in order to familiarise respondents with the geographical area over which the scenario would be applied.

Showcard A described mangrove biodiversity. Considerable effort was made to simplify this concept for it to be intelligible to the local population. This showcard was complimented with illustrations of mangrove bird and mammal species.

Showcard A. BACKGROUND INFORMATION ON MANGROVE BIOLOGICAL DIVERSITY

Mangrove Biological Diversity (or 'biodiversity') refers to the total **NUMBER** and **VARIETY** of plants, animal and fish species found in the mangroves. These mangrove plants, animals and fishes live and interact within different types of mangrove environments.

Johor mangroves are rich in both plant and animal species. There are 90 species of mangrove plants in the world, around 25 of which (over **1/4)** are found in Johor. Johor mangroves are also a home to crabs, shellfish and other invertebrates, and mammals. In addition over **100 species** of birds make use of Johor mangroves.

To protect the individual plant and animal species diversity it is necessary to protect mangrove environment.

Showcard B defined mangroves and their many uses and functions, explained the current threats to the mangrove area, and emphasised the importance of the mangroves of Benut as a bird site of global significance. The information on this show card was interspersed with photographs of: mangrove uses and functions (fish, shellfish, wood, charcoal, and shoreline protection functions); mangroves in bad condition; and rare and endangered bird species of Benut (Lesser Adjutant Stork and Milky Stork).

All references to Benut were replaced with 'mangroves between Pontian and Rengit' so that there could be no confusion of the extent of mangrove within the study area. In the pre-test it was found that respondents only associated the 'mangroves of Benut', with the mangrove areas found closest to Benut town. 'Benut' mangroves were defined by the

project as a management unit (Christensen, 1998), and do indeed stretch from Pontian to Rengit.

The same information was provided to all respondents. Standard answers to questions likely to be asked by respondents were also prepared based on pre-test experience.

(ii) Respondents were then presented with a summary of the current management scenario, followed by the proposed new management scenario, which would ensure protection of the mangrove area. The proposed new management plan entailed a reclassification of Benut mangroves from Stateland to a Protected Forest Reserve. This is the hypothetical change which respondents were to be asked to value. The change to the new management plan would change (improve) the 'quality' of the mangrove resource by ensuring its diverse range of values were properly protected and managed.

B. BACKGROUND INFORMATION ON BENUT MANGROVES

Mangroves are trees and shrubs that grow on sheltered coastlines, mudflats and riverbanks. They are part of a rich coastal ecosystem, which provide a range of natural products and services. Currently, mangrove habitats in Malaysia, including the mangroves of Johor, are being lost due to industrial and urban development, and conversion to fishponds and agricultural land.

Johor State has 25,000 ha (152,650 acres) of rich mangrove resources all around its coastline. However, less than 3% of Johor's mangroves are protected. The mangroves between Pontian and Benut, which are the sole focus of this study, are located on the west coast of Johor. They have been reduced to a narrow belt due to bunding for agricultural development and deforestation.

The area between Pontian and Rengit is a **mangrove biodiversity hotspot**. That is an area with a high number and variety of species. The area qualifies as an **Internationally Important Bird Area**

- More than 1% of the world's population of **Lesser Adjutant Storks** is found between Pontian and Rengit. There are only 5,000 Lesser Adjutant Storks left in the world.
- A colony of nesting Grey herons (there are only 2 other such sites left in Peninsular Malaysia) and a milky stork colony are also found between Pontian and Rengit
- In addition, the west coast of Johor is part of the East Asia Flyway where 2 million shorebirds pass on migration.

If the mangrove area between Pontian and Rengit is further reduced, these mangrove-dependent birds may disappear from Johor forever.

A few other examples of the rich mangrove biodiversity between Pontian and Rengit: small-clawed otter; mangrove Blue flycatcher; mangrove pitta; mangrove mud crab and fiddle crab (*illustrations provided*).

A Coastal Management Plan prepared for South Johor by the Ministry of Science, Technology and Environment in 1992 recommended that:

'**The whole of Benut Stateland Mangrove Forest should be designated as a Protected Forest Reserve'**

That is it should be protected. The benefits of this would include:

- Conservation of the important wildlife and habitat
- Maintenance of a substantial inshore fishing industry
- Provision of a sustainable harvest of mangrove products
- Protection of the bunds of the multi-million ringgit West Johor Agricultural Development Project

Showcard C, presented the two management scenarios: (A) present state of affairs with no protection; and, (B) proposed new management plan which would protect the Benut mangroves and reclassify them as a Protected Forest Reserve. This card was accompanied by illustrations of mangroves in good and bad condition.

C. MANAGEMENT SCENARIOS

SCENARIO 'A': PRESENT STATE OF AFFAIRS - NO PROTECTION

- Mangroves between Pontian and Rengit vulnerable to illegal encroachment and deforestation
- Loss of mangrove areas to agricultural development
- Potential loss of globally important bird species
- Reduction in the protective functions of agricultural bunds
- Increased pollution and loss of fish productivity
- Deterioration of recreational facilities and aesthetic beauty

SCENARIO 'B': PROPOSED MANAGEMENT PLAN: PROTECTION OF MANGROVES BETWEEN PONTIAN AND RENGIT AS A PROTECTED FOREST LAND

- Protection of globally significant birds and other wildlife and habitat currently under threat
- Maintenance of fish stocks and shell fish of benefit to local communities
- Increased protection of agricultural bunds and hence agricultural land
- Improved recreational and educational facilities for residents and tourists
- Reduced pollution
- Protection from illegal activities

The final question of Section B asked respondents to assess the likely damage to the mangroves of Benut if the current management scenario continued. This question was intended to serve as a bridge between the qualitative description of the good provided in this Section and the posing of the wtp question in Section C.

(iii) The payment vehicle, the final component of the contingent market, used in this study was an annual payment to a Biodiversity Fund to be managed by the Government. This was introduced in Section C.

2.1.3 Section C: Willingness to Pay

The purpose of the wtp section is to determine respondent's wtp for protection of the mangroves of Benut, in order to value the resource.

Respondents were asked their wtp to protect the mangroves of Benut (through a move from scenario A to scenario B) in terms of a *monthly fee* to a biodiversity fund which would be managed by the government.

Despite the concerns over the payment vehicle used in the pre-test (largely by non-Malay households), this was not changed due to the lack of credible alternatives.

Prelude to the Elicitation Procedure

As described management and protection of Benut mangroves is necessary to protect the areas rare bird species and to enhance the quality of life of the local populations by providing a continuous source of seafood and recreational facilities. Obviously, the implementation of this project would cost money and people would have to pay their share of the costs on a continuing basis if they want to enjoy the benefits protection of the mangroves will offer.

As such, suppose that in order to protect the mangroves, your household would be asked to pay a monthly fee to A BIODIVERSITY FUND which will be established and managed by the government to help protect Benut's mangroves. Please think for a second about how much this would be worth to you and your household. (IF RESPONDENTS EXPRESS DOUBTS ABOUT THE EFFICIENCY OF PROPOSED PROJECT, TELL THEM TO ASSUME THAT IT WILL WORK WELL).

Please keep in mind: 1. The issues discussed here are only a few among many other environmental problems Johor and Malaysia faces. 2. This interview is on the mangroves between Pontian and Rengit only, not on other environmental issues or other mangrove areas around the country that you may be concerned about. 3.Your own personal income is limited and has important alternative uses. 4. There are no right or wrong answers and you should answer for your household.

Showcard D was prepared to be presented to respondents who asked for more information on the proposed management plan, and the sorts of activities, which would be carried out under this program. Only 10 respondents were shown this card.

SHOW CARD D: POSSIBLE PROJECTS TO INCREASE BIODIVERSITY BETWEEN PONTIAN AND RENGIT

- Rehabilitation of mangroves (e.g., in front of bunds in order to protect agriculture)
- Establishment of visitors centre / information centre
- Promotion of environmental sensitive tourism activities (e.,g., bird watching, boat trips)
- Patrolling of mangrove area to prevent illegal activities
- Monitoring of fish, plant life and mangroves
- Encouragement of proper disposal of garbage and other waste to reduce pollution

Having created a contingent market, it is possible to elicit individuals maximum wtp.

Elicitation Method

Two different elicitation techniques were adopted on an equally split sample: the payment ladder approach (which had worked well in other CV surveys conducted in Malaysia)[3]; and, a referendum question, followed by a double bounded dichotomous choice type question. The surveys were identical in all other respects.

Payment ladder

A payment ladder is a type of 'payment card' which sequentially lists a range of values from low to high. Respondents are asked to tick the amounts they are sure they would pay and to cross amounts that they are sure they would not pay.

The payment ladder used in this study is presented in Figure 1. The values represent possible monthly payments to the Biodiversity Fund. Respondents were asked to begin with the lowest values and, considering each value in turn, to put a tick against those amounts that they were 'almost certain that they would be wtp'. Respondents were then asked to consider the values at the 'high end' of the ladder, and to tick those amounts that they were 'almost certain that they would *not* be wtp'. In the example provided (Figure 1), the respondent is almost certain that he/she would be wtp as much as RM1 per month and equally certain that he/she would not be wtp as much as RM15 per month. Between these two values, the respondent was unable to mark either a tick or cross, indicating that wtp was uncertain over this range.

[3] See, for example, Mourato and Day, 1998.

In addition to providing information on the highest individuals are certain they would pay, and the lowest amounts that they are certain would not pay, the payment ladder approach can reveal the degree of confidence that respondents have in stating their wtp.

Figure 1. Payment Ladder: Benut

RM	✓/✗
0	
0.5	✓
1	✓
2	
3	
4	
5	
6	
7	
8	
9	
10	✗
15	✗
20	✗
25	✗
30	✗
35	✗
40	✗

Referendum Followed by Double Bounded Dichotomous Choice

The second elicitation method used in the study may be referred to as a referendum followed by double bounded dichotomous choice approach.

A referendum question was posed at the beginning of the second elicitation process, which simply asked respondents if they would be wtp anything for the proposed policy ('yes' or 'no'). Respondents answering 'no' to the referendum question were then asked to give their reasons for not being wtp for the protection of Benut's mangroves. Respondents answering 'yes', were presented with the Dichotomous Choice (DC) wtp questions.

The dichotomous choice (DC) format, presents respondents with a take it or leave it price (known as the *bid level*) for the good being valued. It is the format most commonly used in CV studies and is recommended by NOAA. Its favour is based on the intuition that responses to DC type questions are more 'reliable' because they more closely resemble the choice confronting people in 'real' markets. A drawback of DC questions is that large samples are required to obtain statistically significant results. This requirement can be partly overcome by adopting a double-bounded dichotomous choice (DBDC) approach.

The DBDC approach supplements the initial DC question with a follow-up question. For example, the respondent is first asked if he/she is wtp RM1.5. A second wtp question is then asked dependent on the response to the first. If the answer is 'yes' to the first question, the respondent is asked if he/she is wtp a higher amount (e.g., RM3), but if the answer is 'no', the respondent is asked if he/she is wtp a lower amount (e.g., RM0.5). The DBDC format thus gives more information on the underlying wtp than the DC question (Hanemann *et al*, 1991).

The 'bids' (prices) used in the main survey, were defined with reference to the pre-test results. In the pre-test, the highest bid was RM10, so RM15 was taken as the highest bid in the DBDC process. The DBDC questions used are presented in Table 2.1.

Table 2.1. DBDC Questions

Number of Respondent's Posed Question		First DC Question: Would you be wtp x ? If 'yes', go to (2a) If 'no', go to (2b)	Second DC Question: Would you be wtp x?
Planned	Actual		
Question 1			
60	49	(1) RM 1.5	(2a) RM 3 (2b) M 0.5
Question 2			
40	33	(1) RM 2	(2a) RM 4 (2b) RM 1
Question 3			
30	27	(1) RM 5	(2a) RM 8 (2b) RM 2.5
Question 4			
20	21	(1) RM10	(2a) RM 15 (2b) RM 6

This study compares the results of the DBDC elicitation procedure with the payment ladder approach. The payment ladder elicitation procedure has worked well in other CV studies in Malaysia (Mourato 1998, Dubourg, 1998, Mourato and Day, 1998). Given that the majority of studies in Malaysia thus far have used the payment ladder approach, this was done to detect whether different elicitation methods made any significant difference to wtp responses.

Recent empirical evidence suggests that the DC elicitation method can result in a bias called 'yea-saying'; in which respondents accept to pay amounts that they are not really willing to pay. This leads to higher values than those elicited in open-ended formats, thereby running counter to the recommendation of a conservative survey design. Advantages and disadvantages of the payment ladder approach are summarised in Table 2.2.

Table 2.2: Potential Advantages and Disadvantages of the Payment Ladder Approach

Advantages	Disadvantages
(i) Information. Compared to other elicitation procedures it uncovers relatively detailed information on wtp. For example, it reveals the range of uncertainty that exists in the respondents' mind regarding the amounts they are prepared to pay (ii) The payment ladder process allows respondents the time to carefully consider the amounts they are and are not wtp (iii) Requires less statistical assumptions	(i) It is suggested that 'payment card' type elicitation procedures suffer from payment card bias. That is, wtp responses are influenced by the particular amounts presented to them on the payment ladder.

At the end of Section C, following the valuation questions, respondents were asked a final set of 'attitudinal' question seeking to ascertain:

(i) why they were willing, or not willing, to pay to protect the mangroves. For example, their attitude towards the management programme they were being asked to value in terms of feasibility; and,

(ii) Respondent's attitudes to the questionnaire.

2.1.4 Section D: Socio-economic Characteristics.

The final section of the survey collected relevant socio-economic data, such as: sex; age; educational attainment; employment status; and income level. This socio-economic information is important:

(i) to determine whether the survey sample is representative of the population;

(ii) to examine the similarity of the two groups who received different versions of the questionnaire; and,

(iii) to study how wtp for protection of the mangroves of Benut varies according to respondent's socio-economic characteristics.

2.2 Implementation

The surveys were conducted by PE Research, a firm with extensive experience in consumer research and contingent valuation studies.

All interviewers attended training sessions for both the Benut and KLIA Survey. Each survey question was discussed in detail, along with potential problems that might be encountered during the survey process, and possible solutions to them.

The fieldwork consisted of three main phases: pre-pilot; pilot study; and, main survey.

Pre-pilot: In the pre-pilot phase, the draft questionnaire was developed, refined, and informally tested. Background information on the study area was collected both through sites visits and a review of existing literature. Recently completed specialised studies of the area (e.g., biodiversity studies and bird surveys), meant that the questionnaire could be based on up-to-date site information (see Christensen, 1998 and Noramaly, 1998).

The first drafts of the study were carefully discussed with the staff at PE Research and other concerned parties. Considerable attention was paid to the wording of all economic and ecological concepts occurring in the questionnaire, in an effort to ensure that these could be easily followed and understood by local respondents. Visual aids were selected to illustrate the key points of the text. The questionnaires were translated into Bahasa Malay and Mandarin.

Pilot-Study: Two versions of the questionnaire were tested, each on 25 respondents (February 1999). One version of the questionnaire asked respondents their wtp for the protection of the mangroves of Benut, while the second asked respondents their wtp to protect mangrove wildlife. Face to face interviews with individual households were conducted in three locations: Rengit town - a representative urban area; and two villages (Kg. Sungai Jambi, and Kg. Sungai Merlong Laut) – representative of coastal areas.

The payment ladder elicitation process was used for the whole sample; while the payment vehicle was an annual fee to a Biodiversity Fund to be managed by the government.

Through the pilot-study process and a full analysis of the results, it was possible to put to rest a number of concerns over the feasibility of the CV approach as a valuation technique at the chosen site. A fundamental concern had been whether the concerned population could meaningfully value a public good such as a mangrove area, and whether the concept of biodiversity could be successfully communicated.

The pilot-survey also highlighted remaining problems in the wording of the questionnaire, the format used, and the choice of payment vehicle. In addition it allowed the testing of the visual aids.

Key points coming out of the pre-test survey, that facilitated the design of an effective final survey instrument included:

(i) The wtp for wildlife was found to be difficult to understand by respondents, and so was dropped in the final survey.

(ii) The study site was henceforth referred to as ‘the area of mangroves between Pontian and Rengit’, and not as Benut.

(iii) The pre-test wtp responses were used to define a double bounded dichotomous choice wtp elicitation format to be used in the main survey

Main Survey: The main survey was carried out over eight days during March 1999. A total of 307 households were visited (Table 2.3). However, there were 34 rejections (households not wanting to answer the questionnaire), 19 households without a qualified respondent (i.e., people at home were either incapable of understanding the questionnaire, or insisted that the household head was the only appropriate respondent), and 11 no-responses (i.e., no one at home) [4]. The number of interviews completed was therefore 243.

Table 2.3. Summary of Survey Responses

Total number of households visited	307
Number of rejections	34
No. of households without qualified respondent	19
No. of households with no one at home	11
No. of interviews completed	243

Higher rejection rates were noticed at areas near main roads, and amongst Chinese, compared to Malay, respondents. Respondents were equally assigned to one of the two versions of the questionnaire (i.e., version A – payment ladder elicitation approach, and version B – DBDC elicitation approach).

2.2.1 Sampling Strategy

The sampling strategy was determined by PE Research. The study area stretches from Pontian to Rengit, and falls within the districts of Pontian and Batu Pahat, and 5 *munkims* - Sungai Kluang, Benut, Sungai Pinggan, Ayer Baloi and Api Api (see map of study area). The boundary's of the 5 munkims were used to set the extent of the study area which covers approximately 53,000 hectares. The first main road running parallel to the coastline was used to define the coastal / inland divide. There are 48 villages in these 5 *munkims* (more commonly known as *kampung induk*). The concerned population of the study area is 12,650 (1991-population census).

It was planned to survey 300 households in 18 survey villages, constituting 7% of the population of the survey villages (4,208 households). Random sampling techniques were used to select the *kampung induk* from each munkim. The ratio of interviews per number of households was then computed and a random sample assigned to each village. Table

[4] Selected households were visited three times before being classified as a non-response household.

2.6 shows the distribution of the total population and sample, and the ratio and random number for each village in the survey.

During the course of the main survey there appeared to be less houses in the selected villages than suggested in the 1991 census. This could be due to: (i) the demolition of houses since the 1991 census; (ii) fieldworkers missing houses situated in remote areas; (iii) discrepancies in village boundaries as defined by the *penghulu* and the head of the village (*ketua kampumg*).

The discrepancies between the number of surveys planned and completed meant that coastal communities were slightly underrepresented in the final survey (Table 2.7).

Table 2.5 summaries the distribution of the sample and proposed and actual sample between coastal and inland areas.

Table 2.5. Distribution of Population, and Sample

	Population	**%**	**Proposed sample**	**%**	**Actual Sample**	**%**
Coastal	1,641	39%	102	34%	51	21%
Inland / Town	2,567	71%	198	65%	192	79%
TOTAL	4,208		300		243	

Table 2.6: Sampling Plan for Benut

Munkim	No. hh	% of hh	Sample needed	Selected Kampung	No. of hh	Selected hh /munkim	Ratio - survey:hh	Category
Sg. Kluang	3,510	28%	83	Belahan Tampok	191	1,202	1:14	/C
				Seri Merlong	545			C
				Sungai Jambi	233			C
				Sungai Klunag Darat	236			
Benut	2,878	23%	68	Pekan Benut	478	960	1: 14	T
				Kg. Permatamg Sepam	148			
				Kg. Permatang Duku	153			
				Kg. Lubuk Sipat	181	484	1:16	
Sg. Pinggan	1,242	10%	30	Kg. Pt. Ramunia	130			
				Kg. Pt. Syang	96			
				Kg. Pt Marunit	258	769	1:14	C
Ayer Baloi	2,195	17%	52	Pekan Snaglang	242			T
				Kg. Pt Kabar	166			
				Kg Pt. Maklami	233			
				Kg. Pt Terus	129	793	1:11	
Api Api	2,825	22%	67	Kg. Pulai Sebatang	325			C
				Kg. Pt. Sikom	248			

				Kg. Jawa Ulu	220			
TOTAL	12,650	100%	300		4,208	4,208		

Source: from Penghulu of each munkim updated 1996

Notes: Pekan Benut's households numbers is estimation from population; C= coastal; T – town/inland,

Table 27: Planned and Completed Surveys, Benut

Selected Kampung	Planned Sample							Completed Surveys							Rejection	Non-qualified	No one at home	Final	Lack / extra respondents
	A	B	Q1	Q2	Q3	Q4	T	A	B	Q1	Q2	Q3	Q4	T					
Sg. Klung							83							58				81	
Belahan Tampok	7	7	3	2	1	1	14	6	6	3	2		1	12		2		14	
Seri Merlong	19	18	7	5	3	3	37	11	13	5	4	2	2	24	2	4	1	31	-6
Sungai Jambi	8	8	3	2	2	1	16	7	5	1	3		1	12	6		1	19	3
Sungai Klunag Darat	8	8	3	2	2	1	16	5	5	2	1	2		10	3	2	2	17	1
Benut							68							60				80	
Pekan Benut	17	17	7	5	4	1	34	12	18	7	5	3	3	30	12	3	4	49	15
Kg. Permatamg Sepam	5	5	2	1	1	1	10	5	5	2	1	1	1	10				10	-3
Kg. Permatang Duku	5	6	3	1	1	1	11	5	6	3	1	1	1	11				11	
Kg. Lubuk Sipat	7	6	2	2	1	1	13	5	4	2	1		1	9	1			10	
Sg. Pinggan							30							37				39	
Kg. Pt. Ramunia	4	4	1	1	1	1	8	10	7	2	1	3	1	17				17	9
Kg. Pt. Syang	3	3	1	1	1	0	6	2	2	2				4	1	1		6	
Kg. Pt Marunit	8	8	4	2	1	1	16	8	8	4	2	1	1	16				16	
Ayer Baloi							52							42				49	

Pekan Snaglang	8	8	4	2	1	1	16	6	7	3	2	1	1	13	1		1	15	-1
Kg. Pt Kabar	5	6	2	2	1	1	11	4	5	2	1	1	1	9	1	1		11	
Kg Pt. Maklami	8	8	3	2	2	1	16	7	4	2	2			11	2		1	14	-2
Kg. Pt Terus	5	4	1	1	1	1	9	5	4	1	1	1	1	9				9	
Api Api							67							46				58	
Kg. Pulai Sebatang	13	14	6	3	3	2	27	14	12	4	3	3	2	26	2	2		30	3
Kg. Pt. Sikom	11	10	4	3	2	1	21	7	6	2	2	2	2	13	2	1	1	17	-4
Kg. Jawa Ulu	9	10	4	3	2	1	19	4	3	2	1			7	1	3		11	-8
TOTAL	150	150	60	40	30	20	300	123	120	49	33	27	21	243	34	19	11	307	7

2.3 NOAA Guidelines

NOAA defines a set of guidelines for best-practice CV studies (Arrow *et al*, 1993), which provide a useful benchmark for practitioners in the design of CV studies. The key NOAA recommendations were followed in the design, implementation and reporting stages of this study (Table 2.8).

Table 2.8. NOAA Guidelines

Guideline	Guidelines adopted in Benut mangrove Study
Personal interviews	X
Elicitation format: wtp measure	X
Dichotomous choice format	X
Adequate pre-testing	X
Careful pre-testing of photographs	X
Accurate scenario description	X
Conservative design	X
Deflection of warm glows	X
Representative sample	X
Reminder of undamaged substitutes	X
Reminder of budget constraints	X
No answer option	X
Yes/no follow-up questions	X
Cross-tabulations	X
Checks on understanding	X

3 Attitudes on, and Use of Benut Mangroves

3.1 Attitudes

The opening section of the survey consists of a set of attitudinal questions intended to lead respondents into an exploration of their personal views on environmental issues in general, including mangrove habitat and species protection, in preparation for the valuation section. These questions also seek to reveal respondent's underlying motives for supporting protection of the mangroves. Attitudes can be important determinants of wtp, and thus can be used in the interpretation of valuation responses.

Attitudes towards the Environment and Natural Habitat Protection.

Respondents were asked to specify from a list of five social and environmental problems which they considered to be the most, and second most, important in Johor State and in which the Malaysian Government should invest money.

Over one third of respondents considers increasing agricultural productivity to be the most important issue for the area. This is not surprising since agriculture is the areas main land use. Protecting natural habitats and wildlife is a social and environmental problem of lesser concern to respondents. Nonetheless, nearly one-quarter of respondent's cited the protection of natural habitat of primary or secondary concern to them (Table 3.1).

Table3.1: Ranking of Social and Environmental Problems in Johor State

Problem	Most important (rank)	Second most important (rank)	First or second most important (rank)
Increasing agricultural productivity	35% (1)	42% (1)	77% (1)
Inflation	24% (2)	17% (3)	41% (3)
Reducing water pollution	9% (5)	16% (4)	25% (4)
Protecting natural habitats & wildlife	13% (4)	10% (5)	23% (5)
Improving quality of education	19% (3)	28% (2)	47% (2)
Other[a]	4% (6)	4% (6)	8% (6)

Notes: a/ Others include: provision of housing for locals (2); fair price for agricultural products; electricity; water shortages (2); poor telecommunications facilities; job creation; and better communications between government and public. (Problems mentioned by 1 respondent unless indicated in brackets). b/ There were no significant differences between the two versions of questionnaire (e.g., for 'protecting natural habitat and wildlife' - Version A: most important - 14%; second most important - 12%. Total 26% . Version B: most important 12%; second most important 8%. Total: 20%).

In terms of environmental problems, air and water pollution are the top concerns. Wildlife preservation (taken here as a proxy for biodiversity preservation) is considered to be the fourth most important environmental problem in the State. Overall, however, only 15% of the population cite wildlife preservation as a personal concern. (Table 3.2)

Table 3.2: Ranking of Environmental Problems in Johor State

Problem	Most important (rank)	Second most important (rank)	First or second most important (rank)
Air pollution	35% (1)	28% (2)	63% (1)
Water pollution	31%.(2)	32% (1)	63% (1)
Logging	2% (5)	8% (5)	10% (5)
Landslides / Floods	24% (3)	17% (3)	41% (3)
Wildlife preservation	5% (4)	10% (4)	15% (4)
Other / Do not know	3	6	9%

Note: For wildlife preservation, 6% of version A and 4% of version B felt this to be the most important concern, and 11% and 10% respectively the second most important concern.

For the purposes of the contingent valuation analysis, the attitude of respondents to mangrove habitat protection was further explored. Respondents were presented with a series of attitudinal statements about habitat and wildlife protection and asked whether they agreed or disagreed with each statement. These are summarised in Table 3.3. Overall, the responses reveal a high positive value placed on natural resources.

Table 3.3: Attitudinal Statements on Mangrove and Wildlife Management and the Percentage of Respondents Who Agree and Disagree with Each Statement

	Strongly agree	**Agree**	**No opinion**	**Disagree**	**Strongly Disagree**
(i). We have a duty to protect the environment from development regardless of the cost (*intrinsic value/overall duty to protect*)	19	56	10	13	2
(ii). We should reduce our use of the environment now, so that our grandchildren may benefit from it. (*Bequest value*)	17	71	4	7	1
(iii). Malaysia needs to develop her forests, seas, and land to increase jobs and incomes, regardless of the environmental damage (*role of environmental assets in development*)	2	17	5	62	14
(iv). Because rare birds depend on the mangroves, they should be protected regardless of the costs (e*xistence value*)	17	70	6	6	1
(v) I should pay for the protection of parks and nature reserves even if I do not visit them (*selfish use value motive*)	4	31	14	44	7
(vii) Even if I don't use the mangroves now, I am prepared to pay to protect them in case I want to use them in the future (*option value*)	2	45	10	40	3
(viii) It is worth spending money to protect the mangroves because they help to protect agricultural productivity in the area (*indirect use motivations*)	8	66	12	13	1
(ix) We have more important things to think about than the loss of the mangroves (*putting issue in context*)	7	47	29	14	3

The first question asked respondents if they felt one had a duty to protect the environment from development regardless of the cost. This question sought to reveal whether respondents felt that natural resources were of 'intrinsic value' and if we therefore have a duty to protect them. Three-quarters of the respondents agreed that we do have such a moral duty, with nearly 20% of the overall sample strongly agreeing with this statement.

Bequest value is a type of option value. It refers to the fact that even if we do not use natural resources now, we have a duty to pass on these natural assets to our children, so that they may also benefit from them. Again, a very high percentage of respondents, 88% agreed with the statement: 'We should reduce our use of the environment now, so that our grandchildren may benefit from it'. That is, respondents believe that natural resources are of value because of the benefits they can provide to future generations.

A pertinent question in a country such as Malaysia, which has experienced very high rates of growth over the past decade, is the extent to which natural assets may be sacrificed in this development process. In order to gauge respondent's attitudes on the role of environmental assets in the development process, respondents were presented with the statement: 'Malaysia needs to develop her forests, seas, and land to increase jobs and incomes, regardless of the environmental damage'. Over three-quarters of respondents disagreed with this statement (77%), only 2% strongly agreed with this.

This study was particularly interested in uncovering the value respondents placed on rare birds found in the study area. It is assumed that part of the value of rare species is pure existence value. Existence value is not related to any type of 'use' of the environmental good or service in question, it relates to the value derived simply from the knowledge that the good or service exists. As mentioned above, existence values can only be infer through the CVM process. Affinity with the existence value concept was sought through the statement: 'Because rare birds depend on the mangroves, they should be protected regardless of the costs'. A high number, 87%, of the respondents agreed with this statement.

Another statement probing the importance of non-use values to the respondent was: 'I should pay for the protection of parks and nature reserves even if I do not visit them'. Affirmation with this statement would suggest that a park or nature reserve is recognised for its non-use value (i.e., they incorporate other values such as option and existence value). Only 35% of respondents agreed with this statement. Around half the sample, disagree, suggesting that such areas were of value only for their use benefits.

As alluded to above, option value refers to an addition premium placed on a good or service, for the 'option' to be able to use it in the future. The following statement was asked to assess the appreciation of the option value concept among respondents: 'Even if I don't use the mangroves now, I am prepared to pay to protect them in case I want to use them in the future'. Close to 50% of respondents agreed with this concept, affirming mangrove's option value.

Indirect use value, refers to the benefits provided by a mangroves environmental functions and services. The most celebrated indirect mangrove use value is the role they play in supporting inshore and off shore fisheries[5]. Within the study area, an important function of the mangroves is the protection they provide to agricultural land situated behind the mangroves, by acting as a buffer to shoreline erosion and possible saltwater intrusion. In order to assess the appreciation of the indirect functions of the mangroves, respondents were presented with the following statement: 'It is worth spending money to protect the mangroves because they help to protect agricultural productivity in the area'. Nearly three-quarters of respondents agreed with this suggesting a high appreciation of the indirect value of the mangrove.

Finally, in order to put the issue of mangrove loss and degradation into context, respondents were presented with the statement: 'We have more important things to think about than the loss of the mangroves'. Over 50% agreed with this statement. This result is consistent with the finding that mangrove and wildlife protection are of relatively low priority within the study area.

Table 3.3 is summarised in Table 3.4. and clearly shows a strong appreciation of the non-use values of natural resources. We can conservatively state that 65% of the population value the environment for its non-use benefits.

Table 3.4. % of Respondents who Recognise Non-use Environmental Values.

Type of Value	% of Respondents who implicitly 'recognise' different types of value
Indirect use Value (viii)	74
Option Value (vii)	47
Bequest Value (ii)	88
Existence Value (iv & i)	87 / 75
Rejection of non-use values (vi)	35

3.2. Uses

Section B of the questionnaire elicited information on current use and knowledge on the mangroves of Benut. This information provides a better understanding of the respondent's profile, and can also be used to explain wtp responses.

[5] Mangroves serve as important spawning and feeding grounds for fish.

Variables, such as whether the respondent has visited the mangroves, and/or derives direct benefits from it, are expected to affect household wtp for the protection of the mangroves of Benut.

Overall, 75% of respondents (78% version A, and 71% version B) have heard of the mangroves of Benut, while 53% of respondents have visited them (55% version A, and 50% version B). 70% of the respondents stated that they were likely to visit the area in the next 5 years (69% version A, and 71% version B). See Table 3.5.

Table 3.5. Knowledge and Use of Benut Mangroves (% of Respondents)

	Version A	Version B	Overall
Heard of Benut mangroves	78	71	75
Visited Benut mangroves	55	55	53
Likely to visit in next 5 years	69	71	70

We would expect the wtp of households who currently benefit from the mangroves to be higher than those who do not. For those respondents who claim to receive no benefit from the mangroves (41%), wtp can be taken to represent non-use value (Table 3.6). The most important direct use values of the mangroves to respondents are forestry products and seafood.

Table 3.6. Benefits Derived from Mangroves Reported by Respondents

Type of benefit	No. of respondents	%
No Benefits	100	41
Do not Know	15	6
Direct use		
Seafood	51	21
Source of Income	7	3
Recreation	25	10
Forestry products (poles/charcoal)	75	31
Education	3	1
Habitat for wildlife and bird species	8	3
Amenity (fresh air / shade)	10	4
[Land conversion][1]	2	1
Indirect benefits		
Flood prevention / soil erosion / environmental protection	25	10
Non-use value		
Benefit for next generation	1	0.5

Notes: 1/ Land conversion was cited as a benefit by a small number of respondents.

For 85% of respondents (equal across versions), all or part of the information presented on mangrove biodiversity and threats facing the mangroves of Benut was new (overall, 33% all new, 52% some of the information new). The CV survey instrument can, in additional to a valuation tool, therefore be seen as an effective educational mechanism. The remaining 15% of respondents claimed to be familiar with all the information offered (Table 3.7).

Table 3.7: Familiarity with Information Presented (% of respondents)

Familiarity with Information Presented	Version A	Versions B	Overall
All new	30	36	33
Some of it new	56	48	52
Know all already	14	16	15

A high percentage, 83% (equal across versions) believed that the damage to the mangroves would be severe if the current management practices continued (34% damage would be very severe; 49% damage would be severe). See Table 3.8.

Table 3.8. Perceived Damage to Mangroves Under Current Management (%)

Damage to Mangroves if Current Management Continues	Version A	Version B	Overall
Very Severe	37	31	34
Severe	46	53	49
Not so severe	17	15	16
Not at all severe		1	0.5

4 Socio-economic Characteristics of Respondents

The respondents are predominately male (64%) and Malay (90%)[6], (Table 4.1). Household size ranges from 1-25 people and averages 5.

Table 4.1. Ethnic Background of Respondents

	Version A	Version B	Overall
Malay	90	90	90
Chinese	10	9	9.5
Orang Asli	0	0.8	0.5
Indian	0	0	0.0

[6] For version A, 70% of respondents were male, while for version B, 58% were male.

The age of respondents ranges from under 21 (but over 18) to over 70 (Table), and is fairly similar across versions (Table 4.2).

Table 4.2. Age Group of Respondents

Age group	Version A	Version B	Overall
<21	1	3	2
21-30	23	17	20
31-40	15	22	18
41-50	23	22	22
51-60	22	23	23
61-70	7	8	8
>70	9	4	7

Educational attainment was also very similar across versions. Half of the survey sample had received an education to primary school level (Table 4.3).

Table 4.3. Educational Attainment of Respondents

	Version A	Version B	Overall
No formal education	8	8	8
Primary School Education	50	50	50
SRP/PMR	13	13	13
SPM/SPVM	22	22	22
STPM	4	2	3
Diploma/ professional certificate	2	3	3
Degree	0.8	0.8	1

A high percentage of respondents are farmers (34%), while 30% of respondents are unwaged (housewives, unemployed, retired, and students). Some differences are apparent between the occupational distribution of the sample and official occupation categorisation of the population. However, the population figures only takes account of those in employment, so over estimates overall percentages. Also, definitions for job categories are not clearly defined, so errors may have been made in the assignment of respondents to the main job categories (Table 4.4).

Table 4.4. Occupations of Respondents (%)

Job category	Version A	Version B	Overall (number)	Overall (%)	Population[1]
Professional	1	1	2	1%	7%
Administrative and managerial (includes: businessmen; government servants; and teachers)	14	18	32	13%	0%
Clerical and related workers	5	0	5	2%	3%
Sales worker	1	2	3	1%	7%
Service workers					4%
Agricultural (includes 2 fishermen, otherwise all farmers)	47	36	83	34%	46%
Production workers (includes: factory workers; lorry drivers)	26	18	44	18%	33%
Others (includes housewives; unemployed; part-time workers; retired and students).	28	45	73	30%	
Total	122	120	242		

Notes: 1/ Population data based on official statistics for the area

The average household income in 1992 in Johor, was RM1,708. Nearly 90% of respondents report incomes below this (Table 4.5). Nearly, 37% earn less than RM500 per month, and may be under the poverty line set at RM425 per month for Peninsular Malaysia.

Table 4.5. Income Level of Respondents (RM/Month)

Level of Income	Version A (%)	Version B (%)	Overall (%)
No income	1	1	1
RM500 and below	32	43	36
RM501 - RM1000	44	34	38
RM1001 – RM1500	15	14	14
RM1501 – RM2000	5	1	3
RM2001 – RM3000	3	3	3
RM3001 – RM4000		2	1
RM4001 – RM5000		1	0.5
RM5001 – RM6000		0	0
RM6001 – RM7500		1	0.5
Above RM7500			0
No response			3

5 Evaluation of Questionnaire

5.1. Respondents

At the end of the interview, respondents were asked to evaluate the questionnaire. A very high percentage of the respondents found the survey to be interesting (91%), and educational (92%). The educational benefits are assumed to relate to the information presented on mangrove biodiversity and its relevance to the study site. Around a third of respondents found the survey too long. This, however, is not an unreasonable result for a CV survey. CV questionnaires are typically longer than other types of surveys such as opinion polls, due to the time taken communicating complex hypothetical scenarios, and to undertake wtp elicitation processes.

Just less than a third of respondents found the survey difficult to understand (compared to close to 50% on the pre-test survey). A concern over this study had been the difficulty of conveying complex concepts such as biodiversity to respondents in rural areas. Given the complexities of the survey, this can also be taken as a fairly reasonable result.

Only 8% of respondents found the hypothetical scenario ‘unrealistic’ (Table 5.1).

Table 5.1. Respondents Views on Survey

Views on Survey	Version A	Version B	Overall
Interesting	89	95	91
Too long	29	39	34
Difficult to understand	30	31	30
Educational	93	93	93
Unrealistic/not credible	12	5	8

5.2 Enumerator Evaluations

The interviewers also evaluated each questionnaire in terms of the respondent's interest in the survey, comprehension of it, and sincerity of responses. Over 50% of respondents were assessed to have shown more than moderate interest in the survey (Table 5.2). Only, 1% of respondents were not at all interested in the survey process. For 50% of the surveys, other people were present.

Table 5.2. Interest of Respondents

Degree of Interest	% of Respondents
Extremely interested	20
Very interested	37
Somewhat interested	31
Slightly interested	10
Not interested at all	1

The mean and mode of respondent's comprehension of the four Sections of the survey are presented in Table 5.3. Sections A and B were the most difficult to understand, but were still ranked at the lower end of the scale (where 1 equals 'not at all difficult to understand').

Table 5.3. Assessment of the Comprehension of the Survey

	1 Not at all	2	3	4	5	6	7	8	9	10 Extreme Difficulty
SECTION A		*	X							
SECTION B		*	X							
SECTION C		X / *								
SECTION D	*	X								

X = mean; * = mode and median

The interviewers were very confident in 81% of the survey responses (Table 5.4). The three respondents who were 'not at all confident', were all classified as protest 'no' votes. They therefore do not affect the wtp analysis, having been removed from the reduced sample[7].

Table 5.4. Assessment of the Sincerity of Respondent's Answers

Level of Confidence	% of surveys	Number
Very confident	81	197
Not so confident	18	43
Not at all confident	1	3

Overall, therefore, from the point of view of respondents and interviewers the questionnaire worked well in the field.

6 Willingness to Pay

6.1 Responses to wtp Questions

Overall, 56% of respondents reported a positive wtp for the protection of the mangroves of Benut (66% ticked a value greater than zero on the payment ladder, and 47% answer yes to the referendum question posed at the beginning of the dichotomous choice

[7] See Section 6

valuation procedure). Only one respondent refused to answer the wtp question, and was hence excluded from the wtp analysis (Table 6.1).

Table 6.1: Summary of Positive and Negative Responses to wtp Question

WTP response	Payment ladder		Dichotomous choice		Overall	
Yes	81	67%	56	47%	137	56%
No	41	33%	64	53%	105	44%
Don't know	1				1	
TOTAL	123		120		243	

A summary of the motivations for being wtp the mangroves are presented in Table 6.2. The most common motivation appears to be concern over the loss of mangroves and related biodiversity.

Table 6.2. Reasons why Respondents are Willing to Pay to Protect the Mangroves of Benut

REASONS TO PAY	Payment Ladder	Dichotomous Choice	Overall (%)
I think the management plan is a good one	14%	18%	16%.
I feel this is a reasonable amount to pay	25%	23%	24%
I am concerned about the loss of mangroves /biodiversity	35%	27%	32%
It is what I can afford to pay	4%	7%	5%
I am not sure I could pay what I said but I wish I could	22%	23%	23%

Respondents stating a zero willingness to pay, were asked to express their personal reason for *not* wanting to contribute anything to the protection of Benut's mangroves. Motivations for not wanting to pay can be divided into two categories: (i) genuine economic reasons for not wanting to pay; and, (ii) reasons related to a rejection of the contingent market.

If individuals find any part of the contingent market implausible or unacceptable, then they may reject it. These respondents are known as protest voters, i.e., respondents who do not report genuine economic reasons for not wanting to pay anything for protecting the

mangroves, but reject the contingent market nonetheless. Protest voters need to be removed from the wtp analysis, since it cannot be assumed that their wtp is truly zero. Motivations for not being wtp towards the protection of the mangroves of Benut are classified in Table 6.3 as 'Valid reasons for not participating in the contingent market', and 'rejection of the contingent market'.

Table 6.3. Reasons for Zero wtp Statement (Number / % of Respondents)

Reason	Payment ladder		Dichotomous choice		Overall	
Valid Reasons for Not Participation in the Contingent Market						
I have no spare income but would otherwise contribute	12	29%	21	33%	33	31%
I feel that environmental protection of Benut is unimportant	1	2%	1	2%	2	2%
I'd rather have the current situation than pay more	3	7%	0	0%	3	3%
The user should pay	6	15%	7	11%	13	12%
I believe that this improvement will take place without my contribution	0	0%	3	5%	3	3%
Sub-total	22	53%	32	51%	54	51%
Rejection of Contingent Market						
I don't believe the system would bring the changes you describe	2	5%	3	5%	5	5%
It is the government's responsibility	14	34%	26	41%	40	37%
I fail to understand the question	2	5%	1	2%	3	3%
We cannot place a monetary value on biodiversity	1	2%	2	3%	3	3%
No-response	1					
sub-Total	*20*	*46%*	*32*	*51%*	*51*	*48%*
TOTAL	42		64		105	

Overall, 49% of zero wtp responses may be classed as protest votes. This means that 52 surveys (21% of the sample) needed to be excluded from the wtp analysis, reducing the overall sample to 191 (i.e., payment ladder- 103 surveys; DBDC - 88 surveys).

Table 6.4. Summary of Valid Sample.

WTP response	Payment ladder	Dichotomous choice	Overall
Yes	81	56	137
Valid No	22	32	54
[Protest No]	[20]	[32]	[52]
Valid Sample	103	88	191

Voluntary Help in Lieu of Monetary Contribution

Respondents stating that they were not willing to pay to protect the mangroves of Benut, were asked if they would instead be willing to volunteer some of their spare time to protect the mangroves. This presented those unable to pay with a non-monetary means of expressing their value of the area. Just over a quarter of the 'no' respondents are willing to contribute their time (Table 6.5). This suggests 26% (23 respondents), of zero wtp respondents actually 'value' the mangroves, but are unable or unwilling to make a monetary contribution towards their protection. The main reasons for being willing to volunteer time to protect the mangroves are: wanting to protect the mangroves and its wildlife, interest, and a desire to increase mangrove benefits.

Table 6.5. Willingness to Volunteer Time to Protect the Mangroves

	Version A		Version B		Overall	
	No	%	No	%	No	%
Yes	12	29%	16	25%	28	26%
No	30	71%	48	75%	78	74%
Total	42		64		106	

Respondents answering yes to this question were, on average, willing to volunteer 14 hours per month to activities which would help to protect the mangroves (Table 6.6).

Table 6.6. Number of Hours Willing to Contribute to Protect the Mangroves

Number of hours / month	Version A	Version B	Overall
1		3	3
2	2	1	3
3		1	1
5	2	1	3
7	1		1
8	1		1
11	1		1
12	1	1	2
20		1	1
24		1	1
48		1	1
56		1	1
60		1	1
Don’t know	3		3
Total	9	12	21
Mean	6	19	13.5
Median	5	8.5	5

6.2. Analysis of wtp Results[8]

6.2.1 Payment Ladder

The results of the valid (reduced) sample are summarised in Tables 6.7 and 6.8.

Table 6.7 reports the mean, standard deviation, minimum and maximum of the ticks and crosses found in the sample.

Table 6.7: Summary Statistics for WTP Question (RM/household/month)

Variable	Min	Max	Median	Mode	Mean	std.dev	N
Tick	0.5	10.00	1.00	0.5	1.38	2.17	103
Cross	1.00	20.00	4.00	2.0	5.43	4.89	80

The mean of the values ticked, RM1.38, can be taken as the lower bound wtp. That is, the average value that respondents were certain they would pay each month for the protection of the mangroves. The mean value of the crosses – RM5.43, may thus be considered as the upper bound wtp. That is, the average amount respondents are certain that they will not pay. The difference between the ticks and crosses defines the range over which respondent's valuations are uncertain.

The mean provides an estimate of what the 'average' household might be wtp. However, since the distribution of wtp is skewed, this would be in excess of the maximum wtp of the majority of the population. For this reason, it is probably more appropriate to take a median figure as a reference point. The medium value of the ticks is RM1.00, while the medium value of the crosses is RM4.00.

Given a population of 12,650 households, this amounts to RM151,800 per year.

For Table 6.8, the frequency column relates to the number of individuals who ticked this amount as the highest amount that they are wtp, or crossed it as the lowest amount they are certain they would not pay. The 'cumulative' ticks column, indicates the number of respondents who are certain they would pay at least this amount for protection of the mangroves. The cumulative crosses column, shows the number of respondents who at

[8] The results presented in this Section provide key information on the wtp of the sample. Further analysis is required in order to answer more probing issues such as: (i) the implicit average wtp of respondents; (ii) the key factors explaining the differences in wtp responses; and, (iii) and, whether elicitation bias is evident. This analysis is not presented is this paper.

this value had not yet stated that they would not pay. When presented as a function, the cumulative figures define a *survivor function.* This function describes: for ticks - the portion of the sample at each value whose highest ticks are at least that value; and for crosses - the portion of the sample at each value whose lowest cross is higher than this value.

Table 6.8. Payment Ladder Responses

WTP (RM)	Ticks			Crosses		
	Frequency	Cumulative	Survivor	Frequency	Cumulative	Survivor
0	23	103	1	23	103	1
0.5	33	81	0.79	0	80	0.78
1	28	48	0.47	13	80	0.78
2	6	29	0.28	19	67	0.65
3	2	14	0.14	6	48	0.47
4	0	12	0.12	2	42	0.40
5	8	12	0.12	9	40	0.38
6	0	4	0.04	13	31	0.30
7	0	4	0.04	1	18	0.17
8	0	4	0.04	1	17	0.16
9	0	4	0.04	0	16	0.15
10	4	4	0.04	5	16	0.15
15	0	0	0	9	11	0.11
20	0	0	0	2	2	0.02
25	0	0	0	0	0	0.00
30	0	0	0	0	0	0.00
35	0	0	0	0	0	0.00
40	0	0	0	0	0	0.00

6.3 Test for Scale.

Respondents were also asked if they would be wtp more if other mangrove areas, in addition to Benut, were protected. The intention of this question was to determine how scale, and the existence of 'substitute' mangrove areas, influence wtp. One would expect a higher wtp figure for a policy which would protect additional mangrove sites from further deterioration and loss.

Overall, only 16% of respondents were wtp to protect additional sites. This result was consistent across versions. The average maximum wtp to protect additional mangrove sites was RM10 per month (Table 6.9).

Table 6.9. Maximum wtp for the Protection of Other Mangrove Areas (RM)

Maximum	Minimum	Mean	Median	Mode	Std. Dev	N
100	1	10	4	10	17.06	39

Reasons for the not being wtp an additional amounts to protect the mangroves are summarised in Table 6.10.

Table 6.10. Reasons not WTP to Increase Payment in Order to Protect Other Mangrove Areas

Reason	Number (96)	%
Place no value on the protection of other mangrove areas	2	2%
Not enough money	40	41%
Project may fail	5	5%
Previous stated amount considered reasonable	2	2%
Responsibility of people of the areas / not my responsibility	38	39%
There are other methods to protect mangroves	1	1%
Do not know	13	13%

Note: Respondents could give more than one answer.

6.4. Estimating Existence Value

Respondents answering 'yes' to the wtp question were also asked to imagine that they had migrated from the area and were never to 'use' the mangrove again, but otherwise followed an unchanged lifestyle. Given such a scenario, respondents were asked if they

would still be wtp to protect the mangroves. Nearly 70% of respondents answering 'yes' to wtp question (i.e., 94 respondents, representing 40% of the total sample), said that they would still be willing to pay to protect the mangroves in such an eventuality (Table 6.11). Such wtp is one measure of the existence value of the mangrove resource.

Table 6.11. WTP after Migrating from the Area

	A		B		Overall	
Yes	24	30%	18	32%	42	31%
No	56	70%	38	68%	94	69%
Overall	80		56		136	

The majority, 88% (83 respondents), stated that they would pay the same amount as before. (Table 6.12). The remaining 12% (11 respondents) claimed that they would pay a different amount ranging from RM0.20 - RM5.00. Most were wtp 20-60% of their original bids to protect the mangroves of Benut after they had left the area[9].

Table 6.12. Amount wtp After Migration

	Version A		Version B		Overall	
Same as before	49	87%	34	89%	83	88%
Other amount	7	13%	4	11%	11	12%
Total	56		38		94	

Respondents stating that they would not be willing to pay after leaving the area, where asked to express their reasons for this (Table 6.13).

[9] A small number of respondents (3), stated that they were wtp more. The reasons for this are not clear.

Table 6.13. Main Reason Why Not wtp if Left the Area

Reason	Number	% (n=42)
Not capable	7	17
Only people staying in the area should pay	20	48
No benefit	9	21
Not related to me	2	5
Do not know	4	9

6.5 Payment Vehicle

There was some concern that a fund managed by the Government would be rejected by respondents with low confidence in the Government's ability to implement a mangrove management project. Respondents were therefore asked if they considered payments to a biodiversity fund managed by the Government to be the best payment and management mechanism. Over 90% of the survey believed that it was.

Respondents who did not feel comfortable with the payment vehicle would prefer to see:

(i) a fund managed by a non-profit organisation or local community committee;

(ii) a fund managed by a private organisation; or,

(iii) a co-operation between the Government and the private sector.

Direct Benefits

Respondents were also asked if they believed that the project would bring them any direct benefits, and if these benefits were as stated in Section B of the questionnaire, or additional to these benefits. Over three-quarter of respondents believed that the project would bring them direct benefits (Table 6.14).

Table 6.14. Summary of Direct Benefits from The Project

	Version A		Version B		Overall	
Yes	97	79%	87	74%	184	77%
No	25	20%	31	26%	56	23%
Total	122		118		240	

Over 70% of respondents answering this question felt that the project would bring them additional benefits. This represents 54% of the overall sample (Table 6.15).

Table 6.15. Additional Benefits

	Version A		Version B		Overall	
Benefits same as described in B3	27	28%	24	28%	51	28%
Other benefits	70	72%	61	72%	131	72%
Total	97		85		182	

At the end of the wtp section, respondents were asked if the information presented to them had changed their preferences towards the protection of the mangroves of Benut in any way. Overall, the questionnaire affected the preferences of 62% of the respondents. This again illustrates the educational benefits of the CV process, and suggests that initiatives to improve awareness of mangrove goods and services, may allow a more 'reliable' expression of the demand for such assets.

Table 6.16. Impact of Questionnaire on Respondents Preferences

Impact	A	B	Overall
Changed your preferences about whether extra resources should be spent on mangrove protection	10	10	10
Merely given you more information than you had before	29	32	30
Both informed you and changed your preferences	52	53	52
Had no effect	10	4	7

7 Global Values

An additional survey of non-Malaysians was carried out in Kuala Lumpur International Airport (KLIA). As described above, Benut mangroves are of international importance on account of the habitat they provide for endangered bird species. A survey of non-Malaysians was carried out in order to assess the value of these global benefits to the international community. It can be argued that if the global community want to continue to enjoy the benefits of global resources such as found at Benut, then they should pay their share to protect them. A number of studies identify natural resources of global significance, however, valuing these global resources and identifying mechanisms through which they might be captured are challenging areas.

7.1 Methodology

Survey Instrument

The survey instrument used at Benut was adapted in the following ways for the KLIA survey:

(i) An additional map of Peninsular Malaysia highlighting Johor State was included. This was to ensure that respondents were informed of the location of Johor State, on the assumption that many respondents would not have visited Johor.

(ii) The survey was shortened as much as possible, without the loss of important details, in appreciation of the time constraints likely to be facing international travellers. A number of questions were also not relevant to non-residents, particularly from Section B regarding use of the mangroves of Benut. Questions excluded are: A2 on views on environmental issues[10]; B3 and B4 relating to benefits derived from the mangroves and mangrove visitation; B5 and B6 on familiarity with information provided, and opinions on the likely damage to the mangroves if the current management scenarios continue; C3 on willingness to volunteer time to activities aimed at protecting the mangroves; C6 on wtp towards the protection of the mangroves if respondent migrated from the area; C7 soliciting opinions on biodiversity fund; and, D3 on ethnicity.

(iii) The payment ladder and socio-economic questions were tailored for an international sample

Survey

A survey of 120 individuals was undertaken over 3 days, April 1999. Interviewers had access to the departure lounge, where the interviews were conducted.

[10] It was felt that questions A1 and A3 were sufficient to gauge respondent's attitudes to environmental issues. These questions are also particularly time consuming. Question A1 was also amended such that respondents only had to state the problem they felt was most important in their country.

In terms of a sampling procedure, a ratio of 1:5 was employed, that is every fifth person in the departure lounge was approached. Out of the 264 people 'reached', only 120 completed interviews were achieved. Of those reached, 42 did not speak English or Mandarin and 21 were nationals and therefore not eligible for this survey. In addition, 33 of those reached refused to be interviewed, 45 were about to board and 3 were below eighteen years of age (Table 7.1).

Table 7.1. Summary of Survey at KLIA

People reached	264
Under eighteen years of age	3
Boarding	45
Rejections	33
Non English/Mandarin speakers	42
Locals	21
Completed surveys	120

7.2 Socio-economic Characteristics

Respondents came from 28 countries. Australian and British nationals have the highest representation, together accounting for 37% of the sample (Table 7.2). The majority of respondents and male (57%).

Table 7.2. Nationality of Respondents

Argentina	1	1%
Australia	24	20%
Bangladesh	1	1%
Canada	6	5%
China	5	4%
Finland	1	1%
France	3	2.5%
Germany	2	2%
Hong Kong	1	1%
India	10	8%
Indonesia	2	2%
Israel	1	1%
Italy	1	1%
Japan	6	5%
Netherlands	2	2%
New Zealand	1	1%
Norway	1	1%
Philippines	3	2.5%
S. Africa	4	3%
S. Korea	1	1%
Singapore	4	3%
Sweden	4	3%
Switzerland	1	1%
Taiwan	8	7%
Turkey	1	1%
United Kingdom	21	17%
USA	5	4%

The socio-economic characteristics of respondents are provided in Tables 7.3-7.5.

Table 7.3. Age Group of Respondents

Age group	**<21**	**21-30**	**31-40**	**41-50**	**51-60**	**61-70**	**>70**
Number	5	39	24	22	15	11	4
%	4%	33%	20%	18%	13%	9%	3%

Table 7.4. Educational Attainment of Respondents

Level of Education	Secondary	Community college	Tertiary education	Higher degree
Number	18	21	56	25
%	15%	17%	47%	21%

Table 7.5. Income Levels of Respondents

Level of Income	**Number**	**%**
No income	21	17
US$10,000 and below	25	21
US$10,000 - 20,000	12	10
US$20,000 - 25,000	8	7
US$25,000 - 30,000	13	11
US$30,000 - 35,000	8	7
US$35,000 -40,000	4	3
US$40,000 - 50,000	6	5
US$50,000 -60,000	2	2
US$60,000 – 70,000	3	2
Above US$70,000	8	7
No response	10	8

7.3 Attitudes

Improvements in education is considered to be the top social / environmental priority by the majority of respondent's. Protection of natural habitat and wildlife is ranked as the second most pressing social / environmental problem (Table 7.6)[11].

Table 7.6: Ranking of Social and Environmental Problems in Respondent's Country

Problem	Most important (%)	Ranking
Increasing agricultural productivity	11	4
Inflation	7	6
Reducing water pollution	16	3
Protecting natural habitats & wildlife	23	2
Improving quality of education	36	1
Other[A]	8	5

Note: A/ Others include: crime (1); economic recession (3); unemployment (3); health care (1); and reducing corruption (1).

A set of attitudinal questions, similar to that used at Benut, was presented to respondents (Table 7.7). The first question asked respondents if they felt one had a duty to protect the environment from development regardless of the cost. Nearly 90% of the respondents agreed that we do have such a moral duty, with nearly 40% of the overall sample strongly agreeing with this statement (this compares to 75% and 20% on local survey). A number of respondents apparently changed their opinion due to the term 'regardless', i.e., they may have agreed with the statement initially but switched to disagree after reading the term 'regardless', or vice-versa.

Again, a very high percentage of respondents (similar to local survey), 88% agreed with the statement: 'We should reduce our use of the environment now, so that our grandchildren may benefit from it'. That is, respondents believe that natural resources are of value because of the benefits they can provide to future generations.

[11] As respondents were informed at the beginning of the questionnaire that it related to mangroves, it is possible that this prompted people to select 'wildlife and habitat protection' as the most important problem.

In order to gauge respondent's attitude of the role of environmental assets in the development process, respondents were presented with the statement: 'Countries need to develop her forests, seas, and land to increase jobs and incomes, regardless of the environmental damage'. 70% of respondents disagreed with this statement, 8% strongly agreed with this.

Affinity with the existence value concept was sought through the statement: 'Because rare birds depend on the mangroves, they should be protected regardless of the costs'. 78% of the respondents agreed with this statement, (compared to 87% on local survey).

Another statement probing the importance of non-use values to respondents was: I should pay for the protection of parks and nature reserves even if I do not visit. Affirmation with this statement would suggest that a park or nature reserve was recognised for its use value and non-use values. Over three-quarters of respondents agreed with this statement, suggesting that such areas are valued for more than their use benefits, i.e., that they represent other values such as option and existence value. Only 7% of respondents disagreed with this statement.

The following statement was asked to assess the appreciation of the option value concept among respondents: 'Even if I don't use the mangroves now, I am prepared to pay to protect them in case I want to use them in the future'. Over 70% of respondents agreed with this concept, affirming a mangrove option value.

The most celebrated indirect use value of mangrove resources is the role they play in supporting inshore and offshore fisheries, as important spawning and feeding grounds for fish. This example was thus used in the KLIA survey, replacing the statement linking mangroves to agricultural productivity in the local survey. 'It is worth spending money to protect the mangroves because they help to protect fisheries productivity in the area'. Again, nearly three-quarters of respondents agreed with this, suggesting a high appreciation of the ecological services (indirect values) provided by mangroves.

Finally, in order to put the issue of mangrove loss and degradation into context, respondents were presented with the statement: 'We have more important things to think about than the loss of the mangroves'. Just over 40% agreed with this statement, lower than the local survey result of 54%, and consistent with mangrove and wildlife protection being of the highest priority for 23% of respondents.

Table 7.7: List of Attitudinal Statements on Mangrove and Wildlife Management and the Percentage of Respondents Who Agree and Disagree with each Statement

***Value* / Statement**	**Strongly agree**	**Agree**	**No opinion[12]**	**Disagree**	**Strongly Disagree**
(i). *Intrinsic value/overall duty to protect* We have a duty to protect the environment from development regardless of the cost	39	50	3	5	2
(ii). *Bequest value* We should reduce our use of the environment now, so that our grandchildren may benefit from it.	44	44	8	3	0
(iii). R*ole of environmental assets in development* Countries need to develop their forests, seas, and land to increase jobs and incomes, regardless of the environmental damage	8	15	6	47	23
(iv) E*xistence value* Because rare birds depend on the mangroves, they should be protected regardless of the costs	20	58	15	6	1
(v) S*elfish use value motive* I should pay for the protection of parks and nature reserves even if I do not visit them	13	65	13	7	0
(vii) O*ption value* Even if I don't use the mangroves now, I am prepared to pay to protect them in case I want to use them in the future	11	60	25	4	0
(viii) I*ndirect use motivations* It is worth spending money to protect the mangroves because they help to protect fisheries productivity in the area	13	60	20	5	0
(ix) P*utting issue in context* We have more important things to think about than the loss of mangroves	3	39	22	27	7

[12] Field workers felt that some respondents did not know what a mangrove was, thus a lot of 'no opinion' were selected.

Only 5% of the respondents had heard of the mangroves of Benut prior to the interview. None of the respondents had visited the area. The survey can therefore be taken as an evaluation of non-use values.

7.3 Evaluation of Questionnaire

Again, a very high percentage of respondents found the questionnaire both interesting and educational (96% and 92% respectively). Furthermore, the questionnaire was easily understood by 93% of the sample and considered to be realistic by 92%. Only 19% of the sample considered the interview to be too long, compared to 34% for the local survey (Table 7.8).

Table 7.8. Respondent's Views on the Survey

Views on Survey	Yes	No	No response
Interesting	96	4	0
Too long	19	80	1
Difficult to understand	7	93	0
Educational	92	8	0
Unrealistic/not credible	3	92	5
Other			

Field workers felt that the KLIA survey was easier to conduct. Over 70% of the sample were assessed to be very, or extremely, interested in the survey (Table 7.9). All sections of the survey were perfectly comprehensible to over 90% of the sample, and interviewers felt that 96% of the survey responses were sincere (Tables 7.9 and 7.10). For 39% of the surveys, other people were presents.

Table 7.9. Interest of Respondents

Degree of Interest	% of Respondents
Extremely interested	21
Very interested	52
Somewhat interested	17
Slightly interested	7
Not interested at all	3

Table. 7.10. Assessment of the Comprehension of the Survey

	1 Not at all	2	3	4	5	6	7	8	9	10 Extreme Difficulty
SECTION A	91%	7%	1%	1%						
SECTION B	93%	6%	1%							
SECTION C	92%	7%	1%							
SECTION D	93%	6%	1%							

Table. 7.11. Assessment of the Sincerity of Respondent's Answers

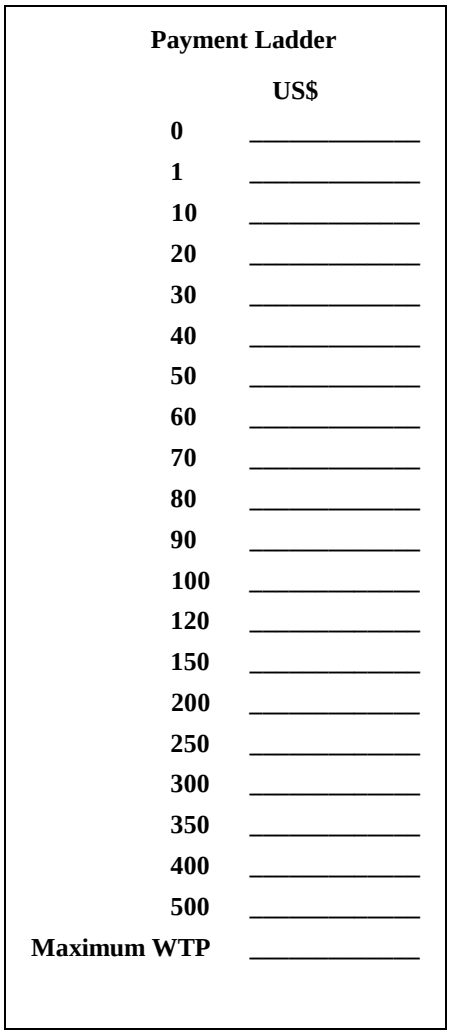
Level of Confidence	**% of surveys**	**Number**
Very confident	96	115
Not so confident	2	3
Not at all confident	0	0
No response	2	2

Clearly, from the point of view of both respondents and interviewers, the questionnaire worked well in the field.

7.4 Willingness to Pay.

The payment ladder used in the KLIA survey is presented in figure 2.

Figure 2



Over 60% of respondents are wtp to protect the mangroves of Benut. Of the respondents not willing to pay, 25 of these are protest votes, leaving a valid sample of 95 (Table 7.12).

Table 7.12. Summary of Willingness to Pay Responses

Response	Number	%
YES	75	63%
NO	45	37%
No Protest Vote	[25]	
Valid Sample	95	

A high percentage of those not willing to pay (42%), stated that this was because they felt it was Malaysia's responsibility (16% of the total sample). See Table 7.13.

Table 7.13. Reasons for Zero wtp Statement (Number / % of Respondents)

Reason	No of respondents	%
Valid responses		
No spare income but otherwise would contribute	12	10
The user should pay	1	1
I believe that the improvements will take place without my contribution	5	4
Protest Votes		
I don't believe that the system would bring the changes you describe	5	4
It is Malaysia's responsibility	19	16
We cannot place a monetary value on biodiversity	1	1
Sub-Total	25	
No response	2	2

Reasons for wanting to pay to protect the mangroves are presented in Table 7.14. Concern over loss of mangrove areas and biodiversity is the main motivation.

Table 7.14. Reasons why Respondents are Willing to Pay to Protect the Mangroves of Benut

REASONS TO PAY	Number	% of yes respondents	% of sample
I think the management plan is a good one	12	17	10
I feel this is a reasonable amount to pay	6	8	5
I am concerned about the loss of mangroves /biodiversity	37	52	31
It is what I can afford to pay	8	11	7
I am not sure I could pay what I said but I wish I could	8	11	7
TOTAL	71		

For the KLIA survey respondents were asked their wtp to a Biodiversity Fund on an annual bases. Payment ladder responses are provided in Tables 7.15 and 7.16.

Table 7.15. Payment Ladder Responses

WTP ($US)	Ticks			Crosses		
	Frequency	Cumulative	Survivor	Frequency	Cumulative	Survivor
0	49	119	1	0	120	1
1	15	70	0.59	48	120	1
6	0	70	0.59	1	72	0.60
10	21	55	0.46	6	71	0.59
20	15	34	0.28	21	65	0.54
30	6	19	0.16	10	44	0.37
40	0	13	0.12	2	34	0.28
50	7	13	0.11	6	32	0.27
60	0	6	0.05	7	26	0.22
70	0	6	0.05	1	19	0.16
80	0	6	0.05	0	18	0.15
90	0	6	0.05	2	18	0.15
100	5	6	0.05	5	16	0.13
120	1	1	0.01	5	11	0.09
150	0	0	0	2	6	0.05
200	0	0	0	2	4	0.03
250	0	0	0	1	2	0.02
500	0		0	1	1	0.00

Table 7.16 reports the mean, standard deviation, minimum and maximum of the ticks and crosses found in the sample.

Table 7.16: Summary Statistics for WTP Question ($US/year)

Variable	Mean	Median	Mode	Std. Dev	Min	Max
Tick	18	10	0	26.70	1	120
Cross	61	30	20	73.08	6	500

The number of people visiting Malaysia for eco-tourism is expected to reach, 1.25 million by the year 2000. Even conservatively defining the 'global' population as the number of eco-tourism visitors to Malaysia, and taking the lower bound median wtp of US$10 a year, the non-use values of Benut may be estimated at USS12.5 million.

Test for Scope

Respondents were asked if they would be willing to pay an additional amount, if other mangrove areas in addition to Benut were to be restored. In total 37 respondents said that they would (36% of the overall sample). WTP amounts ranged from US$2-1,000 with a mean of US$122 (median US$50; mode: US$50). Reasons given for not being willing to contribute more to protect additional areas are summarised in Table 7.17.

Table 7.17. Summary of Reasons for not Paying More to Protect Additional Mangrove Areas

Reason	No.	%
Malaysia's concern	1	
Not priority / problems in own country / contribute to other funds already	11	
Amounted stated for Benut sufficient	5	
Depend on success of plan	1	
Can't afford more	14	
No confidence in plan	1	

Around 50% of respondents believed that the project would bring them benefits (7.18).

Table 7.18. Summary of Benefits from Protection of Mangroves

Benefit	No. of Respondents (N-55)	Percentage
Environmental protection	31	
Maintenance of wildlife	9	
Reduced pollution	3	
Tourism	14	
Benefits to next generation	7	
A good example for other countries	4	
Seafood	2	
Satisfaction	2	

Around 40% of the sample claimed that the questionnaire had changed their preference to environmental protection in some way (Table 7.19).

Table 7.19. Impact of Questionnaire on Respondents Preferences

Impact	%
Changed your preferences about whether extra resources should be spent on mangrove protection	12
Merely given you more information than you had before	48
Both informed you and changed your preferences	29
Had no effect	11

8 Conclusions and Recommendations

Taking a lower bound wtp of RM1 per household per month, and given a population of 12,650, annual wtp by locals to protect the mangroves of Benut amounts to RM151,800 (US$40,000). On a per hectare bases this represents US$24 a year (the area of Benut mangroves is 1,690 hectares). The local survey revealed a high appreciation of the non-use benefits of the mangrove resource. Up to 40% of total wtp might be taken to represents non-use value attributable to the mangroves of Benut.

The survey of non-Malaysians reveals a very high wtp for the protection of the Benut mangroves and its global biodiversity. This value has been conservatively estimated at U$$12.5 million per year (US$7,500 per hectare). This represents non-use (existence) value. This however, is only relevant to Malaysia if mechanisms can be put in place to 'capture' part of this value. Possible mechanism include internationally funding (e.g., via the Global Environmental Facility), and higher levies on international tourists.

Despite their high value ecologically and economically, only 0.3% of mangrove areas in Malaysia are protected. Mangrove areas are thus extremely under-represented in Malaysia's protected areas (national parks, wildlife reserves and sanctuaries). With the rapid and continuing loss of mangroves in Malaysia, opportunities to conserve and protect pristine mangrove areas, and areas of high local and global biodiversity value are disappearing quickly.

Given the high biodiversity value of Benut, it is recommended that this site be afforded protection status either as a State park or a protected forest reserve. The local use benefits from protecting the site in terms of capture fisheries, tourism and shoreline protection are seen to be in the region of US$1,375 per hectare (Table 8.1). These results demonstrate that even without accounting for the high existence value placed on Benut's rare and endangered biodiversity, it is in the Malaysia's interest to protect the site.

Table 8.1. Benut: Summary of Mangrove Values (RM/year)

Category	Value Estimate	RM /ha	US$/ha
Capture Fisheries		2,000	526
Tourism	17,700	10	3
Shore-line protection	5,424,144	3,209	845
Sub-total		5,330	1,375
Non-use values	US$12,500,000		7,512
TOTAL			8,916

Source: Bann, 1999.

Notes: 2/ Aquaculture and fisheries: per hectare values based on State mangrove area of 27,000 hectares. 3/ Tourism, shoreline protection and non-use values based on area of Benut mangroves (1,690ha); 4/ Tourism values related to sports-fishing benefits; 5/ Shoreline protection benefits are based on benefits to agricultural productivity only.

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Appendix 1: Questionnaire

CV: MANGROVES OF BENUT

(Version A)

- INSTRUCTIONS TO INTERVIEWERS ARE IN CAPITALS
- NOTE SOME QUESTIONS DEPEND UPON PREVIOUS ANSWERS
- CARE MUST BE TAKEN TO ASK RELEVANT QUESTIONS
- IN THE CASE OF A REFUSAL TO RESPOND NOTE THIS WITH A CAPITAL 'R'. DO NOT MERELY LEAVE BLANK.
- NEED RESPONDENTS WHO ARE AT LEAST 21 YEARS OLD AND DECISION MAKERS IN THE HOUSEHOLD

INTRODUCE YOURSELF AS FOLLOWS:

Good morning / afternoon, sir/madam. My name is..... I am involved in a study being conducted by the Johor State Forestry Department (JSFD) on the mangroves of Johor. [I work for a private research company and] We are carrying out a survey to find out how much households value the mangroves between Pontian and Rengit, and would like to ask you a series of questions. All answers are confidential and there are no right or wrong answers. Your opinion is what counts. I must warn you that the questionnaire is quite lengthy and may take 20-30 minutes of your valuable time, but we will be most grateful for your co-operation. If you do complete the interview, we would like to offer you a small gift as a token of our appreciation.

IF NOT INTERESTED THANK THEM AND LEAVE. IF INTERESTED CONTINUE.

Respondent:..... **Serial number:**…….....

Address:..... **Date :**....…….....

..... **Time interview starts:** …….....

Telephone no.:..... **Time interview ends:**.....……..

Language : ……..…… **Interviewer Name:**...…….....

Area: 1. Inland 2. Coastal

A. GENERAL ATTITUDES AND BEHAVIOUR

A1. To start the interview, suppose that the Malaysian government is going to invest money to help with one of the problems listed below. Which of these problems do you consider to be the most important one to solve in Johor State? And which of the problems do you consider the second most important to solve?

CIRCLE ONE ANSWER FOR MOST IMPORTANT AND ANOTHER FOR SECOND MOST IMPORTANT

Problem	**Most important**	**Second most important**
Increasing agricultural productivity	1	1
Inflation	2	2
Reducing water pollution	3	3
Protecting natural habitats & wildlife	4	4
Improving quality of education	5	5
Other, specify_____	6	6

A2. What problems concerning the natural environment are you most worried about?

CIRCLE ONE ANSWER FOR MOST IMPORTANT AND ANOTHER FOR SECOND MOST IMPORTANT

Problem	**Most worry about**	**Second worry about**
Air pollution	1	1
Water pollution	2	2
Logging	3	3
Landslides / Floods	4	4
Wildlife preservation	5	5
Other, specify_____	6	6

A3. I am going to read out a few statements. Please indicate your opinion on a scale of 'strongly agree' to 'strongly disagree'. There is no right or wrong answer; I only need your frank opinion.

SHOW CARD FOR EACH QUESTION

	Strongly Agree	**Agree**	**No Opinion**	**Disagree**	**Strongly Disagree**
(i). We have a duty to protect the environment from development regardless of the cost	1	2	3	4	5
(ii). We should reduce our use of the environment now so that our grandchildren may benefit from it	1	2	3	4	5
(iii). Malaysia needs to develop her forests, seas, and land to increase jobs and incomes, regardless of the environmental damage	1	2	3	4	5
(iv). Because rare birds depend on the mangroves, they should be protected regardless of the costs	1	2	3	4	5
(v). I should pay for the protection of parks and nature reserves even if I do not visit them	1	2	3	4	5
(vi). Even if I don't use the mangroves now, I am prepared to pay now to protect them in case I want to use them in the future	1	2	3	4	5
(vii). It is worth spending money to protect the mangroves because they help to protect agricultural productivity in the area	1	2	3	4	5
(viii). We have more important things to think about than the loss of the mangroves	1	2	3	4	5

B. USE OF MANGROVES BETWEEN PONTIAN AND RENGIT AND BACKGROUND INFORMATION

B1. Have you heard of the mangroves between Pontian and Rengit?

Yes	1
No	0

SHOW MAP 1: This map shows the major mangrove areas in Johor State. You can see that the mangroves from Pontian to Rengit are one of these areas.

SHOW MAP 2: MANGROVES OF PONTIAN AND RENGIT: Mangroves cover an area of nearly 2,000 hectares along the coastline.

B2. Have you ever visited the mangroves between Pontian and Rengit?

Yes	1
No	0

B3. What benefits, if any, do you currently get from using the mangrove area and its natural resources?

_____

_____

B4. Are you likely to visit the mangroves in the next 5 years?

Yes / Likely	1
No / Unlikely	0

I am now going to introduce the concept of biodiversity.

SHOW INFORMATION CARD A AND READ INFORMATION ON MANGROVE BIODIVERSITY

I am now going to give you some information about the mangroves between Pontian and Rengit and introduce you to some of the environmentally sensitive issues that these mangroves face today.

SHOW INFORMATION CARD B AND READ BACKGROUND INFORMATION ON THE MANGROVES BETWEEN PONTIAN AND RENGIT

B5. Is this information new to you?

Yes, very new	1
Only some of it is new	2
I know all this already	3

PRESENT SHOWCARD C:

READ SCENARIO A

B6. How severe in your opinion is the likely damage to the mangroves between Pontian and Rengit if the trend highlighted in scenario 'A' continues?

Very severe	1
Severe	2
Not so severe	3
Not at all severe	4

Don't know *99*

READ SCENARIO B

C. WILLINGNESS TO PAY SECTION

As described management and protection of the mangroves between Pontian and Rengit is necessary to:

- protect the areas rare bird species;
- enhance the quality of life of the local populations by providing a continuous source of seafood and by protecting agricultural land

Obviously, the implementation of this mangrove protection project would cost money and people would have to pay their share of the costs on a continuing basis if they want to enjoy the benefits protection of the mangroves will offer.

As such, suppose that in order to protect the mangroves, your household would be asked to pay a monthly fee to A BIODIVERSITY FUND, which will be established and managed by the government to help protect the mangroves between Pontian and Rengit. Please think for a second about how much this would be worth to you and your household.

(IF RESPONDENTS EXPRESS DOUBTS ABOUT THE MANAGEMENT PLANS EFFICIENCY, TELL THEM TO ASSUME THAT THE SYSTEM WILL WORK WELL).

[IF NECESSARY SHOW CARD D WHICH LISTS POSSIBLE PROJECTS WHICH COULD IMPROVE BIODIVERSITY].

Please keep in mind:

1. The issues discussed here are only a few among many other environmental problems Johor and Malaysia faces.
2. This interview is on the mangroves between Pontian and Rengit only, not on other environmental issues or other mangrove areas around the country that you may be concerned about.
3. Your own personal income is limited and has important alternative uses.
4. There is no right or wrong answers and you should answer for your household.

PAYMENT LADDER: SHOW PAYMENT CARD

C1: Now on this payment card is a range of different amounts of money, from RM0 to RM40. Let's start at the top of the list and move down. Ask yourself, 'would I pay 50 sen a month to protect the mangroves?'. Or 'would I prefer the new management proposal not to be implemented and for mangroves to continue to deteriorate and for biodiversity to be lost?' And would I pay RM1? And RM2? And so on? If you are ALMOST CERTAIN you would pay some of these amounts to protect the mangroves, then lets place a tick in the space next to the amount. Please do not agree to pay if you cannot afford it, if you feel you have other, more important, things to spend your money on, or if you are not sure about being prepared to pay or not. If you are not sure whether you would pay or not, or if you think that you would not pay then let's stop.

INTERVIEWER EITHER YOURSELF OR THE RESPONDENT TICK THE AMOUNTS THE RESPONDENT IS CERTAIN TO BE PREPARED TO PAY. IF THE RESPONDENT IS NOT WILLING TO PAY ANYTHING GO TO QUESTION C2

Ok, now I would like you to look at the value at the bottom of the list, RM40. Please ask yourself 'would I pay RM40 to protect the mangroves?' And what about RM35? And RM30? If you are ALMOST CERTAIN you would NOT pay these amounts to protect the mangroves between Pontian and Rengit, let's place a cross in the space next to that money amount. If you are unsure whether you would pay these amounts, then let's stop and leave it blank.

INTERVIEWER EITHER YOURSELF OR THE RESPONDENT CROSS THE AMOUNTS THE RESPONDENT IS CERTAIN NOT TO PAY.

So this means that you are sure that you would pay (last amount ticked), not sure (amounts with blanks) and would not pay (first amount crossed) for sure. Is that correct? Do you want to revise your answer?

IF RESPONDENT WANTS TO REVISE, PLEASE DO SO. OTHERWISE, MOVE TO QUESTION C-4.

C-1. PAYMENT LADDER

RM	✓,✗
0	
0.5	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
15	
20	
25	
30	
35	
40	

TO ANSWER ONLY IF RESPONDENT STATED A ZERO WILLINGNESS TO PAY

C2. People have different reasons for saying that they are not willing to pay anything to protect the mangroves, or for saying that they don't know or can't answer the question. Please read the following statements, and tell me which one best describes your views.

CIRCLE ONE ANSWER ONLY.

I have no spare income but would otherwise contribute	1
I don't believe the system would bring the changes you described	2
It is the government's responsibility	3
I feel that environmental protection of the mangroves between Pontian and Rengit is unimportant	4
I'd rather have the current situation than pay more	5
The user should pay	6
I believe that this improvement will take place without my contribution	7
I fail to understand the question	8
We cannot place a monetary value on biodiversity	9

C3. Under your current circumstances instead of paying anything to the biodiversity fund, would you be prepared to volunteer some of your time to help with projects and/or fund raising to protect the mangroves between Pontian and Rengit? Projects might include: (A) work at an information centre giving information about the mangroves between Pontian and Rengit to visitors and students (B) Policing the area to ensure that visitors are not damaging the assets of the park and harming the animals. (C) Conducting guided tours, etc. Would you be willing to act as such a volunteer? Please remember that your time has several competing uses.

Yes	1	Go to C3a
No	0	Go to C7

C3a. If yes, how many hours per month on a continuous basis?

None	0
Hours per month	
Do not know	999

C3b. Why are you willing to spend your time in the mangroves between Pontian and Rengit?

_____

_____

GO TO QUESTION C7

TO ANSWER ONLY IF THE RESPONDENT STATED A POSITIVE WTP

C4. People have different reasons for being prepared to pay for the protection of these mangroves. Out of the statements below, which one best describes your personal reasons?

CIRCLE ONE ANSWER ONLY

I think the management plan is a good one	1
I feel this is a reasonable amount to pay	2
I am concerned about the loss of mangroves / biodiversity	3
It is what I can afford to pay	4
I am not sure I could pay what I said but I wish I could	5

C5. Would you increase the amount specified for the biodiversity fund if in addition to the conservation of the mangroves between Pontian and Rengit other mangrove areas would be restored?

Yes	1
No	0

C5a. If Yes, what would be your maximum willingness to pay?

_____

C5b. If NO, what is your reason?

_____

_____

C6. Imagine you were to migrate from this area, but otherwise your lifestyle and income remain unchanged. After leaving you will never make any use of the mangrove resource again. Would you still be willing to pay for the protection of the mangrove area?

Yes	1
No	0

C6a. IF YES. What would you be willing to pay

Same as before	1
Other amount, specify _____	2

C6b. If NO, Why are you NOT willing to pay anything?

_____

_____

TO BE ANSWERED BY ALL RESPONDENTS

C7. Do you think that a biodiversity fund managed by the government is the best management method?

Yes	1
No	0

C7a. If NO, what method would you prefer?

_____

_____

C8. Do you think that there would be any direct benefits to you from this project?

Yes	1
No	0

C8a. IF YES, do these direct benefits relate to your current use of the mangroves between Pontian and Rengit listed earlier as B3 or are there other benefits to you

Direct benefits due to current uses listed at B3	1
Other, additional direct benefits. LIST AS DESCRIBED: _____ _____ _____	2

C9. Do you feel the information presented to you so far in this interview has:

READ THE FOLLOWING. NOTE ONLY ONE CATEGORY TO APPLY

Changed your preferences about whether extra resources should be spent on mangrove protection	1
Merely given you more information than you had before	2
Both informed you and changed your preferences	3
Had no effect	4

D. SOCIO ECONOMIC BACKGROUND

Finally I have just a few questions about your background that will only be used for statistical purposes

D1. Record sex.

Male	0
Female	1

D.2 Which of these age groups do you fit into?

< 21	1
21 – 30	2
31 – 40	3
41 – 50	4
51 – 60	5
61 – 70	6
> 70	7

Refuse 99

D3. Please record your race.

CIRCLE ONE ANSWER ONLY

Malay / Bumiputera	1
Chinese	2
Indian	3
Orang Asli	4
Other, specify _____	5

D4. What is the highest level of education you have obtained?

No formal education	1
Primary School	2
SRP/PMR	3
SPM/SPVM	4
STPM	5
Diploma/Professional certificates	6
Degree	7

D5. What is your occupation _____

D6. How many members are there in your household? _____

D7. Could you estimate for us your total household's gross monthly income? Choose from one of the categories below. Your answer will be completely confidential. It will be used only for statistical analysis.

No income	0
RM500 and below	1
RM501 - RM1000	2
RM1001 - RM1500	3
RM1501 - RM2000	4
RM2001 - RM3000	5
RM3001 - RM4000	6
RM4001 - RM5000	7
RM5001 - RM6000	8
RM6001 – RM7500	9
Above RM7500	10

Don't know/ refusal 99

D8. Last of all, what did you think of this questionnaire?

INTERVIEWER READ EACH STATEMENT TO RESPONDENT:
CIRCLE ONE ANSWER FOR EACH STATEMENT

	Yes	**No**
1. Interesting	1	2
2. Too long	1	2
3. Difficult to understand	1	2
4. Educational	1	2
5. Unrealistic / not credible	1	2
6. Other, specify _____	1	2

END INTERVIEW, THANK RESPONDENT AND PRESENT GIFTS (CAR STICKERS /BADGES AS APPROPRIATE.)

[Thank you for your time and effort.

Your responses will help our research efforts]

E. TO BE COMPLETED BY INTERVIEWER

E1. Were other people present and listening when you interviewed this individual?

Yes	1
No	0

E2. How interested did the respondent appear to be during the interview?

Extremely interested	1
Very interested	2
Somewhat interested	3
Slightly interested	4
Not interested at all	5

E3. Did the respondent have difficulties in understanding the questions in each section?

E3. Did the respondent have difficulties in understanding the questions in each section?

	Not at all									**Extreme Difficulty**
SECTION A	1	2	3	4	5	6	7	8	9	10
SECTION B	1	2	3	4	5	6	7	8	9	10
SECTION C	1	2	3	4	5	6	7	8	9	10
SECTION D	1	2	3	4	5	6	7	8	9	10

E4. How confident do you feel about the sincerity of the respondent's answers to the questions?

Very confident	1
Not so confident	2
Not at all confident	3

E5. Other comments:

_____