CrossMark

RESEARCH ARTICLE

Who pays more to preserve a natural reserve, visitors or locals? A confidence analysis of a contingent valuation application

Dani Aoun

Abstract   Because of the current trend in nature degradation, protected areas are gaining importance. Ehden reserve in Lebanon is one such example, a reserve providing shelter to a substantial number of endangered species. This paper was designed to have three main objectives which are firstly to measure respondents' willingness to pay (WTP) to preserve the protected area, drawing a distinction between visitors and residents to ascertain whether there are any appreciable differences and why these might arise; Secondly, to identify the best ways to collect local funds; Thirdly, to investigate further studies and to inform decision makers about the importance of a long-term conservation and sustainable program. Using an open ended questionnaire, contingent valuation method is applied to obtain the WTP. The WTP is then tested by using a stepwise multiple regression model relating WTP to all socio demographic variables. Finally the problems of hypothetical bias are explored.

D. Aoun (✉)
Faculty of Business Studies and Economics, Arab Open University, Beirut, Lebanon
e-mail: daoun@aou.edu.lb

🙋 Springer

1 Introduction

Following the current trends in environmental degradation, some 46–58 million square miles of forest are lost each year[1], noting that forests cover 31 % only of the land area on our planet; therefore, the importance of preserving the environment for future generations has never been more vital than today. Lebanon is no exception. After 15 years of civil war (1975–1990), and a general absence of strict environmental laws, a country once 25 % green has now reached a 13.4 % threshold[2]. Lebanon has over the last few decades, seen its forests suffer from chaotic human activity marked by widespread disregard for the environment, such as overhunting, overcutting, and overgrazing. This has led to the ruin of the floral and faunal resources, a great imbalance in the productive system, as well as bringing some rare species of plants and animals to the verge of extinction.

Natural reserves or protected areas are one of the mostly used instruments to preserve the environment; they now cover more than 12 % of global land area (Chape et al. 2005) and are a critical environmental policy tool. These areas provide important environmental benefits including carbon sequestration, watershed protection, and wildlife habitat (Millennium Ecosystem Assessment 2005; IPCC 2007; International Union for the Conservation of Nature 2009). However, the global conservation community is increasingly concerned about the local socio-economic impacts of protected areas (Adams et al. 2004; Scherl et al. 2004; Agrawal and Redford 2006; Wilkie et al. 2006; Robalino 2007; Ferraro and Hanaeur 2011). By definition, protected areas will constrain resource use, and might reduce local incomes. However, protected areas might also create new income from eco-tourism; stimulate infrastructure improvement, or increase the flows of economically significant environmental services. Unfortunately, there is little empirical evidence on the socioeconomic impacts of protected areas in developing countries to inform this debate.

As a result, the research principally seeks to provide an economic valuation of a protected area in Lebanon estimating local residents' and visitors' willingness to pay (WTP), by using the contingent valuation method, one of the most appropriate tools for valuing non-market public goods, as is the case in hand. We also aim to determine whether there are any appreciable differences between the valuations declared by visitors and local residents (Fairweather and Swaffield 2002; Hess and Beharry-Borg 2012) and to assess the sensitivity of these findings to the subjects' various socioeconomic and behavioral characteristics. In addition to measuring the respondents' WTP, we aim also to evaluate the Lebanese population knowledge of the reserve and their valuation of the reserve's different attributes.

The findings to emerge from the research may prove useful in gaining an insight into visitors' demand and may provide guidelines for management issues such as pricing policy, capturing sponsorship or project evaluation. Finally, as an innovation, we explore hypothetical bias problems in contingent valuation exercises and correction thereof through a certainty analysis of stated preferences.

---

[1] Source: World Wildlife Organization (WWF), Online access: http://worldwildlife.org/

[2] Source: World Development Indicators (WDI). Online access: http://databank.worldbank.org/

The paper is structured as follows: this section is the introduction. Section 2 gives an overview of Ehden reserve, their value and attributes. Section 3 presents the method used while Sect. 4 covers the survey and respondents' profiles. Section 5 presents the results of the study and Sect. 6 concludes the paper.

2 Case study

LEB/95/G31/A/1G/99 Strengthening of National Capacity and Grassroots In-Situ Conservation for Sustainable Biodiversity Protection, commonly known as the Protected Areas Project, commenced on 15 November 1996 by establishing three demonstration protected areas in Barouk, Ehden and the Palm Islands. They were chosen because they met most of the following criteria:

- The areas represent different regions and/or ecosystems.
- They contain documented centers of endemism for plants and animals.
- They are important resting areas on the routes of migrating birds.
- They are government-owned with legislative-standing as protected areas.
- They are situated in well-defined and stable communities.
- They receive support from local NGOs, community and political leaders.
- They are accessible to visitors from urban areas.

The Protected Areas Project was financed by the Global Environment Facility (GEF) through the United Nations Development Program (UNDP) with the technical and administrative guidance of the World Conservation Union (IUCN) and under the execution of the Ministry of Environment in Lebanon.

The Project's overall development objective was to conserve endemic and endangered wildlife and their habitats, incorporate wildlife conservation as an integral part of sustainable human development, and strengthen the institutional capacity of government agencies and non-governmental organizations.

For this research, we chose to study one of the three protected areas, Ehden Reserve, mainly because of easier access to data sources, and due to a lack of resources, studying all three reserves turned to be very costly. Moreover, as Sect. 2.1 shows, the reserve has a unique environmental value reflected by the high number of globally threatened, rare and endemic species found on the reserve.

2.1 Ehden reserve

Ehden Reserve represents a mountainous ecosystem of the northern Mount Lebanon chain (1,300–1,950 m) and located 3.5 km from the summer resort of Ehden, 35 Kilometers from the city of Tripoli and 100 km from the capital Beirut. The area of the reserve, owned by the municipality of Ehden, is about 1000 ha of public land; whereas, the forested core of the protected reserve covers little more than 450 ha. Ehden forest is a unique assemblage of conifers, deciduous and evergreen broadleaf trees in an isolated phyto-climatic region with a highly varied topography (Fig. 1).
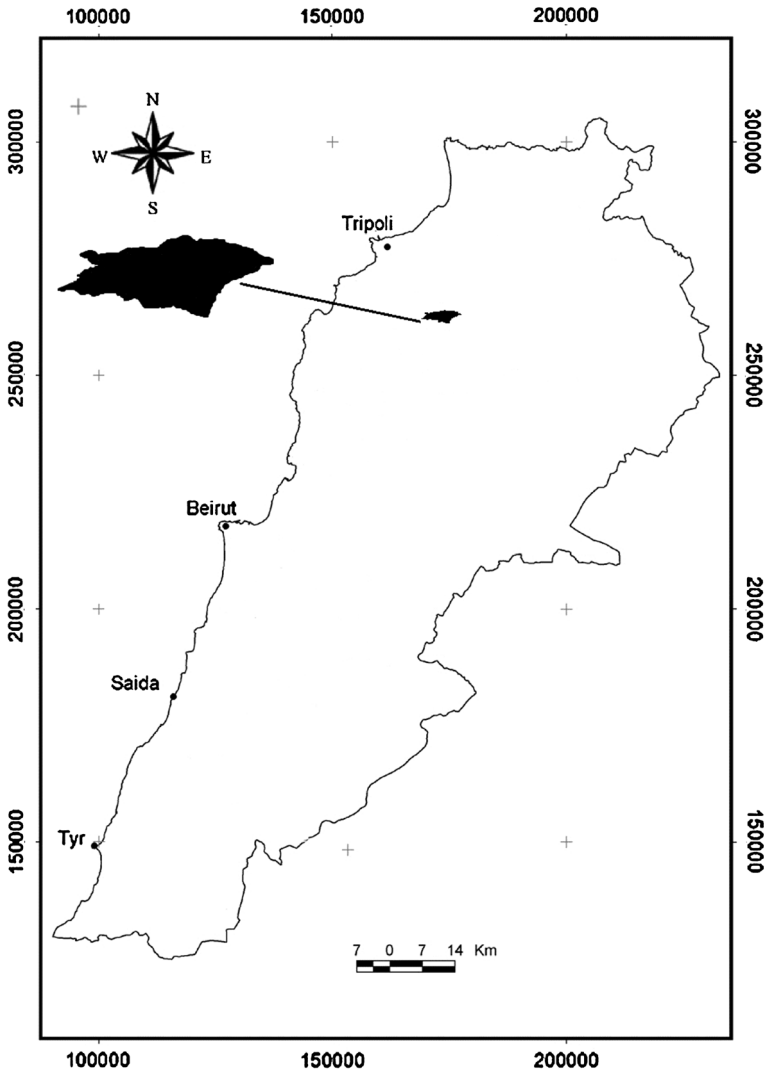
Fig. 1 Geographic location of Horsh Ehden Nature Reserve in Lebanon. Source: (Municipality of Ehden 2011)

The National Council for Scientific Research (NCSR) on behalf of the Protected Areas Project conducted an inventory and survey work on plants, mammals, birds, amphibians, and reptiles of the Ehden reserve. The results are shown in Table 1.

Moreover, the main forest communities are the Cedrus libani forest community which represents about 20 % of the remaining cedar forests in Lebanon and is thus significant at the national level. This significance is increased by the ecological integrity of the community, its high biodiversity, range of age classes and inter-relationship with other forest communities. The Abies cilicica forest community,

Table 1 The National Council for Scientific Research (NCSR) Inventory Results

	Number of species	Percentage
Plants	487	
Nationally and globally threatened species	21	4.31
Rare species	8	1.64
Lebanese endemic species	56	11.50
Mammals	26	
Nationally rare species	6	23.08
Globally threatened species	11	42.31
Birds	148	
Nationally threatened or declining	55	37.16
Globally threatened species	4	2.70
Regionally threatened or declining	9	6.08
Amphibians and reptiles	23	
Globally threatened species	1	4.35
Regionally threatened or declining	19	82.61

Source: MoE/LU/UNDP 2004

considered to be the natural southern limit of the species. The Juniperus excelsa forest community is considered to be a resource and a gene pool for possible reforestation projects at higher altitudes. It is considered nationally significant as a gene stock for the reforestation of the high peaks of Mount Lebanon, above 2,000 m. And last but not least, the malus trilobata forest community, Ehden reserve is the only protected area in Lebanon containing the last remaining forest community of the endemic apple of Lebanon.

3 Contingent valuation method (CVM)

When market data are missing, economists usually use substitute estimation methods centered on hypothetical market conditions. One of the mostly used approaches is the contingent valuation method (CVM) which is favored by researchers because of its applicability to a variety of environmental goods and its capacity to assess existence value as well as user value (Mitchell and Carson 1989; Arrow et al. 1993; Carson and Hanemann 2005). Moreover, most studies that have compared the contingent valuation to the conjoint analysis approach, which is another widely used approach within the family of stated preferences approaches, found that WTP estimates derived from contingent valuation studies are significantly larger than those obtained from the CVM. For instance, Stevens et al. (1999) concluded that conjoint model results often produce WTP estimates that are biased upwards compared to CVM.

CVM has been used in a variety of environmental studies such as, measuring societies willingness to pay (WTP) for water (Memon and Matsuoka 2002; Polyzou et al. 2011) and air (Vassanadumrongdee et al. 2004; Dziegielewska and

Mendelsohn 2005; Wang and Zhang 2009; Du and Mendelsohn 2011) quality improvement, for restoring cultural heritage (Ulibarri and Ulibarri, 2010; Báez and Herrero 2011), and for Modeling the effect of social factors on improving biodiversity protection (Halkos and Jones 2012; Lindhjem and Tuan 2012), just to cite a few. The WTP is solicited from respondents, by way of a questionnaire, asking them to reveal their WTP for some policy initiative; this could be done by using simple open questions (Davis 1963), or more complex bidding games (Hanemann et al. 1991; Markandya and Murty 2004; Carraro et al. 2007).

The WTP denotes a sum of money a respondent would be willing to pay to improve the welfare of the good or prevent the loss thereof. To obtain this value, we make use of the following utility function:

$$U = U(p, y, z), \tag{1}$$

where U stands for utility, reflecting a respondent's degree of welfare, bearing in mind individual budgetary restrictions; p, the price of the environmental good; y, the respondent's level of income; and z, the quantity or quality of the studied good. Now assuming that the respondent is presented with the opportunity of changing the environmental good from a z^0 state to a z^1 state, conditional to z^1 being an improvement to the z^0 state ($z^1 > z^0$), and that $U(p,y,z^1) \geq U(p,y,z^0)$, therefore, using Hanemann and Kanninen's (1999) compensating variation of welfare measure, the maximum WTP that would adjust z^0 to z^1 would be an amount α displayed by:

$$U\left(p, y - \propto, z^1\right) = U\left(p, y, z^0\right) \tag{2}$$

Despite its wide applicability, the procedure has been heavily criticized by researchers doubting its ability to accurately assess a public good's true economic value mainly due to the problems of insensitivity when dealing with the nature and range of goods being evaluated, temporal instability of valuations or biases within the valuation method itself (Diamond and Hausman 1994). Most critics, however, have defended the underlying usefulness of the method, and have pushed for a more cautious approach to the elicitation of WTP estimates (Ajzen 1996). To have a more accurate and realistic WTP, we made every effort to build our survey following the recommendations listed in the "Report of the NOAA Panel on Contingent Valuation" (Arrow et al. 1993) and the latest guidelines for conducting CV analyses (Whitehead 2006). Moreover, we develop an ex post solution consisting of asking a follow-up question intended at reflecting the extent of confidence with which respondents chose their valuation. This approach has been used by Champ and Bishop (2001), Poe et al. (2002), Bedate et al. (2009), and Herrero et al. (2011). Confidence scales range from 1 to 10, although the difficulty, which has yet to be resolved, is determining the optimal point on the scale since our aim is to determine which respondents are most certain of their answers. The next step involves eliminating statements, which fail to offer enough assurance of credibility applying the certainty scale and following the criteria of the researcher. The first alternative allows us to retain all respondents who have accepted the valuation exercise, while penalizing answers with a low level of confidence. By contrast, the second option,

which possibly will cause a loss in sample size, offers better dependability by removing respondents with a low level of confidence. This is the option we decided to use in our study.

4 Survey questionnaire

The questionnaire was built using open ended questions for they allow respondents to use their own words while avoiding forced answers. Moreover, open ended questions are known to provide more richness or depth in the data collected and might help us identify possible responses options for further quantitative research.

The survey was conducted personally by a small group of previously trained interviewers during the summer of 2011 (June through August), following a pre-testing round on 40 individuals. Changes were made to several questions, making them easier to understand.

The target population for the survey was Ehden residents and visitors aged 18 and above. A total of 643 respondents were interviewed, some, while visiting the reserve others, in restaurants, coffee shops and houses around Ehden, the village. After filtering for an affirmative readiness to participate in the survey, a total of 578 valid responses were collected. Out of which 302 were Ehden residents, and 276 were visiting the region. It is worth noting that the estimated number of Ehden residents during the summer season (June–September) is around 25,000 based on information from the municipality of Zgharta-Ehden and the average number of visitors to the reserve during any 1 year ranges between 8,000 and 9,000.

Interview material included a brochure in full-color, informing the respondent about the protected area, including a description of the valuable flora and fauna and the management problems that the protected area currently faces (most Ehden residents were well informed and did not need additional info about the reserve).

The first section of the interview dealt with general type questions aimed at evaluating the respondent's willingness to participate, and to categorize her/him among the two previously mentioned categories (visitor or resident, means of transport, if lodging or just passing by, loves nature or not, number of nature-related activities per year, etc.). It should be noted that recent literature in choice modeling has argued that attitudes can not be measured. For instance, in such literature the Love of Nature variable will not be measured directly but through a manifestation of that attitude, known as indicator. They argue that answers to attitudinal questions can not be used as explanatory variables as this creates endogeneity bias and possible issues with measurement error (Ben-Akiva et al. 2002). Although we acknowledge such research, yet several studies have been using attitude questions as explanatory variables (Cawley 2008; Abdullaha and Jeanty 2011); therefore, following such studies we used the Love of Nature as an explanatory variable.

The second section measured the respondent's interest in visiting and protecting the reserve, and an estimation of her/his yearly WTP, noting that it was clearly explained to each respondent that their WTP is a yearly contribution and will be used to manage the reserve and for the conservation of its biodiversity. Lebanese residents were also asked of their preferable method of payment which will give

policy makers a better picture of what is acceptable and more efficient, voluntary contributions or government regulations and enforcement.

The third section was dedicated to obtain information about the respondent's social, economic and demographic characteristics (age, gender, occupation, education level, residential area and income level).

4.1 Respondent profile

The sample was evenly divided between males (47.1 %) and females (52.9 %) with 52.2 % being residents of Ehden. 73.5 % hold a university degree or higher (Masters or a PhD) and around half of the sample (45.8 %) earn less than 1000 USD per month, while only 8.5 % earn more than 5000 USD. What is interesting to our case is the actual number of respondents who actually heard of the reserve, the survey showed that 87.9 % of respondents know about the reserve out of which 67.5 % have already visited the reserve at least once.

Since the aim of the research is to test for differences between local residents and visitors, it would be useful to compare the two categories' profiles. Table 2 shows the socioeconomic characterization of the two groups, Ehden residents and visitors. The means are very similar in all aspects except for the number of nature-related activities, knowledge of the reserve and number of visits to the reserve. The results show that all Ehden residents, at least those sampled, have heard of the reserve, and most of them have already visited the area at least once; it also shows a big difference in the number of nature-related activities undertaken by each category. Moreover, the visitors' WTP is 3.39 USD higher than Ehden residents, which might be attributed to the fact that Ehden residents feel that the reserve is part of their heritage and should be able to enjoy it without having to pay.

It should be noted that respondents' with a zero WTP amounted to 14.88 % of the total sample, when asked about the reason for not paying, 47.7 % agreed that it is the government responsibility to sustain the reserve; 40.7 % because they can not

Table 2 Descriptive analysis of the characterization variables

	Residents		Visitors	
	Mean	Std. deviation	Mean	Std. deviation
Age	39.897	11.638	37.638	12.690
Gender	0.460	0.499	0.482	0.501
Education	4.318	0.950	4.141	1.085
Monthly household income	2.778	1.302	2.417	1.390
Love of nature	1.980	1.037	1.736	1.012
No. of nature related-activities[a]	0.937	0.243	0.754	0.432
Knowledge of Ehden reserve	12.093	7.187	8.457	7.631
Have you visited the reserve	1.000	0.000	0.746	0.436
No. of visits[a]	0.907	0.291	0.335	0.473
WTP	33.44	29.904	36.83	44.100

[a] Yearly

afford to pay; 5.8 % gave no explanation for not paying. Moreover, by looking at the residents and visitors, the difference in the number of zero responses becomes more apparent, since only 22.1 % of those are Ehden residents. Although residents showed a lower WTP compared to visitors, their willingness to participate is higher (less zero responses) which could be interpreted that residents do value their reserve and most of them are willing to pay but on average their payments are lower than visitors, probably due to the fact that the probability of actually having to pay is higher for residents than someone just passing by. In a way, the hypothetical bias is lower for residents than visitors.

5 Results

Data analysis relied on the modeling of the WTP as a dependant variable with the considered socioeconomic variables for the entire population. The model is set up as follows:

WTP	F{AGE, GEND, RESI, EDUC, OCCU, HSIZ, INCO, LNAT, VISI}
WTP	Willingness to pay per year (In USD)
AGE	Age of respondent (age of respondent)
GEND	Gender (male = 1, female = 0)
RESI	Resident of Ehden or not (yes = 1, no = 0)
EDUC	Level of Education (no education = 0, elementary = 1, intermediate = 2, secondary = 3, university = 4, postgraduate = 5, technical = 6; 6 dummy coded variables were created out of the 7)
OCCU	Occupation (unemployed = 0, self-employed = 1, employed = 2, low-management = 3, mid-management = 4, high-management = 5; 5 dummy coded variables were created out of the 6)
HSIZ	Household Size (number of persons per household)
INCO	Household Income (<$1000 = 1, $1000–$2500 = 2, $2500–5000 = 3, $5000–$7000 = 4, >$7000 = 5)
LNAT	Love of nature (yes = 1, no = 0)
VISI	Whether respondent visited the reserve before (yes = 1, no = 0)

A dummy variable was created to account for interaction effects between the variables using the residence of the respondent. Using a stepwise multiple regression model, the collective impact of the independent variables on the dependent variable WTP was tested. Table 3 shows the regression results of the sample per category. INCO and LNAT proved to have a positive significant effect on WTP for the three categories while all other variables were dropped by the model.

Table 3 Regression results

Variable	Entire sample		Residents		Visitors	
	Estimate	T value	Estimate	T value	Estimate	T value
Constant		−7.226[a]		−4.726[a]		−8.462[a]
Household income (INCO)	0.559	17.926[a]	0.469	9.493[a]	0.676	17.233[a]
Love of nature (LNAT)	0.337	10.538[a]	0.340	6.885[a]	0.246	6.266[a]
Resident of Ehden (RESI)	−0.198	−6.204[a]		–		–
Root mean square error		27.586		25.326		27.461
Adjusted-R^2		0.455		0.283		0.612

All other variables failed to contribute to the WTP's variance and were dropped by the model

[a] Significant at the less than 1 % level of significance

5.1 Segmentation analysis

Table 4 presents a segmentation analysis in relation to a set of characterization variables based on the regression results. The results clearly show that WTP is driven by age, household size, monthly income, love of nature, fidelity as measured by the number of nature-related activities per year, and knowledge of the reserve. These findings should be of no surprise since income is usually positively correlated with WTP and age and household size are positively correlated with income. As for the other three variables, it is quite expected for a nature lover to do more nature-related activities than anyone else and probably know about the different nature reserves in the country, it would also be expected of them to contribute to preserve nature. We were expecting WTP to be higher for university holders compared to non-university, which is the case for visitors but not for residents; this anomaly could be the result of a low sample of non-university residents since they account for only 22.5 %, while residents holding a university degree account for 77.5 %. Thus, a low sample with a few outliers could push the mean away from the expected average. The results also show that in all the chosen criteria, except for the young at age, the non-university and low income respondents, the valuations allocated by tourists are higher than those allocated by locals. This is probably due to several reasons, one of them might be the hypothetical bias mentioned earlier. We posit that residents will take the questionnaire more seriously than visitors, due to the fact that implementing a participation program whereby respondents will have to pay to preserve the area is more feasible if implemented within the boundaries of Ehden, while assuming a nation scale program is less effective due to the fact that little faith is put in governmental institutions as shown from the number of respondents choosing governmental tax as a payment mechanism (Table 7); this low percentage is also confirmed by Sattout et al. (2007). Another reason might be that residents of Ehden believe that the reserve is part of their heritage and should have free access to enjoy it without having to pay. Looking at the purpose for visiting the reserve, the results reveal that respondents have a more generalist view of the reserve; they value the area as a whole with little concern for specific elements such as birds, animals or endangered species. This is an important point to consider by

Table 4 WTP results. Socioeconomic and behavioral segmentation

Variable	Value	Residents		Visitors	
		WTP	N	WTP	N
Gender	Female	34.11	163	34.93	143
	Male	32.66	139	38.88	133
Age	Young	23.30	53	19.72	86
	Middle-aged	34.42	181	42.32	142
	Elderly	38.75	68	51.25	48
Education	Non-university	36.03	68	23.41	85
	University	32.69	234	42.81	191
Household size	Small	25.47	32	30.53	19
	Medium	34.49	205	36.19	161
	Large	34.08	65	39.17	96
Monthly Income	Low	23.35	115	18.51	150
	Middle	34.27	157	43.55	107
	High	67.83	30	143.68	19
Love for nature	No	2.37	19	2.72	68
	Yes	35.53	283	47.99	208
Fidelity[a]	Low	19.68	47	18.14	102
	Medium	34.70	82	43.66	71
	High	36.59	173	50.64	103
Knowledge of reserve	No	–	–	33.21	70
	Yes	33.44	302	38.06	206
Purpose of visit	Enjoy nature	39.90	100	50.67	159
	Watch birds	29.80	50	–	–
	See animals	30.00	7	0.00	1
	See endangered species	31.62	34	75.00	4
	Hike	34.55	78	13.75	4
	Recreational	35.88	17	62.50	4
Payment method	Governmental tax	–	–	55.00	9
	Municipal tax	38.68	72	–	–
	Donation to NGO	31.97	147	49.73	125
	Entrance fee	38.24	68	46.55	74

[a] Fidelity is measured by the number of nature-related activities per year

management, we believe that a more educated population would be more willing to pay for the preservation of the reserve, once they know the importance of the different fauna and flora available. This conclusion is accentuated by the high number of respondents who believe that endangered species is a highly important attribute (Table 6). We believe management should seriously consider regular educational campaigns at schools and universities.

Table 5 Estimations of WTP in terms of confidence levels

Certainty	Residents		Visitors	
	WTP	N	WTP	N
1 or more	33.44	302	36.97	275
2 or more	32.88	278	36.38	258
3 or more	31.97	254	35.56	242
4 or more	31.34	228	34.16	232
5 or more	30.24	209	33.01	208
6 or more	27.51	173	33.97	164
7 or more	26.71	137	33.31	124
8 or more	26.70	100	33.02	82
9 or more	26.23	56	32.54	28
10	25.92	22	31.73	15

5.2 Confidence analysis

As previously mentioned in the methodology, we decided to include a certainty question in the survey so as to assess on a scale of 1–10 the level of confidence with which respondents confirmed their payments. To determine whether hypothetical bias was present, sub-samples were created based on the original data, grouping together all respondents who stated a confidence greater than or equal to one, two and so on. Should there have been no hypothetical bias, WTP estimations for each of these sub-samples would likely have been very similar. However, in our case, the groups were increasingly becoming smaller as the levels of confidence increased, both for visitors and residents. Indeed, Table 5 shows respondents' valuation pattern for the various degrees of confidence, excluding at each consecutive level of confidence respondents who are unsure. Noting that, we assume that those declaring a null WTP are respondents who are certain of their zero valuation, whereas those expressing a positive WTP are not always sure (Champ and Bishop 2001). It is thus understandable that mean WTPs are gradually decreasing as the confidence scale rises. Basing on that, we again note how visitors express a higher valuation of the reserve than do residents of Ehden.

The findings may prove to be useful once an actual participation program is to be considered; the previous mean WTPs, 33.44 and 36.83 for residents and visitors, respectively, should be scaled down to probably 27.51 for residents and 33.97 for visitors based on a confidence level of 6 or more, which we believe is an acceptable level of confidence. Moreover, we decided to add an additional test to validate the measured WTP, by comparing it to the electricity bill paid by citizens. On average, the monthly electricity bill is around $75 which we believe makes the measured WTP quite reasonable and acceptable.

Table 6 Importance of the different attributes (Percentage of respondents)

Reason	Highly important	Important	Slightly important	Not important
Biodiversity	70.60	15.40	10.60	3.40
Landscape	79.20	15.60	2.80	2.40
Recreational	48.70	33.50	12.50	5.30
Endangered Species	88.50	9.50	1.20	0.80
Wood products	5.30	6.80	20.20	67.70
Other products	38.60	15.80	10.20	35.40

Table 7 Respondents' replies on the preferable payment method to conserve the area

Payment method	Percentage of respondents
Annual governmental taxes	1.56
Fixed annual amount (Municipal)	12.46
Donation to NGO	47.06
Entrance fee	24.57

5.3 Respondents valuation of the reserve

In addition to measuring the respondents' WTP, the aim of this study was to evaluate the Lebanese population knowledge of the reserve and their valuation of the reserve's different attributes. As previously mentioned, all of Ehden residents have heard of the reserve compared to 74.6 % of visitors, which is an acceptable percentage although is not enough to generalize over the Lebanese population due to the small sample (approximately 0.01 %) and due to the fact that the survey was conducted only in Ehden; for more reliable, results we suggest conducting a larger survey in different cities and villages around Lebanon. When asked to rate the different attributes of the reserve on a scale of 1– from not important to highly important, endangered species seems to be mostly important for respondents (88.50 %) followed by landscape value (esthetic) with 79.20 % and biodiversity 70.60 % while wood products were rated not important by 67.70 % (Table 6). It is interesting to know that most of the respondents actually value biodiversity especially when they knew that the reserve contains endangered species. This could also be used as a selling point when implementing a conservation program.

5.4 Payment method

The results of Table 7 might be especially useful to policy makers, as they can be interpreted from two angles. On the one hand, the results clearly show how little confidence the Lebanese citizens have in their governmental institutions as only 1.56 % chose the annual government tax, while most of the respondents chose donation to NGO (47.06 %) and entrance fee (24.57 %). On the other hand, the results could also be interpreted as an escape from an actual mandatory payment scheme, since governmental tax or fixed municipal payment might have a more

mandatory feel to it with the actual implementation of such a payment scheme meaning that people will actually have to pay a yearly sum, while donation to NGO is just a donation; respondents can always refrain from donating and the entrance fee is related to actual usage of the reserve.

6 Conclusion

The aim of this study was to measure respondents' willingness to pay to preserve a protected area, specifically Ehden reserve, drawing a distinction between visitors and residents to ascertain whether there are any appreciable differences and why these might arise. In this sense, the findings evidence that visitors always display a significantly higher WTP than residents, even when considering the confidence level of the respondents. This might be explained by a higher hypothetical bias on the part of the visitors, or because of a sense of ownership on the part of Ehden residents, as already discussed in Sect. 5.1.

   The results also reveal that although all sampled residents and most of the visitors have heard of the reserve, their knowledge and valuation of its different attributes is still lacking. This is an important point for policy makers to consider, any attempt to include the general public in a sustainability program should be preceded by intensive educational campaigns, since we believe higher payments can be solicited from contributors once they understand the importance of the different attributes, such as endangered species.

   Another relevant finding for policy makers is the respondents' preferred method of payment, the results clearly reveal how little confidence respondents have in their governmental institutions; thus before implementing any program, the concerned party has to find a way to establish a transparent payment system with proper accountability processes.

   Finally, this study is a step towards understanding the value of such reserves to the Lebanese population; more in depth research is recommended. This would mean conducting a survey covering a bigger sample and a wider area than the one at hand. It would also be useful to study the possibility of actually implementing a sustainability program using a Cost Benefit Analysis approach and calculating the minimum WTP needed to sustain the reserve. In general, this study was able to reveal an actual concern for nature, building on that, policy makers can establish proper action plans to implement preservation programs.

References

Abdullaha S, Jeanty W (2011) Willingness to pay for renewable energy: evidence from a contingent valuation survey in Kenya. Renew Sustain Energy Rev 15(2011):2974–2983

Adams WM, Aveling R, Brockington D, Dickson B, Elliott J, Hutton J, Roe D, Vira B, Wolmer W (2004) Biodiversity conservation and the eradication of poverty. Science 306:1146–1149

Agrawal A, Redford K (2006) Poverty, development, and biodiversity conservation: shooting in the dark?. Wildlife Conservation Society, New York

Ajzen I, Brown TC, Rosenthal LH (1996) Information bias in contingent valuation: effects of personal relevance, quality of information, and motivational orientation. J Environ Econ Manag 30:43–57

Arrow K, Solow R, Portney PR, Leamer EL, Radner R, Schuman H (1993) Contingent valuation methodology report (Report of the NOAA Panel on Contingent Valuation). Fed Regist 58:4602–4614

Báez A, Herrero LC (2011) Using contingent valuation and cost-benefit analysis to design a policy for restoring cultural heritage. J Cultural Herit 13(3):235–245

Bedate AM, Herrero LC, Sanz JA (2009) Economic valuation of a contemporary art museum: correction of hypothetical bias using a certainty question. J Cultural Econ 33(3):185–199

Ben-Akiva M, McFadden D, Train K, Walker J, Bhat C, Bierlaire M, Bolduc D, Boersch-Supan A, Brownstone D, Bunch DS, Daly A, de Palma A, Gopinath D, Karlstrom A, Munizaga MA (2002) Hybrid choice models: progress and challenges. Mark Lett 13(3):163–175

Carraro C, Marchiori C, Sgobbi A (2007) Negotiating on water: insights from non-cooperative bargaining theory. Environ Dev Econ 12(2):329–349

Carson RT, Hanemann WM (2005) Contingent valuation. In: Mäler KG, Vincent JR (eds) Handbook of environmental economics. Valuing environmental changes, vol 2. Elsevier, Amsterdam, pp 821–936

Cawley J (2008) Contingent valuation analysis of willingness to pay to reduce childhood obesity. Econ Hum Biol 6:281–292

Champ PA, Bishop RC (2001) Donation payment mechanisms and contingent valuation: an empirical study of hypothetical bias. Environ Resour Econ 19(4):383–402

Chape SJ, Harrison M, Spalding M, Lysenko I (2005) Measuring the extent and effectiveness of protected areas as an indicator for meeting global biodiversity targets. Philos Trans R Soc Ser B 360:443–455

Davis RK (1963) The value of outdoor recreation: an economic study of the Maine Woods. Ph.D. Dissertation, Harvard University

Diamond PA, Hausman JA (1994) Contingent valuation: is some number better than no number? J Econ Perspect 8(4):45–64

Du X, Mendelsohn RO (2011) Estimating the value of the reduction in air pollution during the Beijing Olympics. Environ Dev Econ 16(6):735–749

Dziegielewska DAP, Mendelsohn R (2005) Valuing air quality in poland. Environ Resour Econ 30(2):131–163

Fairweather JR, Swaffield SR (2002) Visitors and locals experiences of Rotorua, New Zealand: an interpretative study using photographs of landscapes and Q method. Int J Tour Res 4:283–297

Ferraro PJ, Hanauer MM (2011) Protecting ecosystems and alleviating poverty with parks and reserves: 'Win-Win' or tradeoffs? Environ Resour Econ 48(2):269–286

Halkos GE, Jones N (2012) Modeling the effect of social factors on improving biodiversity protection. Ecol Econ 78:90–99

Hanemann WM, Kanninen B (1999) The statistical analysis of discrete-response CV data. In: Willis KG, Bateman IJ (eds) Valuing environmental preferences. theory and practice of the contingent valuation in the US, EU and developing countries. Oxford University Press, New York, pp 302–441

Hanemann W, Loomis J, Kaninnen B (1991) Statistical efficiency of double-bounded dichotomous choice contingent valuation. Am J Agric Econ 73:1255–1263

Herrero LC, Sanz JA, Bedate A, Barrio MJD (2011) Who pays more for a cultural festival, tourists or locals? A certainty analysis of a contingent valuation application. Int J Tour Res 14(5):409–512

Hess S, Beharry-Borg N (2012) Accounting for latent attitudes in willingness-to-pay studies: the case of coastal water quality improvements in tobago. Environ Res Econ 52(1):109–131

IPCC (2007) Summary for policymakers. In: Solomon S, Qin D, Manning M, Chen Z, Marquis M, Averyt KB, Tignor M, Miller HL (eds) Climate change 2007: the physical science basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge

International Union for the Conservation of Nature (IUCN) (2009) Reducing emissions from deforestation and forest degradation (REDD) in developing countries, Position paper for UNFCCC Climate Change Talks at Bonn

Lindhjem H, Tuan TH (2012) Valuation of species and nature conservation in Asia and Oceania: a meta-analysis. Environ Econ Policy Stud 14(1):1–22

Markandya A, Murty MN (2004) Cost-Benefit analysis of cleaning the Ganges: some emerging environment and development issues. Environ Dev Econ 9(1):61–81

Memon MA, Matsuoka S (2002) Validity of contingent valuation estimates from developing countries: scope sensitivity analysis. Environ Econ Policy Stud 5:39–62

Millennium Ecosystem Assessment (2005) Ecosystems and human well-being: policy responses: findings of the Responses Working Group of the Millennium Ecosystem Assessment. Island Press, Washington, DC

Ministry of Environment/Lebanese University/United Nations Development Programme (2004) Biodiversity assessment and monitoring in the protected areas/Lebanon Leb/95/G31, Horsh Ehden Nature Reserve. Lebanese University Press, Beirut

Mitchell RC, Carson RT (1989) Using survey to value public goods: the contingent valuation method. Resources for the future, Washington. p 463

Municipality of Ehden (2011) Public records, Zgharta

Poe GL, Clark JE, Rondeau D, Schulze WD (2002) Provision point mechanisms and field validity test of contingent valuation. Environ Res Econ 23(1):105–131

Polyzou E, Jones N, Evangelinos KI, Halvadakis CP (2011) Willingness to pay for drinking water quality improvement and the influence of social capital. J Socio-Econ 40(1):74–80

Robalino JA (2007) Land conservation policies and income distribution: who bears the burden of our environmental efforts? Environ Dev Econ 12(4):521–533

Sattout EJ, Talhouk SN, Caligari PDS (2007) Economic value of cedar relics in Lebanon: an application of contingent valuation method for conservation. Ecol Econ 61:315–322

Scherl LM, Wilson A, Wild R, Blockhus J, Franks P, McNeely JA, McShane TO (2004) Can protected areas contribute to poverty reduction? Opportunities and limitations. IUCN, Gland, Switzerland, Cambridge

Stevens TH, Dennis D, Kittredge D, Rickenbach M (1999) Attitudes and preferences toward co-operative agreements for management of private forestlands in the North-eastern United States. J Environ Manag 55(2):81–90

Ulibarri CA, Ulibarri VC (2010) Benefit-transfer valuation of a cultural heritage site: the Petroglyph National Monument. Environ Dev Econ 15(01):39–57

Vassanadumrongdee S, Matsuoka S, Shirakawa H (2004) Meta-analysis of contingent valuation studies on air pollution-related morbidity risks. Environ econ policy stud 6(1):11–47

Wang Y, Zhang Y (2009) Air quality assessment by contingent valuation in Ji'nan China. J Environ Manag 90(2):1022–1029

Whitehead JC (2006) A practitioner's primer on the contingent valuation method. In: Alberini A, Kahn JR (eds) Handbook on contingent valuation. Edward Elgar, Northampton

Wilkie DS, Morelli GA, Demmer J, Starkey M, Telfer P, Steil M (2006) Parks and people: assessing the human welfare effects of establishing protected areas for biodiversity conservation. Conserv Biol 20:247–249