Are Tourists Willing to Pay for a Marine Litter-Free Coastal Attraction to Achieve Tourism Sustainability? Case Study of Libong Island, Thailand

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Abstract: Coastal areas around the world are under increasing environmental pressures from marine litter. In particular, tourism in coastal tourist areas suffers with waste littering on the coast, as well as in the water. Therefore, substantial costs are required for the handling of marine litter in order to achieve sustainable development in the tourism sector. The introduction of an entrance fee as an economic tool is a feasible way to provide alternative financing, in addition to limited government funding. The objective of this study was to estimate tourists’ willingness to pay (WTP) for visiting a marine litter-free coastal attraction, and examine the factors affecting the WTP. A questionnaire was employed using a single-bound dichotomous choice method on Libong Island, Thailand, between September and December 2020. A logistic model was used to estimate the WTP of the 1655 respondents. The mean WTP obtained is THB 92.24 per person per visit (approximately USD 3). The expected benefit of charging an entrance fee is THB 27.52 million (USD 0.88 million) for 2019. The factors influencing WTP are bid amount, age, education, monthly income, marine litter perception, and environmentally responsible behaviors. Associated initiatives were recommended to achieve coastal destination sustainability, including regular clean-up operations at beaches, seagrass beds, and surrounding waters; the placement and maintenance of litter facilities; and the promotion of marine litter awareness and environmentally responsible behaviors.

Keywords: willingness to pay (WTP); entrance fee; marine litter; Thailand; contingent valuation method (CVM)

1. Introduction

Marine and coastal tourism is one of the fastest growing areas of the world’s tourism industry [1]. The unique features of the marine and coastal ecosystem and activities attract many tourists, both local and international. The cleanliness of the sea and beaches is a feature that fascinates tourists [2,3]. However, currently, some coasts around the world are threatened by marine litter [4–10]. Marine litter is one type of marine pollution caused by anthropogenic factors. The impacts of marine litter, mainly found to affect wildlife, marine ecosystems, human health, and tourism, from various parts of the world have been studied and reported [2,4,5,11–13].

In the context of coastal tourism, the increase in marine litter negatively affects the health of the coastal ecosystem, services, and recreation [3,5]. Some tourists are unsatisfied and decline to visit beaches that are strewn with marine litter [2,14]. This could lead to a 39% drop in local tourism revenue due to changes in attractions [14]. It has also been found that marine litter has a social cost (e.g., the potential damage to the welfare of tourists) [2]. Moreover, it increases some of the economic costs for a municipality in coastal
management, including the direct costs of cleaning the coastline, and dealing with a wider impact on the coastal environment and recreation [15]. Importantly, when litter enters the sea, it becomes a transboundary problem that is a chronic problem at the municipal, state, and national levels [14]. There is a challenge for destination managers to balance the goals of maintaining the environment and economic growth, as well achieving sustainable tourism development.

In coastal tourist destinations, marine litter is a very complicated issue, as it comes from many sources. Potential sources may be in other areas or regions. However, previous research confirms that the litter found in coastal attractions is the result of recreational activities and coastal tourism, due to the environmentally careless behavior of beach users [2,14,16]. The higher the density of beach tourists, the more marine litter that is generated. The cleanliness of the beach environment is a particularly important factor in achieving sustainable beach tourism [17]. To improve the quality of the environment, it is necessary to spend time, money, and human resources on litter disposal, in order to keep the destination attractive.

Charging an entrance fee is a measure, known as an economic instruments measure, that has been adopted, in the form of fee-collecting law enforcement. This collection of entrance fees derived from the idea of wanting tourists, who are responsible for the damage to the environment, to contribute to maintenance through the prices of goods and services. It is a common effective mechanism to provide direct funding for conservation through tourism. There is a belief that the tourists who have already paid their taxes, under the national taxation system, will face double charging when they are asked to pay entrance fees to natural attractions [18,19]. However, the tax revenue of the nation is insufficient to achieve the objectives [19] of marine litter mitigation, and the restoration of natural resources affected by the marine litter issue. Therefore, charging the tourist entrance fee is necessary to generate adequate public funds for the country or local government to maintain and manage marine litter in coastal tourism areas. Many studies support the idea of an entrance fee, as it tends to be a good source of income in areas with high levels of tourism, especially in developing countries [18–22]. The acquisition of this funding is not only a substitute for public funds, thereby reducing the government’s cost of the conservation of natural resources in tourist areas, but it is also as a regulatory tool to control the number of tourists [18–21]. Moreover, charging an entrance fee is a very good way to earn revenue from international tourists who pay taxes elsewhere [18,19].

Marine and coastal natural resources are all public goods, with no market value. Therefore, the price of an entrance fee cannot be determined by the market mechanism. The most widely used and successful approach to non-market valuation (e.g., improving water or air quality, conservation, the protection of natural resources, or environmental restoration) is the contingent valuation method (CVM) [19,22–25]. CVM is a natural resource valuation technique used for many types of environmental quality improvements. It encourages individuals to report the value of their willingness to pay (WTP) for a specific product or service, in order to meet their satisfaction, through direct questioning by creating a scenario [25]. This study highlights the role of an entrance fee, a representative of WTP, as a payment vehicle for establishing a marine litter-free coastal destination.

Recently, marine litter has become a major environmental problem in Thailand. The problem has worsened with the growth of coastal tourism, the environmental carelessness of tourists, and due to the impairment of tourism management. A current overview of Thailand’s coastal destinations shows that, in most areas, no entrance fee is charged; entrance fees are charged in some areas, but are not specifically used to deal with marine litter problems. The fees collected by the local government are low and do not cover litter management costs. Therefore, this study aimed to explore the feasibility of charging an entrance fee to tackle marine litter issues at a coastal destination. For this study, the WTP and its determining factors were investigated. In addition, the study examined the tourists’ socioeconomic demographic characteristics, their marine litter perception, and their environmentally responsible behaviors. This study serves as a guideline for determining the
appropriate fees to maximize the benefit of managing destinations, policy formulation, budget allocation for marine litter mitigation efforts, and also reducing tourist congestion. It is also a guide in the use of economic mechanisms in promoting environmental management in different countries.

2. Willingness to Pay and Determinants

CVM is the most widely used method of estimating economic values for all kinds of ecosystem services and environmental goods, which are not traded on the market [19,21,22,24,26–29]. It is called “contingent” valuation because respondents state their willingness to pay contingent on a specific scenario and environmental service described. It determines WTP quite accurately when the scenario is similar to the familiar situation of the market [30], as it reduces the cognitive burden of respondents, and simulates the behavior of people in a normal market.

The WTP an entrance fee for marine litter management in this study was the highest price that a tourist or visitor was willing to pay for access to recreational services at a coastal attraction in a marine litter-free area. Previous research estimates the amount of a tourists’ WTP for entrance fees to natural attractions, national parks, and protected areas. For example, tourists are willing to pay to access Lake Karagol, Turkey, at approximately USD 4.40 per person [30], similar to that of Icelandic tourists willing to pay entrance fees to the natural attractions Gullfoss waterfall and Skaftafell national park of USD 4.63 and USD 7.06 per person, respectively [19]. In addition, tourists in China are required to pay a higher entrance fee of USD 7.54 per person in the Dalai Lake protected area, in order to provide funding for biodiversity conservation and environmental protection [22]. The entrance fees for natural tourist attractions in the developing countries of southeast Asia are less, such as Malaysian tourists willing to pay an entrance fee of, on average, USD 1.72 per person to the Paya Indah wetland, to aid conservation [21]. The marine national park entrance fees range from approximately USD 1.5 per person in Malaysia, to USD 6 per person in Thailand and Indonesia [20]. According to economic theory, the higher the price of a product or service, the fewer people that are willing to pay. If there are fewer visitors to the attraction after a fee is charged, this hinders the income of the attraction. However, some studies show that launching a small fee, or raising an existing fee by a small amount, is not a significant hindrance [19].

During the review of the WTP entrance fees and environmental pollution management, it is demonstrated that the fee price may not be the only major influence on a tourists’ decision to pay [22,31]. WTP can vary from person to person. This variance is usually due to differences in individuals’ socioeconomic characteristics such as age, gender, income, and education. Some studies [19,23,30,32] indicate that younger people, those with a higher income, and those with a higher education are more willing to pay. On the other hand, another study [18] found that respondents of an older age were positively associated with the WTP response. It was also demonstrated that some factors, such as gender and nationality, do not have a significant effect on WTP [19,22,31,32]. Therefore, tourists of different socioeconomic characteristics, visiting different coastal destinations, have different perceptions of the environment and respond differently to WTP.

In addition to the socioeconomic characteristics, previous studies recreation have indicated that tourists’ perception of marine litter, such as its quantity and the impact it has, plays an important role in environmental behavior, including WTP the entrance fee [3,14]. Marine litter perception shows the value that people place on marine litter-free beaches [2]. Consequently, the perception that litter is abundant along the coast has a significant correlation with attitudes towards marine litter disposal, and cooperation in litter abatement campaigns [3]. In addition, tourists in Bulgaria, Greece, and the Netherlands indicate that the presence of marine litter is a nuisance, so they are willing to participate in programs to combat marine litter, in both monetary and non-monetary ways [2]. However, marine litter perception varies according to individual perspectives and external factors
(e.g., the context of the site). Moreover, marine litter perception has a significant implication for WTP.

Brouwer, Hadzhiyska, Ioakeimidis, and Ouderdorp [2] suggest that environmentally responsible behaviors (ERBs) should be added to the research framework, to verify that this variable has the power to support the payment of an entrance fee. ERBs include civil action, educational action, financial action, legal action, physical action, and persuasive action [33]. The participation of people in ERBs links individuals’ behavior with their awareness, knowledge, attitudes, environmental concerns, and intention to take action to address specific problems [3,34–37]. The WTP is influenced by an experience of environmental behavior, for example, membership in an environmental organization, [2] and a history of fee-paying [19]. In addition, volunteering (e.g., a volunteer in beach clean-up programs) has been identified as playing a key role in efforts to reduce the impact of marine litter [38]. The voluntary participation of tourists in acting to improve the overall environmental is associated with a better perception of marine litter, and an understanding of the scale of the problem. It is their willingness to join programs that has positive effects on society and the environment [2,3,14].

Consequently, tourists’ WTP for marine litter management varies, based on both personal internal factors (e.g., gender, age, education, income) and complementary factors (e.g., marine litter perception, ERBs). A small number of studies were conducted to understand the latter, including some related to the stimulation of the environmental intentions that leads to the participation. These studies are a positive factor in the issue of WTP entrance fees for coastal tourism areas. It is good to understand what factors determine WTP before implementing the entrance fee payment policy for the marine nature attractions that provides funding for destination managers to design strategies, and helps formulate new policies towards the development of sustainable tourism.

3. Methodology

3.1. Study Area

Libong Island, a marine nature destination that is becoming popular in Thailand, was selected as a study area. It is located in the Andaman Sea, southwestern Thailand, and is the largest island in Trang Province, with an area of approximately 40 square kilometers. The island is known for its rich wildlife, with plenty of well-known flora and fauna. One part of the island is Ramsar [39], an internationally important wetland. This site, in addition to being a support for birds, threatened or endangered species, and economically important fish, also has the healthiest and most diverse seagrass ecosystem, and maintains 12 of the 13 seagrass species found in Thailand [40] (Figure 1). Moreover, the area around Libong Island is the habitat of the last herd of dugongs in Thailand (Figure 1). The dugong is classified as 1 of 19 protected wildlife in the Thailand Wildlife Preservation and Protection Act 2019 [41].

In the coastal areas of Libong Island, the presence of marine litter and microplastics has been reported, such as in the death of rare marine species (e.g., dugongs) due to the ingestion of plastic litter [42], microplastic contamination in seafood (e.g., clams, snails, blue swimming crabs, mackerel) [43,44], and the accumulation of marine litter on the beach [45]. The investigation reveals that the largest proportion of macro marine litter on the island originates from coastal tourism and recreational activities [45]. The amount and composition of the litter is a reflection of beach recreation in the context of the current situation of the island regarding the development of tourism. To tackle marine litter in coastal tourist destinations, managers need to have a clear understanding about its origin. For coastal attractions on Libong Island, a representative selection of marine litter accumulation from coastal recreational activities was catalogued, to identify which activities were the probable source of litter from beach users. As a result of the continuous expansion of tourists on the island (298,306 tourists in 2019, comprising 87% domestic tourists and 13% foreign tourists), the island faces an increasing problem of litter every day. When litter enters marine ecosystems, it inevitably becomes marine litter.
management systems are limited and people’s tendency to litter in public areas needs to be addressed. Therefore, the remedies need to be funded by the government.

![Figure 1](image_url). Location of the survey sites on Libong Island, Thailand (modified from Google Maps and DMCR [40]).

In Thailand, the burden of tourist attractions stewardship is an increasingly local responsibility. The roles of local government organizations in managing natural resources and the environment are: (1) protection, rehabilitation, and maintenance of natural resources and the environment, (2) prevention and remediation of pollution, and (3) environmental monitoring and surveillance. As a result, some local government organizations responsible for famous natural attractions, such as Libong Island, have to bear the cost of taking care of tourists, natural resources, and the environment, as well as public facilities. However, the local administration has financial constraints, and a lack of funding for its management. Therefore, the entrance fee is a site-level financial mechanism that can be widely applied, and which has the potential to generate income from the high levels of tourism, in order to increase funding to support a zero-waste tourism management policy.

3.2. Survey Design

This study investigated tourists’ WTP entrance fees on Libong Island, in order to support marine litter management, using CVM. Before reaching the broader respondents, a pilot study of 153 samples was conducted in the study area in August 2020, to help create a feasible scenario, and to find a suitable starting price, set from an open-ended question. The respondents were questioned about the maximum amount they were willing to pay for each visit to the island. The respondents who were willing to pay had a price of between THB 20-100 per visit. To elicit WTP from respondents, formal questionnaires implemented the single-bound dichotomous CVM. This approach has advantages over other approaches, such as being more reliable than open-ended questions [25,46], being easier to use, and being more efficient than the double-bound dichotomous choice when the sample size is large and a pretest is conducted [47].

The formal survey used a structured questionnaire, divided into four main parts, as described below.

The first part warmed up with simple questions about the tourists’ socioeconomic characteristics: gender, age, education, and income.

The second part focused on tourists’ marine litter perception. There were seven items about the presence and impact of marine litter: “The beach is clean”, “The beach is crowded”, “Frequently encounter marine litter on the beach”, “Marine litter causing annoyance”, and “The problem of beach litter affects the decision to select tourist attrac-
tions”. In these items, respondents responded according to a Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). The rest of the items were “What type of litter do you encounter most?” and “Which do you think is the main origin of marine litter on this island?”, and the respondents were able to answer from the given options.

The third part asked tourists to self-assess their frequency of acting on ERBs, to reflect their responsibilities to the environment and ecosystems. There were ii items: “Learn about marine litter issue”, “Support government policy/legislation on marine litter”, “Donate money to support an environmental organization”, “Buy re-usable, rather than single-use disposable, non-biodegradable products”, “Properly dispose of litter in the trip”, “Volunteer in beach clean-up”, “Pick up litter at risk of becoming marine litter”, “Ask people to pick up their litter if you see them littering”, “Bring back self-generated litter”, “Reuse the shopping bags”, and “After a picnic, leave the place as clean as it was originally”. The respondents responded according to a Likert scale (1 = at no time, 2 = seldom, 3 = once in a while, 4 = constantly, 5 = all the time).

The fourth part investigated the WTP for tourists’ entrance fees. Before starting the question, the interviewers briefly explained the purpose of the research, the situation of the marine litter problem in the sea and coastal tourism areas, the rise and impact of marine litter, approaches to mitigate the problems, and introduced a valuation scenario. The statement was expressed as follows:

“Local authorities require tourists to pay an entrance fee to access Libong Island. The incomes from the entrance fee will be used to zero marine litter tourism development and support the marine litter abatement campaigns and essential infrastructures to make the destination is beautiful, clean, and sustainable”.

The respondents were then asked: “Are you willing to pay an entrance fee?” and “Are you willing to pay an entrance fee of ______ baht?”. The proposed bid price for this research was a set of dichotomous choices. To gather information to support the true WTP distribution, the starting bids were varied among individuals [47]. Therefore, the respondents were randomly asked a specific price of the nine entrance fees of THB 20, 30, 40, 50, 60, 70, 80, 90, and 100 (USD 0.64, 0.96, 1.28, 1.61, 1.93, 2.25, 2.57, 2.89, and 3.21). The sample for each entrance fee was distributed in a similar number. Each respondent was reminded to consider their current income and expenses in order to reveal the true value. For respondents who refused to pay an entrance fee, a reason for refusal was required.

The survey was conducted through face-to-face interviews, by two well-trained interviewers. The questionnaire was first created in English, and then made available in Thai. All respondents were Thai tourists who were 18 years old or older, and able to make financial decisions. The data were collected by convenience sampling at major destinations on the island, including Sai Kaew Beach, Leek Phai Bridge, Lang Khao Beach, Thung Ya Kha Beach, Stone Bridge, and Ban Phrao Pier (see Figure 1). The questionnaires were distributed during September and December 2020. There was a total of 1670 participants, and 1655 (99.10%) provided usable survey results.

3.3. Statistical Model

The logit model was chosen to estimate the parameters. It is appropriate when attempting to estimate dependent variables in a binary or dichotomous choice format [48]. For example, for a given entrance fee for marine litter management purposes, respondents responded either to accept (WTP = 1) or reject (WTP = 0) the proposed entrance fee. It is also a popular method for deciding on WTP situations in past studies [18,21,22,31,32,49]. This model has an established theoretical background, due to its robustness, ease of interpretation, and diagnostics [48]. The logistic cumulative probability distribution function was used to solve the problem. A logistic regression model is used to estimate according to Hanemann [50], as shown in Appendix A. The explanatory variables (see Table 1) are the predictors of the probability of accepting the proposed bid amount when asked about WTP.
Table 1. Explanatory variables included in the model.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description and Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>BID</td>
<td>Entrance fee amounts (THB 20, 30, 40, 50, 60, 70, 80, 90, 100).</td>
</tr>
<tr>
<td>GEN</td>
<td>Respondents’ gender (1 = male, 0 = female).</td>
</tr>
<tr>
<td>AGE</td>
<td>Respondents’ age.</td>
</tr>
<tr>
<td>EDU</td>
<td>Respondents’ level of education</td>
</tr>
<tr>
<td>INC</td>
<td>Respondents’ average monthly income.</td>
</tr>
<tr>
<td>MLP1</td>
<td>Respondents’ opinions on “The beach is clean” (1 = strongly disagree to 5 = strongly agree).</td>
</tr>
<tr>
<td>MLP2</td>
<td>Respondents’ opinions on “The beach is crowded” (1 = strongly disagree to 5 = strongly agree).</td>
</tr>
<tr>
<td>MLP3</td>
<td>Respondents’ opinions on “Frequently encounter marine litter on the beach” (1 = strongly disagree to 5 = strongly agree).</td>
</tr>
<tr>
<td>MLP4</td>
<td>Respondents’ opinions on “Marine litter causing annoyance” (1 = strongly disagree to 5 = strongly agree).</td>
</tr>
<tr>
<td>MLP5</td>
<td>Respondents’ opinions on “The problem of beach litter affects the decision to select tourist attractions” (1 = strongly disagree to 5 = strongly agree).</td>
</tr>
<tr>
<td>ERBs</td>
<td>Respondents’ frequency of overall ERBs performance (1 = at no time to 5 = all the time).</td>
</tr>
<tr>
<td>WTP</td>
<td>Binary dependent variable (1 = yes, 0 = no).</td>
</tr>
</tbody>
</table>

Therefore, the logistic regression model that is established to understand the quantitative relationship between WTP and the explanatory variables can be expressed as follows:

\[
\text{Probability (WTP)} = \beta_0 + \beta_1 \text{BID} + \beta_2 \text{GEN} + \beta_3 \text{AGE} + \beta_4 \text{EDU} + \beta_5 \text{INC} + \\
\beta_6 \text{MLP1} + \beta_7 \text{MLP2} + \beta_8 \text{MLP3} + \beta_9 \text{MLP4} + \beta_{10} \text{MLP5} + \beta_{11} \text{ERBs} + \epsilon
\]

where, \( \beta_0 \) is the constant, \( \beta_1 \ldots \beta_{11} \) are the coefficients, and \( \epsilon \) is the error terms. The mean and median WTP were estimated as the area under this probability function through the method proposed by Hanemann [51], and were estimated using Equations (A6) and (A7), respectively (shown in Appendix A). Additionally, total WTP was provided by mean WTP multiplied by population size. SPSS 17.0 (NCKU, Tainan, Taiwan) was used for parameter estimation.

4. Results

4.1. Respondents’ Socioeconomic Characteristics

Table 2 summarizes the socioeconomic characteristics of the 1655 respondents. There are more female (64%) respondents than male (36%), and they have an average age of 34 years. In terms of education, respondents are biased, and a total of 87% of respondents have achieved at least a bachelor’s degree. There are changes in the age composition and level of education of tourists in various tourist destinations. The findings may explain that Libong Island is more attractive to highly educated, young tourists. The complexity of getting to the island contributes to the younger and more educated demographic, similar to those of other studies in ecotourism, mountain tourism, and adventure tourism [22,49,52,53]. The respondents have an average monthly income of THB 13,300 (USD 427.10).

Table 2. Respondents’ socioeconomic characteristics (n = 1655).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0 (female)</td>
<td>1 (male)</td>
<td>0.36</td>
<td>0.48</td>
</tr>
<tr>
<td>Age (years)</td>
<td>18</td>
<td>60</td>
<td>34</td>
<td>8.60</td>
</tr>
<tr>
<td>Education</td>
<td>0 (below bachelor’s deg.)</td>
<td>1 (bachelor’s deg. or higher)</td>
<td>0.87</td>
<td>0.33</td>
</tr>
<tr>
<td>Income (THB)</td>
<td>2500</td>
<td>23,000</td>
<td>13,300</td>
<td>2455</td>
</tr>
</tbody>
</table>

4.2. Respondents’ Marine Litter Perception

The respondents’ self-assessment perception of marine litter in the study area shows that the majority of respondents agree that, for the most part, the beaches they visited
are clean (mean score 4.11). They indicate that marine litter is found infrequently on the beaches (mean score 2.01), and report that the beaches are crowded (mean score 4.02). However, they agree that litter strewn on the beaches is annoying (mean score 3.95), and its presence influences their tourist destination decisions (mean score 3.97) (Figure 2). This is consistent with beach surveys conducted in Turkey [26] and Greece, Bulgaria, and The Netherlands [2].

![Figure 2](image)

**Figure 2.** Response mean scores for marine litter perception in the study area (n = 1655). Note: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

In addition, when the respondents were asked to report on the most common types of marine litter they encounter during the trip, plastics (29%), glass (25%), and derelict fishing gears (24%) are mentioned in the top three, followed by cans (14%), foams (7%), and cigarette butts (1%) (Figure 3a). Regarding the main sources of marine litter in the study area, the respondents decide that most of the marine litter comes from land-based activities, including communities on the island (32%) and inland (17%), and beachgoers (25%), followed by sea-based activity such as fisheries (26%) (Figure 3b). A recent marine litter survey [54] in Libong Island reports that ceramic and glass litter was found in the greatest amounts, followed by plastics. For the plastic category, plastic bags account for most of the litter. Other possible sources also identified are shoreline and recreational activities, but these are not classified as sources of tourism litter coming from the island or being carried by in waves or offshore currents. Other sources are fishing and maritime activities. Therefore, when comparing the types and sources of marine litter from the survey of overall respondents’ opinion, their perception of marine litter is close to reality.

![Figure 3](image)

**Figure 3.** Response percentage for marine litter types (a) and main sources (b) in the study area.

4.3. **Respondents’ Environmentally Responsible Behavior**

For the frequency of performance for each ERB, the respondents self-assessed at a similar level, as shown in Figure 4. The mean scores are in the range of 2.41–2.57. The overall ERBs of most respondents are considered low.
4.3. Respondents’ Environmentally Responsible Behavior

For the frequency of performance for each ERB, the respondents self-assessed at a similar level, as shown in Figure 4. The mean scores are in the range of 2.41–2.57. The overall ERBs of most respondents are considered low.

4.4. Respondents’ WTP for Marine Litter-Free Coastal Attraction

4.4.1. Reasons for Non-Payment of the Entrance Fee

This section focuses on answering questions about WTP an entrance fee per visit as an alternative funding source, in order to improve the long-term quality of coastal and marine resources on Libong Island. A total of 76% (1258 out of 1655) of respondents provided answers about the nine proposed entrance fees in Table 3. The entrance fee amounts have an impact on overall tourist demand.

Table 3. Probabilities of respondents’ WTP for different entrance fee levels (n = 1655).

<table>
<thead>
<tr>
<th>Entrance Fee (THB)</th>
<th>Number of Respondents</th>
<th>Number of WTP</th>
<th>Probability of WTP (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>195</td>
<td>195</td>
<td>100.0</td>
</tr>
<tr>
<td>30</td>
<td>173</td>
<td>172</td>
<td>99.4</td>
</tr>
<tr>
<td>40</td>
<td>176</td>
<td>173</td>
<td>98.3</td>
</tr>
<tr>
<td>50</td>
<td>194</td>
<td>169</td>
<td>87.1</td>
</tr>
<tr>
<td>60</td>
<td>194</td>
<td>139</td>
<td>71.6</td>
</tr>
<tr>
<td>70</td>
<td>181</td>
<td>109</td>
<td>60.2</td>
</tr>
<tr>
<td>80</td>
<td>184</td>
<td>112</td>
<td>60.9</td>
</tr>
<tr>
<td>90</td>
<td>182</td>
<td>97</td>
<td>53.3</td>
</tr>
<tr>
<td>100</td>
<td>176</td>
<td>91</td>
<td>51.7</td>
</tr>
<tr>
<td>Total</td>
<td>1655</td>
<td>1257</td>
<td>76.0</td>
</tr>
</tbody>
</table>

The 24% (397 out of 1655) of respondents who refused to pay provided the reasons for non-payment, which are summarized in Table 4. The most common reason (65.6%) of respondents that refuse to participate in payments is that they believe they pay enough taxes. About 34.3% of them have financial constraints. Only 0.2% do not believe that their money would be used to improve the environment. The results show that some tourists are concerned about the fairness of access to natural attractions, as they are public goods, and the burden of restoring the environment, as they are already taxpayers in the system. In addition, some tourists are concerned that paying the fee will reduce their spending. At the same time, it shows that most tourists, even those who refuse to pay, recognize the pressure of marine litter on coastal and marine resources as a major threat to the ecosystem, and understand that it is imperative to manage the environment.

Some respondents who believe in non-payment (true zero) are classified as “protests”. The protests are separated from the representation of the population, as this could result in a significant bias in evaluating the true value of the entrance fee [22,23,49].
Table 4. Reasons for non-payment of the entrance fee.

<table>
<thead>
<tr>
<th>Reasons</th>
<th>n = 397</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I already pay enough through taxes</td>
<td>260</td>
<td>65.5</td>
</tr>
<tr>
<td>2. Financial constraints</td>
<td>136</td>
<td>34.3</td>
</tr>
<tr>
<td>3. Do not believe the money will be used for</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>environmental improvement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.4.2. Logit Model

The logit model was assessed using three models, according to the category of explanatory variables: socioeconomic characteristics, marine litter perception, and ERBs (Table 5), in order to better understand the determinants of the respondents’ WTP response. Respondents who declined to pay the entrance fee for each price in the survey were excluded from the model. The results of the statistical analysis of all three models show that bid amount is significantly negatively correlated ($p < 0.001$) with WTP. It displays that the respondents are more likely to pay an entrance fee if the bid amount is lower. The following are the effects of each model found in the study.

Table 5. Logit model results ($n = 1655$).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>S.E.</td>
<td>Coefficient</td>
</tr>
<tr>
<td>Constant</td>
<td>0.5923</td>
<td>0.4578</td>
<td>−1.7335</td>
</tr>
<tr>
<td>BID</td>
<td>−0.0543</td>
<td>0.0034 ***</td>
<td>−0.0547</td>
</tr>
<tr>
<td>GEN</td>
<td>−0.1385</td>
<td>0.1434</td>
<td>−0.1544</td>
</tr>
<tr>
<td>AGE</td>
<td>0.0771</td>
<td>0.0098 ***</td>
<td>0.0775</td>
</tr>
<tr>
<td>EDU</td>
<td>0.4546</td>
<td>0.2030 *</td>
<td>0.4390</td>
</tr>
<tr>
<td>INC</td>
<td>$10 \times 10^{-5}$</td>
<td>$3 \times 10^{-5}$ ***</td>
<td>$10 \times 10^{-5}$</td>
</tr>
<tr>
<td>MLP1</td>
<td>0.1719</td>
<td>0.0886</td>
<td>0.1727</td>
</tr>
<tr>
<td>MLP2</td>
<td>0.1606</td>
<td>0.0892</td>
<td>0.1370</td>
</tr>
<tr>
<td>MLP3</td>
<td>0.1940</td>
<td>0.0897 *</td>
<td>0.1885</td>
</tr>
<tr>
<td>MLP4</td>
<td>0.1515</td>
<td>0.0908</td>
<td>0.1879</td>
</tr>
<tr>
<td>MLP5</td>
<td>0.0123</td>
<td>0.0877</td>
<td>0.0608</td>
</tr>
<tr>
<td>ERBs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>−2 Log likelihood</td>
<td>1367.91</td>
<td>1351.92</td>
<td>1325.81</td>
</tr>
<tr>
<td>Chi-squared</td>
<td>458.01</td>
<td>474.00</td>
<td>500.11</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.000 ***</td>
<td>0.000 ***</td>
<td>0.000 ***</td>
</tr>
<tr>
<td>Pseudo R2</td>
<td>0.362</td>
<td>0.373</td>
<td>0.390</td>
</tr>
</tbody>
</table>

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Model 1 is comprised of four explanation variables of socioeconomic characteristics: gender, age, education, and the monthly income of tourists (Table 5). The results show that age and income determine the respondents’ WTP significantly, ($p < 0.001$) with a strong positive correlation. It shows that older and higher-income tourists are more likely to be willing to pay a fee for the improvement of Libong’s beaches, and to remove marine litter. Similarly, education has a positive and statistically significant coefficient ($p < 0.05$), suggesting that tourists with a bachelor’s degree and above are more likely to be willing to pay than those with an education below bachelor’s degree level. In contrast, gender does not have a significant influence on respondents’ WTP the entrance fees. This is important, showing that gender differences are less common in gender-equivalent societies.

Five items of marine litter perception are added to Model 2 (Table 5). All of them have a positive effect on WTP, particularly the frequency of encountering marine litter (MLP3), which has a significant positive impact ($p < 0.05$). Tourists on Libong Island enjoy recreational activities on the beaches around the island. They may, therefore, be more susceptible to marine litter accumulating on the beaches, which leads to their desire to
engage in more environmentally supportive behavior, and to them being more likely to be willing to pay the fee.

In Model 3, the average of all ERB items are combined with the previous explanation variables (Table 5), and show a significant negative effect on WTP \((p < 0.001)\). That is, tourists who believe they perform ERBs are unwilling to pay the fee. It seems that fee prices are a major barrier to encouraging the tourist to perform ERBs.

Additionally, there are differences between Model 2 and Model 3 regarding the presence of marine litter, which annoys tourists (MLP4) and influences the WTP of both models, but is particularly significant for the latter model. It reveals that marine litter pressures, however, affect tourists’ WTP to support the entrance fees for marine litter management.

The results of the statistical analysis are shown in Table 5. The chi-square test indicates that all logit models are statistically significant \((p < 0.001)\). The pseudo \(R^2\) value is used to assess goodness of fit, as it represents the proportion of variance in the criteria explained by the predictors [55]. The larger pseudo \(R^2\) indicates a better fit for the model. As shown in Table 5, the pseudo \(R^2\) values increase from the first to the third model, 0.362, 0.373, and 0.390, respectively, indicating that the model shows improvement.

4.4.3. Potential Benefits of Charging an Entrance Fee

The mean and median WTP to support the entrance fee for marine litter management in Libong island were calculated using logistic regression estimates based on Model 3 (see Table 5). The mean and median WTP are THB 92.24 and 92.12 per person per visit, respectively (approximately USD 3). The mean WTP is multiplied by the total number of tourists visiting the island in the last year (298,306 tourists in 2019) and used to calculate the economic value of tourists supporting marine litter management policies on the site. Therefore, the expected benefit of charging the tourist entrance fee in 2019 is THB 27,515,745 (USD 883,514.89).

In addition, the total number of tourists in the general situation in 2019 is also the basis for calculating the expected benefits from the different entrance fees for Libong Island, which are estimated as shown in Table 6. The WTP is responsive to the price. The probability of WTP decreases as the entrance fee increases. Despite the maximum entrance fee of THB 100 (USD 3.21), only half (51.75\%) of tourists are willing to pay, and this provides the highest expected income of THB 15,422,420 per year (USD 495,205.12). There is a lower expected income for the lower fees. Consequently, an entrance fee of THB 100 (USD 3.21) is the entrance fee recommended for Libong Island, in the case of the island managers needing the highest benefit, and controlling the number of visitors.

<table>
<thead>
<tr>
<th>Candidate Entrance Fee (THB)</th>
<th>Number of Respondents</th>
<th>Percentage of WTP (%)</th>
<th>Expected Tourists</th>
<th>Potential Benefits (THB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>195</td>
<td>100.0</td>
<td>298,306</td>
<td>5,966,120</td>
</tr>
<tr>
<td>30</td>
<td>173</td>
<td>99.4</td>
<td>296,516</td>
<td>8,895,485</td>
</tr>
<tr>
<td>40</td>
<td>176</td>
<td>98.3</td>
<td>293,235</td>
<td>11,729,392</td>
</tr>
<tr>
<td>50</td>
<td>194</td>
<td>87.1</td>
<td>259,825</td>
<td>12,991,226</td>
</tr>
<tr>
<td>60</td>
<td>194</td>
<td>71.6</td>
<td>213,587</td>
<td>12,815,226</td>
</tr>
<tr>
<td>70</td>
<td>181</td>
<td>60.2</td>
<td>179,580</td>
<td>12,570,615</td>
</tr>
<tr>
<td>80</td>
<td>184</td>
<td>60.9</td>
<td>181,668</td>
<td>14,533,468</td>
</tr>
<tr>
<td>90</td>
<td>182</td>
<td>53.3</td>
<td>158,997</td>
<td>14,309,739</td>
</tr>
<tr>
<td>100</td>
<td>176</td>
<td>51.7</td>
<td>154,224</td>
<td>15,422,420</td>
</tr>
</tbody>
</table>

5. Discussions

5.1. WTP and Its Determinants

A contingent value study of tourists’ WTP for Libong Island entrance fee found that the majority (76\%) of respondents were willing to pay various fees, in order to improve the quality of coastal attractions, and for them to be free of marine litter. The proportion of poss-
itive WTP responses is comparable to previous findings in protected areas in Ethiopia [49] and China [22], natural tourism areas in India [18], and WTP for other studies, such as improving air quality in China [23], and the construction of a bridge to the Curonian Spit protected area in Lithuania [28]. In the current study, most tourists are willing to pay an entrance fee to support local authorities in marine litter prevention and mitigation on the island for public benefit. Reasons for negative WTP indicate that tourists are financially concerned that paying fees will reduce their spending. At the same time, they fully believe that the funding will be used to improve coastal quality. It is different from the findings of Aseres and Sira [49], which report that respondents in protected areas in Ethiopia are suspicious that authorities and site administrators will transparently manage conservation funding, and the study of Guo, Wang, and Zhang [23], in which respondents decline to contribute to improving air quality because they believe governments and polluters should bear the burden.

The logit model is a good fit (Table 4). Therefore, the developed logit model is appropriate and can explain tourists' WTP. The final results show that six explanatory variables are statistically significant determinants of tourists’ WTP: bid amount, age, education, income, marine litter perception (i.e., frequency of encounter and annoyance), and ERBs.

The bid amount of the entrance fee demonstrates an impact that hinders the trend in tourist numbers. The probability of a tourist’s WTP the entrance fee decreases if the entrance fee increases, following the economic theory of demand law. Age has a strong positive effect on the WTP. It shows that older people are more likely to be willing to pay to provide economic support for marine waste management. This result is consistent with the previous study of Bhandari and Heshmati [18], but inconsistent with other studies [2,23,24,27,49]. Likewise, education shows a positive result and the most impact on WTP. Education has a positive effect on personal maturity and knowledge enhancement, which ultimately has an impact on positive thinking, and raise a person’s environmental awareness. The same results are apparent in previous studies [18,22,27,49]. The results for income are as expected; low-income tourists are more likely to decline to pay for environmental protection, and this correlation is confirmed in other studies [18,22,23,27,49]. However, gender has no significant effect on WTP. It points to a similar interest in the marine litter problem among women and men; it is possible that both male and female tourists intend to pay some of their income for improving beach quality for their leisure. Lucrezi and Digun-Aweto [3], and Choi and Lee [27], support the findings on gender. Contrary results are also reported [20,23,28,56].

When considering variables related to the marine litter situation in the study area, the frequency of, and annoyance caused by, beach litter are factors affecting WTP the entrance fee. It can be interpreted that the more tourists recognize the presence of marine litter, and the frustration of performing activities on dirty beaches, the more likely they are to support the fee. Studies by Lucrezi and Digun-Aweto [3], and Brouwer, Hadzhiyska, Ioakeimidis, and Ouderdorp [2], identify similar results. Cleanliness is the main feature of the beach. As noted in Beaumont, Aanesen, Austen, Borger, Clark, Cole, Hooper, Lindeque, Pascoe, and Wyles [11], and Birdir, Ünal, Birdir, and Williams [26], beach litter is not a desirable. Recreational coastal tourists may be exposed to marine litter more often, and this may affect quality of life. It is also often identified as a major reason why tourists spend less time in these environments, or completely avoid some beaches that are dirty due to marine litter [2]. The majority of respondents, therefore, support fees that are used to protect and improve the quality of attractions. However, the marine debris perception differentiates between those who are willing to pay, and those who are unwilling to pay the entrance fee.

Tourists’ ERBs were investigated in this study. It was found that there is a significant negative correlation with tourists’ WTP. That is, the more tourists engage in ERBs, the more likely it is that they are not willing to pay the entrance fee. The result is unexpected, and inconsistent with a study by Guo, Wang, and Zhang [23]. In general, tourists perform ERBs because they perceive the potential of natural resources and the environment, and the barriers of marine litter to marine and coastal ecosystems. However, the results of
this study suggest that once they perform a certain level of ERBs, they are no longer willing to contribute to improving beach quality. In the end, if all cooperate and behave positively towards the environment, there is no need to pay a fee to finance environmental improvements to ensure marine litter-free environments.

In this study, however, the overall mean score for the frequency of ERBs defined by respondents for the eight behaviors is $2.49 \pm 0.27$. In addition, 57% of respondents responded with an average below 3, which indicates that more than half of tourists are not showing enough environmentally beneficial behaviors. Therefore, destination managers should take action to encourage tourists’ participation in ERBs. Previous research [57] explains that some behaviors require more time and effort to perform, for example, ERBs such as donating money to environmental organizations, volunteering to join a beach clean-up, and bringing back home the self-generated litter. These actions require some effort, or sacrifice the tourist’s comfort, money, or time. Therefore, the ERBs of tourists are more effective when reducing the above effects. However, beach tourism has been identified as having a negative effect on the environment in some other parts of the world [2,5], where tourists admit to littering, while some are unaware of, or refuse to change, their behavior. Therefore, according to PPP, it is still necessary to charge tourists an entrance fee to ensure they take responsibility for generating and disposing of litter.

5.2. Implications

State administrations are willing to take part in parallel stewardship of marine litter, but insufficient costs hinder progress. Therefore, the entrance fee is used as an economic tool for the development of environmental policy, and as a financial mechanism for conservation. The recommendation in this paper is to charge entrance fees to coastal attractions that are specifically aimed at keeping tourist sites free of marine litter. In this regard, there are two significant points of interest related to the charging of entrance fees to tourists: “marine litter derived from anthropogenic activities” and “user pays”. First, all tourists are direct and indirect sources of marine litter, both intentionally and unintentionally, including improper disposal, inappropriate sorting, and illegal littering. However, the problem of beach marine litter is often caused by the increasing number of tourists [58], especially during the high season or holidays. Second, there is the user pays principle, which was started by the Organization for Economic Co-operation and Development (OECD) in 1972 [59]. This is the application of natural resource management requiring the users to be responsible for the degradation of that resource from their utilization of it. In addition, user pays policies are encouraged in view of equity; that is, the benefits will come to those who use recreational services [19]. Moreover, it is fair and reasonable for them to bear the cost of managing pollution. An explanation below provides an understanding of the perspective on entrance fee options.

The results of this study reveal that the majority of tourists on Libong Island (76%) are willing to participate in marine litter prevention and mitigation by financial subsidies through entrance fees. The mean WTP is for an entrance fee of THB 92.24 (USD 2.96) per person per visit. That is 10% of the average expenditure per person to the island (THB 1000, USD 32.11). Although the WTP is very low compared to other studies, which generally report USD 4-8 [19,20,22,30], it may be too high for local people, compared to national park entrance fees in Thailand (THB 40 per person per visit, USD 1.28). Additionally, this could result in a nearly 50% drop in tourist numbers. However, there are few marine and coastal areas where biodiversity (i.e., seagrass and dugongs) are as prominent and accessible as Libong Island. That increases the ability to charge relatively high fees. Witt [31] has proposed another important consideration in determining the optimal fee level, which is the current tourist number, and the site’s ability to manage the number of tourists. If a site is experiencing a level of visitation that could damage natural facilities or the environment, a high entrance fee has the added benefit of limiting the number of tourists.

The entrance fee is a site-level mechanism. At each site, tourists are divided into two categories, domestic and international. In developing countries, there is a large income
disparity between these two groups, thus requiring a fee difference, which is generally higher for foreign tourists. On the other hand, a fee difference is normal. Domestic tourists have paid the country a tax that includes conservation taxes, and foreign tourists from developed countries are generally willing and able to pay more for access to natural attractions. Charging an entrance fee has the potential to fund the attraction’s operations to stop the loss of biodiversity from recreational activities in the area, such as the impact of marine litter. As a result, tourism areas are more self-reliant and independent of the politics of national budget allocations. However, charging a fee is also a mechanism to facilitate or limit tourist access [30,49]. One point of view of Schuhmann, Skeete, Waite, Lorde, Bangwayo-Skeete, Oxenford, Gill, Moore, and Spencer [29], and Akbar, Puad Mat Som, and Ghani [32], is that an aversion to using pricing may be caused by fears of losing a market share to similar, or nearby, destinations that do not charge, or have lower fees. In addition, uncertain income depends on visitation rates, which can fluctuate seasonally. However, as expected, the total benefits increase as long as the number of tourists increases. The sufficiency of fee income gives site managers an incentive to keep natural resources in good condition, and provide attractive services to the public, improving the experience for tourists [32]. However, the existence of fees serve as a sign of a destination’s commitment to environmental stewardship [29].

Local governments are often the primary agencies responsible for managing natural tourism areas. There are several mechanisms for collecting the tourist entrance fee. Officers can charge directly to tourists, at the entrance gate (e.g., personnel issuing entrance passes, voluntary drop boxes), or previously at other service centers, such as tour operators that include the fee in the total cost of their tour packages. In addition, the fee collection can be set on multi-tiered pricing, such as discounted rates or waived fees for children and the elderly. This approach, besides increasing income to the destination, promotes social equality in a fairer way than single-tiered pricing [29]. Importantly, multi-tiered pricing may help reduce worries about the burden of paying fees for family tourists.

Marine litter in tourist attractions continues to increase as the number of tourists increases. Long-term solutions, besides alternative financing, include downstream marine litter management and expanding tourist responsibility. Considering the serious detrimental effects of marine litter on the marine ecosystem, the effectiveness of beach litter removal campaigns is an alternative to combating the litter. It greatly reduces marine litter along the coast [60]. Efforts to clean up beaches, coral reefs, and seagrass are important management actions for islands and coastal areas. Despite the high operating costs, it can be used as an opportunity to collect marine litter data, educate the public, and raise awareness among people about the marine litter issue in the marine and coastal environment. Iñiguez, et al. [61], Kim [57], and Panwanitdumrong and Chen [62] support the idea that educational programs and increasing awareness of environmental issues eventually leads to environmental behavior formation. In addition, reducing consumption from sources is one of the best strategies to reduce marine litter pollution. Therefore, site managers should focus on encouraging ERBs. A previous major study on Libong Island [62] provides recommendations for forming coastal tourists’ ERBs, including raising marine litter awareness, promoting marine litter abatement measures, and upgrading the quality of coastal attractions. These measures are to prevent litter before it enters the marine environment.

6. Conclusions

The entrance fee is a simple market mechanism that can catch a large amount of income from tourists. This is important because tourist fee income supports sustainable financing for environmental conservation and marine litter management efforts. In this study, the mean WTP of tourists is THB 92.24 (USD 2.96). As a result, Libong Island has an expected revenue, in 2019, of THB 27.5 million (USD 0.9 million), which is higher than the annual budget (about THB 5.8 million or USD 0.2 million) for marine litter-related policies in Trang areas. In addition, the information obtained can be used to help make budgeting decisions to support marine litter-free tourism management, develop tourism
plans, improve destination quality, and support necessary actions, including (1) removing marine litter from coastal ecosystems; (2) campaigns to reduce marine litter generating, by focusing on tourists and tour operators; (3) researching marine litter to obtain sufficient evidence to support appropriate management interventions; and (4) providing marine litter data according to the International Coastal Cleanup for future reference. For future studies, foreign tourists’ WTP should be studied, including environmental education, sanctions, and rewards, etc., to determine a reasonable and fair entrance fee.

According to previous and current studies, WTP is the most commonly used indicator for assessing the economic value of natural resources and the environment. The difference is WTP for this tourism fee supports sustainable financing for environmental conservation and marine litter management efforts. It reflects the cost of recreational services, pollution concerns, and the value of the resources tourists gain from their experiences at the site. The gathering of economic assessments and insights, derived from the determinants, contributes to providing important information and decision-making for good solutions for other tourist sites that also face budget constraints and issues with marine litter and other pollutants within the blue economic framework.

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Appendix A

The logistic regression model [50] used to estimate the probability of accepting the offered WTP bid can be expressed as follows:

\[
P_i = E(Y = 1|X_i) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_i)}}
\]

where \(P_i\) is the probability of accepting the price, \(X_i\) is a group of explanatory variables, \(\beta_0\) is a constant, and \(\beta_1\) is the coefficient of estimated parameters. In addition, \(P_i\) is between 0 and 1, and correlates in a nonlinear with the variable \(X_i\), thus, making it impossible to estimate parameters with the ordinary least square (OLS) method.

If \(P_i\) is the probability of accepting the entrance fee, then \(1 - P_i\) is the probability of rejecting it:

\[
1 - P_i = \frac{1}{1 + e^{(\beta_0 + \beta_1 X_i)}}
\]

The odds ratio is:

\[
\frac{P_i}{1 - P_i} = \frac{1 + e^{(\beta_0 + \beta_1 X_i)}}{1 + e^{-(\beta_0 + \beta_1 X_i)}} = e^{(\beta_0 + \beta_1 X_i)}
\]

The odds ratio is the ratio of the accepted probability to the price rejection; take the natural logarithm of the equation:

\[
L_4 = \ln \left( \frac{P_i}{1 - P_i} \right) = \beta_0 + \beta_1 X_i
\]
where $L_i$ is the log of odds ratio, it can be seen that the equation is linear to both the variable $X_i$ and the parameter $\beta$, therefore, Equation (A4) is called the logit model. To estimate the parameters, the maximum likelihood (ML) is used. The equation is estimated as:

$$L_i = \beta_0 + \beta_1 X_i + \epsilon_i, \quad i = 1, 2, \ldots, n \quad (A5)$$

where $L_i$ is the dependent variable, $X_i$ is the explanatory variable, and $\epsilon_i$ is the random error. The mean and median WTP are estimated as the area under this probability function through the method proposed by Hanemann [51]:

$$\text{Mean WTP} = 1/\beta_1 \times (\ln(1 + \exp(\beta_0 + \sum(\beta_n(Z_n)))))) \quad (A6)$$

$$\text{Median WTP} = (\beta_0 + \sum(\beta_n(Z_n)))/\beta_1 \quad (A7)$$

where $\beta_1$ is the coefficient of the entrance fee, $\beta_n$ is the vector of other coefficients, and $Z_n$ is the sample mean of the associated explanatory variables.

References


