

Willingness to Pay for Maintenance of a Nature Conservation Area: A Case of Mount Wilhelm, Papua New Guinea

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Abstract

Ecosystem services that are not traded on markets contribute to human wellbeing however their economic value is not well known and research is required to reveal it. This paper reports on a study of willingness to pay (WTP) for the maintenance of Mount Wilhelm by urban residents and socio-economic factors influencing it. The possibility of developing an ecotourism strategy that could generate benefits for local are discussed. The data were obtained from questionnaire and personal interviews of residents of Kundiawa, which is the capital of Simbu Province, Papua New Guinea. The data were analysed using descriptive statistics and binary logit regression model. The results showed that 92% of the respondents were willing to pay for maintenance of Mount Wilhelm and they would pay an average of 7.4 Papua New Guinea Kina (US\$ 2.5) each year. The respondents who belonged to high income group had the highest WTP, followed by those who were willing to give out part of their land for conservation. Approximately 62% of the respondents would pay ≥ 10 Papua New Guinea Kina (PGK), which is equivalent to the amount charged as access fee to Mount Wilhelm by the locals living around it. The willingness to pay ≥ 10 PGK was influenced by income, education, importance of forests and willingness to give up land for conservation. The findings will contribute to land use planning and design of nature-based recreation that meets societal demands.

Keywords: Binary logit model, mountain forests, national park, nature-based recreation, residents, willingness to pay

1. Introduction

Protected areas such as national park have been established in various parts of the world to help conserve nature (Shang et al., 2012). However, this has not been very successful in some developing countries due to that nature conservation often conflict with local demands for forest products and use of land for agriculture (Ezebilo & Mattsson, 2010). For a national park to be effective in conserving nature there is a need for local support for conservation activities and the integration of conservation with development. To promote local support for nature conservation various projects such as ecotourism have been implemented near national parks so that locals can benefit from conservation (The International Ecotourism Society, 1990; Berkes, 2004; Stronza & Gordillo, 2008). Nature-based recreation can help promote public health by encouraging physical and mental well-being (Townsend, 2006) as well as provide benefits for locals (Ezebilo, 2014). However, it is difficult to reveal the demand for recreation by domestic visitors without research and this paper contributes to this. The knowledge of resident's preferences and demands for nature-based recreation in PNG will help recreation managers in designing nature areas in a way that meets societal recreational needs. Though Mount Wilhelm provides recreational experience to people and contribute to ecotourism however its economic value has not been studied. Uses of land such as agriculture often leads to loss of tropical forests especially in developing countries where livelihoods of most people are strongly linked to natural resources (Miettinen et al., 2011; Hansen et al., 2013). Thus eliciting economic value of services provided by the forest is crucial for supporting land use decisions that can incorporate the trade-offs between ecosystem services (e.g. recreation) and other uses of land such as agriculture (Koh & Ghazoul, 2010). This will help in planning and managing recreation sites in order to maximize benefits from it (Carrasco et al., 2014).

Ecosystem services are benefits people obtain from ecosystems (MEA, 2005). Some of the services are traded on markets and are called market ecosystem services e.g. timber, mushrooms, berries and fish. Other ecosystem

services are not sold on markets and are referred to as non-market ecosystem services e.g. recreation experience based on free access to recreation site, aesthetic experience and air and water purification (TEEB, 2010; Filyushkina et al., 2016). The economic value (i.e. benefits provided by goods and services to consumers) of market ecosystem services are reflected in their market prices and are well known by people. However, the value of non-market ecosystem services are not known without research (Field & Field, 2013; de Groot et al., 2012). This paper contributes toward revealing the economic value of recreational experience in Mount Wilhelm, Papua New Guinea.

Most non-market ecosystem services are public good. This implies that once the service is produced people cannot be excluded from using it (non-excludable) and use of the service by an individual does not reduce its availability to other people, i.e. non-rivalry (Tietenberg & Lewis, 2010). This makes it practically impossible to charge people for use of a non-market ecosystem service. Without assigning monetary value on non-market ecosystem services their contributions to human welfare may be undervalued (Fisher et al., 2008; Carpenter et al., 2006). Accounting for the value can help in making informed decisions for allocating resources between competing uses of land and enables efficient use of environmental resources (Daily et al., 2009; Carpenter et al., 2009; TEEB in Policy, 2011).

The economic value of non-market ecosystem services can be estimated using non-market valuation methods such as the contingent valuation method (Mitchell & Carson, 1989; Carson, 2004; Bateman et al., 2002). The contingent valuation method (CVM) uses survey questions to elicit preferences for non-market good by asking people how much they would be willing to pay for a specified improvement or to avoid a decrement in the good (Mitchell & Carson, 1989). There are several published papers that have shown that different factors influence willingness to pay (WTP) for nature based recreation. For example, distance of home to nature area (Ezebilo, 2014; Shang et al., 2012), income (Chen & Jim, 2010; Wang & Jia, 2012), proximity of alternative recreation sites (Mwebaze & Bennett, 2012; Abuamoud et al., 2014), access fee to recreation site (Casey et al., 2010; Cheung et al., 2014), gender (Kamiri, 2013), years of residence (Shang et al., 2012), age (Ransom & Mangi, 2010) education (Abuamoud et al., 2014; Bãez-Montenegro et al., 2012), family size (Naeemifar et al., 2011) and travel cost (Hakim, 2011). Others are category of visitors (Chen & Llaw, 2012; Pandit et al., 2015) and dependency on natural resources (Tuan et al., 2014).

Papua New Guinea (PNG) is one of the most biodiversity rich countries in the world and has huge potential for nature-based recreation (Brooks et al., 2006). However, published papers on nature-based recreation in the country have focused mostly on management of nature areas (Green et al., 2009; Shearman et al., 2009; Wearing et al., 2010), i.e. supply side of recreation. Studies on economic values of nature areas, i.e. demand side are limited (e.g. Pondorfer & Rehdanz, 2015). The capacity of an ecosystem to supply services often determines potential uses of the services and consequently has influence on its economic values (Martin-Lopez et al., 2014). This highlights the need for incorporating the supply and demand sides of recreational experience into recreation site management decisions. Expressing the value of recreation in monetary units play an important role in informing policy makers about the relative importance of recreation and the recreation site in particular (de Groot et al., 2012). The value that people held for recreation in an area such as Mount Wilhelm will provide it managers with important information regarding the economic value of resources there which cannot be revealed on markets.

The aim of this study was to examine urban residents' willingness to pay for maintenance of Mount Wilhelm for its use in the future and socio-economic factors influencing it. It was also to explore the possibilities of designing an ecotourism strategy that could generate benefits for locals. The study involves Kundiawa town residents in Simbu Province, PNG. The findings from this study will provide Mount Wilhelm managers with more understanding on possible access fee that domestic visitors such as urban residents would pay for recreational visit to Mount Wilhelm. It is hoped that the findings will provide policy makers with more understanding on distribution of benefits and costs associated with recreation in Mount Wilhelm. It is also hoped that this paper will serve as a guide for future economic valuation studies in PNG.

2. Conceptual Framework

As people can use Mount Wilhelm for recreational activities for free it has characteristics of a non-market good (Field & Field, 2013). This implies that the recreational value of Mount Wilhelm will not be fully reflected in market prices. The CVM is capable of capturing the full value of recreation based on free access (Mitchell & Carson, 1989; Bateman et al., 2002; Ezebilo et al., 2015). In this paper the CVM was used to explore whether Kundiawa residents would be willing to pay for maintenance of Mount Wilhelm for its use in the future, i.e. bequest value.

A person's belief determines his or her behaviour and attitudes and people do not often like to take risk, i.e. risk aversion (Fisbein & Ajzen, 1975; Garrod & Willis, 1999). In this way people tend to have positive assessments for things that will generate net benefits to them and have negative assessments for things that generate net losses (Ezebilo et al., 2012). This implies that people who expect to use Mount Wilhelm in the future would pay for its maintenance. People who do not expect to use Mount Wilhelm would not pay for it. The WTP reflects the benefit an individual expects to get from using Mount Wilhelm in the future. The amount of money that the respondent would be willing to pay for the maintenance of Mount Wilhelm is:

$$v(p, y - EV, mt^0; s) = v(p, y, mt^1; s) \quad (1)$$

Where $v(\cdot)$ is the maximum satisfaction that the respondent gets from maintenance of Mount Wilhelm for future use when she is faced with a price level and an amount of income (indirect utility function). This reflects the respondent's preferences for maintenance of Mount Wilhelm. p is the price of composite good (i.e. other goods often bought by the respondent), y is disposable income, EV is the maximum amount of money that the respondent will pay for maintenance of Mount Wilhelm (i.e. equivalent variation; Champ et al., 2003), mt^0 represents a vector of facilities with maintenance of Mount Wilhelm and mt^1 is without, and s is a vector of personal characteristics of the respondent. The respondent's willingness to pay for maintenance of Mount Wilhelm (WTP_{mt}) which is equal to EV will depend on:

$$EV = f(p, y, mt^0, mt^1; s) \quad (2)$$

3. Materials and Methods

3.1 The Study Site

Mount Wilhelm, which is the highest mountain in PNG is approximately 4509 metres high and is considered to be one of the seven summits in the world (Peakware World Mountain Encyclopaedia, 2015). In the event of climbing Mount Wilhelm one could experience beautiful scenery and ecological changes associated with altitude. For example, one has the opportunity to experience rainforest and alpine grassland environment as well as see waterfalls, lakes, rocky outcrops and glacial valley. For people who are interested in history they could also see some remnants of wreckage of World War II plane. The most easily accessible route to Wilhelm is through Keglsugl village which can be reached by road from Kundiawa, i.e. the capital of Simbu Province. Mount Wilhelm has been under customary land ownership and about four families from Keglsugl are claiming ownership for it (Papua New Guinea Tourism Promotions Authority, 2015). It was previously declared a national park and was managed by the Papua New Guinea National Parks Board and later by the Department of Environment and Conservation. However, since 1994 there has been little or no active management of Wilhelm (Papua New Guinea Tourism Promotions Authority, 2015). Since the Department of Environment and Conservation closed its operations at Mount Wilhelm, the management of the park has been left at the 'mercy hands' of the immediate community or the 'landowners'.

The main livelihoods activities in Kundiawa are agriculture, marketing of agriculture produce and businesses related to tourism. Some Kundiawa residents work in government offices as medical doctors, nurses, teachers and secretaries. Others work as traders, transporters, catering and hotelier. Businesses related to tourism are important economic activity in Kundiawa and tourism associated with Mount Wilhelm contributes to the livelihoods of some Kundiawa residents. For example, during the period of this study there were at least two hotels in Kundiawa where visitors to Mount Wilhelm often lodge before travelling to Keglsugl (i.e. the closest village to Mount Wilhelm). Some Kundiawa residents engage in transporting visitors to Keglsugl village and some visitors also buy foodstuffs from various shops in Kundiawa. Some of the visitors often lodge at two guesthouses located in Keglsugl village before climbing Mount Wilhelm and some locals serve as tourist guides. Moreover, some Kundiawa residents visit Mount Wilhelm for ecotourism.

To climb Wilhelm landowners around Wilhelm expect each visitor to 10PGK (3.3 US\$) to one of the landowner's representative. According to the landowners, "the money is used for maintenance of Mount Wilhelm". At the time of this study there were two huts on Mount Wilhelm where visitors could lodge before climbing to the summit of Mount Wilhelm. These huts were managed by two Keglsugl locals. However, this paper focuses on Kundiawa town residents (i.e. urban residents) due to that the town is the capital of Simbu Province and decisions regarding environmental and tourism related issues in the Province are made there. Most government offices are located there and some Kundiawa residents seem to be well informed about the financial and recreational benefits associated with Mount Wilhelm. However, they know little about the welfare benefits of Mount Wilhelm. This is due to that Kundiawa is the first point of call by Mount Wilhelm visitors. Some Kundiawa residents also visit Mount Wilhelm with their friends from other Province or other parts of the world. Based on the visitors' register at the two guesthouses in the Keglsugl village visitors to Mount Wilhelm are from

different parts of the world especially Australia, New Zealand, Japan and various European countries as well as local visitors from Kundiawa.

3.2 Data Collection

The data were collected by means of survey involving semi-structured hand delivered questionnaire. The questions used were designed through pre-tests and discussions with three academics whose works were related to social aspects of environmental management and tourism. Of the academics, one was a Professor of Natural Resource Economics and had about 20 years experience in survey design and administration and economic valuation of environmental goods. The second was a Professor of Forest Planning and had more than 10 years experience in land use planning especially those related to allocation of land between timber production and recreation. The third academic was an Associate Professor of Environmental Economics and had more than five years experience in survey design and administration and economic valuation methods. After discussion with the academics regarding the proposed study they suggested some possible questions. A question draft was developed and sent to the academics for comments. The draft was modified to help address some concerns raised by the academics and sent back again to them. This continued until the academics were satisfied with the question draft. To verify whether potential respondents would easily comprehend the questions a pre-test survey involving 10 randomly selected Kundiawa residents was conducted. They were asked to comment on whether they understood the questions and to suggest ways of improving the questions. The respondents for the pre-test raised concerns about the use of open-ended question format for the WTP question (i.e. asking people to state the maximum amount they are willing to pay for a good). They were of the opinion that most Kundiawa residents are used to bargaining the price of goods they intend to buy rather than stating the maximum price they would pay. The pre-test respondents suggested the use of iterative bidding question format for the WTP question. This led to further modification of the questionnaire and the final version produced. The questionnaire consists of open-ended and closed-ended questions.

The main survey was conducted with the help of one assistant who was fluent in Tok pisin, i.e. the language spoken by majority of people in Kundiawa. The assistant was trained in survey techniques. Potential respondents were selected using multi-stage systematic random sampling technique. In the first stage Kundiawa was selected among other towns around Mount Wilhelm based on its location as the “gateway” to Mount Wilhelm. In the second stage, Kundiawa was hypothetically divided into four sectors corresponding to geographical cardinal points (northeast, northwest, southeast and southwest). Every 10th person was intercepted at the major street leading from each of the sectors to the central part of Kundiawa until 50 people were intercepted for each of the sector, giving a sum total of 200 people for all the four sectors (i.e. 50 for each sector $\times 4 = 200$). They were handed questionnaire and were asked to complete it on the spot. For the people who could not read or write, each question in the questionnaire was read to them and their responses used to complete the questionnaire. Due to that English is the official language in PNG and virtually everyone in the country speaks Tok pisin (i.e. the local version of English) the questionnaire was written in English. However, for people who could not read or write English a survey assistant (i.e. a native of Kundiawa) asked them the questions in Tok pisin. The questionnaire consists of 25 questions of which 10 were used for analysis in this paper. Of all the people selected for the survey 134 completed the questionnaire and the questions in the questionnaire was read to 16 people giving a total of 150 respondents. The remaining 50 people declined to participate in the survey. The main reasons they gave includes that they do not have time and that they were not interested.

The purpose of the study (i.e. understanding the importance of environmental conservation and ecotourism associated with Mount Wilhelm) was explained to the respondents and were assured that their responses will be held in confidence. The respondents were asked about their age, home location, income, education, occupation and gender. They were asked about the importance they attach to forest and whether they would give up portion of their land for biodiversity conservation.

3.3 The Contingent Valuation Question

The WTP question was of the iterative bidding format (Randall et al., 1974). A hypothetical market scenario related to the maintenance of Mount Wilhelm that could help visitors have a better experience was described. The respondents were informed that money generated from payment for maintenance of Mount Wilhelm for its future use would be held in trust by notable selected elders among landowners in Kegsugl (i.e. the closest village to Mount Wilhelm). The respondents were asked to consider their income and expenditures and to state the amount of money in PGK they would be willing to pay each year for the maintenance of Mount Wilhelm for its use in future. To begin the bidding process the respondents were asked whether they would pay 5 PGK (i.e. the initial payment amount). The amount was raised continuously for the respondents who accepted 5 PGK until

they decline to pay. For the respondents who declined to pay 5 PGK, the amount was continuously lowered until they accept to pay.

3.4 Econometric Model

Landowners around Mount Wilhelm charge visitors 10 PGK (3.3 US\$) for access to Mount Wilhelm. The landowners claimed that the fee serve as compensation to them for maintaining footpath that provides access to Mount Wilhelm through Kegsugl village. To this end, I attempted to explore the personal characteristics of the respondents who would pay 10 PGK or more for maintenance of Mount Wilhelm for their own use in the future. This is because the respondents who can pay 10PGK for the maintenance of Mount Wilhelm have the potential to pay 10 PGK as entrance fee should they visit Mount Wilhelm. Thus the willingness to pay 10 PGK or more for maintenance of Mount Wilhelm in relation to socio-economic characteristics of respondents was analysed. The willingness to pay 10 PGK or not for maintenance of Mount Wilhelm for its use in future (WTP_{mt}) can be modelled as discrete choice:

$$I = 1, \text{ if } WTP_{mt} = \text{yes} \\ = 0 \text{ if } WTP_{mt} = \text{no} \tag{3}$$

where, I is the indicator variable.

The WTP_{mt} can be explored using a binary choice model such as the binary probit or logit. However, the probit has the restrictive assumptions of normal distribution and that the variance around the regression line is the same for all values of the predictor variance i.e. homoscedasticity (Greene, 2003). To explore whether the data used for analysis in this paper meet these assumptions, homoscedasticity and normality tests (Greene, 2003) were conducted. For the homoscedasticity test, the Lagrange multiplier (LM) statistic was 48.791. This is asymptotically distributed as chi-squared (X^2) with 7 degrees of freedom. Given that X^2 statistic at 1% statistical significant level is 18.48, the hypothesis that the model is homoscedastic was rejected. Using the LM test, the test statistic for normality was computed as 14.583 with 2 degrees of freedom. Given that the X^2 statistic at 1% statistical significant level is 9.21, the hypothesis that the error term is normally distributed was also rejected. These test results revealed that the assumptions for using the probit model could not be satisfied. As an alternative, the binary logit model was applied. The probability that the respondent will give a ‘yes’ response (i.e. would pay 10 PGK or more for maintenance of Mount Wilhelm) is:

$$p[\text{yes}] = \frac{1}{1 + e^{-\beta x}} \tag{4}$$

where β is a vector of parameters to be estimated and x is a vector of the respondent personal characteristics. The probability that the respondent will give a ‘no’ response, i.e. would not pay 10 PGK is:

$$p(\text{no}) = 1 - p(\text{yes}) \tag{5}$$

$$p[\text{no}] = \frac{1}{1 + e^{\beta x}} \tag{6}$$

Manipulation of equations 5 and 6 gives

$$1 - p(\text{yes}) = \frac{1}{1 + e^{\beta x}} \\ \frac{p(\text{yes})}{1 - p(\text{yes})} = e^{\beta x} \tag{7}$$

where $e^{\beta x}$ is the ratio of the probability of a ‘yes’ to the probability of a ‘no’ response. The logarithm of odds ratio is:

$$\ln \left[\frac{p(\text{yes})}{1 - p(\text{yes})} \right] = \beta x$$

$$WTP_{mt} = \alpha + \beta_1 INCOME + \beta_2 GENDER + \beta_3 LAND + \beta_4 EDU + \beta_5 FOREST + \beta_6 AGE + \varepsilon \tag{8}$$

where α is intercept, WTP_{mt} is willingness to pay 10 PGK or more for maintenance of Mount Wilhelm for its future use, INCOME is disposable income, GENDER is gender of the respondent, LAND is willingness to give up land for conservation, EDU is educational level, FOREST is the importance attached to forest, AGE is the respondent's age and ε is the error term which is logistically distributed.

The binary logit model was estimated using LIMDEP NLOGIT version 4.0.1 statistical package (Econometric Software Inc, New York, USA, 2007) to examine factors influencing willingness to pay 10 PGK or more for the maintenance of Mount Wilhelm. To explore multicollinearity in the independent variables, the variance inflation factor (VIF) of the variables was estimated. The VIF of each of the included variables did not exceed 1.85, which indicates that multicollinearity is not a serious problem (Chatterjee & Price, 1991) in the estimated model. The average willingness to pay (AWTP) for all the respondents, i.e. the respondents who would pay less than 10 PGK and those who would pay 10 PGK and above was calculated as:

$$AWTP = \frac{1}{n} \sum_{i=1}^n \frac{B_{ij} + B_{ik}}{2} \tag{9}$$

where, n is the sample size and B_{ij} is the amount reported by the respondent and B_{ik} is the next higher amount on the payment list that was presented to the respondent.

4. Results

Of the 200 people who were selected for the survey 75% (150) participated in the survey. However, 13% (20) who do not live in Kundiawa were excluded from this analysis giving a total of 130 useable questionnaires. Out of the 130 respondents who lived in Kundiawa approximately 90% (117) answered all the questions associated with variables used in the present analysis. This paper is based on analysis of the 117 observations. Approximately 92% of the respondents would pay for the maintenance of Mount Wilhelm and eight percent would not pay anything at all. The AWTP for all the respondents was 7.43 PGK (2.5 US\$) per year. The results showed that approximately 62% of the respondents would pay 10 PGK (3.3 US\$; see Table 1) and more than 10 PGK. Approximately 46% of the respondents reported that they would give up part of their land for biodiversity conservation and 80% attached much importance to forests.

Table 1. Descriptive statistics of variables used in statistical analysis

Variable	Description	Mean	SD	Min	Max
WTP_{mt}	The respondent would pay ≥ 10 PGK yearly for maintenance of Mount Wilhelm Park: yes = 1, no = 0	0.615	0.489	0	1
INCOME	The respondent's disposable income in PGK per year.	11226	15668	1200	60000
GENDER	The gender of the respondent: female = 1, male = 0	0.436	0.498	0	1
LAND	The respondent would give up part of his or her land for biodiversity conservation: yes = 1, no = 0	0.462	0.500	0	1
EDU	The respondent had high school education: yes = 1, no = 0	0.752	0.434	0	1
FOREST	The respondent attach much importance on forest: yes = 1, no = 0	0.795	0.406	0	1
AGE	Respondent's age in years	30.286	10.017	18	65

PGK is Papua New Guinean Kina (1US\$ = 3 PGK).

The results revealed that on average, men would pay more than women while respondents who attach much importance to forest would pay more than those who attach little importance (Table 2). Among the income groups, low income earner has the lowest WTP and high income earner had the highest. The respondents who would give up portion of their land for biodiversity conservation were willing to pay more than those who would not give up their land. The respondents who had high school education would pay more than those who do not. For the case of older adults and youths their AWTP do not differ.

Table 2. Willingness to pay in relation to demographic characteristics

Characteristics	AWTP	SD
Gender:		
Female (51)	6.98	4.65
Male (66)	7.77	4.39
Age:		
Older adult, i.e. >24 years (87)	7.40	4.48
Youth, i.e. ≤24 years (30)	7.50	4.65
Respondents who attach much importance on forest (93)	8.51	4.14
Respondents who attach little importance on forest (24)	4.63	4.84
Income:		
Lower income earner (75)	6.44	4.73
Medium income earner (32)	9.00	3.53
High income earner (10)	9.80	3.45
Respondents who would give up part of their land for biodiversity conservation (54)	8.72	4.17
Respondents who would not give up part of their land for biodiversity conservation (63)	6.32	4.52
Respondents who had high school education (88)	8.39	4.04
Respondent who do not have high school education (29)	4.52	4.06

PGK is Papua New Guinean Kina (1US\$ = 3 PGK), number of observations in parenthesis,

AWTP is average willingness to pay.

For the respondents who would pay ≥10 PGK for maintenance of Mount Wilhelm in relation to some variables, more than 60% men would pay, whereas it was approximately 48% for women (Fig 1). More of the respondents who attach much importance on forests would pay ≥10 PGK than those who attach little importance. More than 70% of the respondents who had high school education would pay 10 PGK or more and 30% of those that do not have high school education would do so. All the respondents who belonged to high income group would pay 10 PGK or more, 90% for the case of medium income group and it was 50% for low income. Approximately 70% of older adults would pay and it was 57% for the youth.

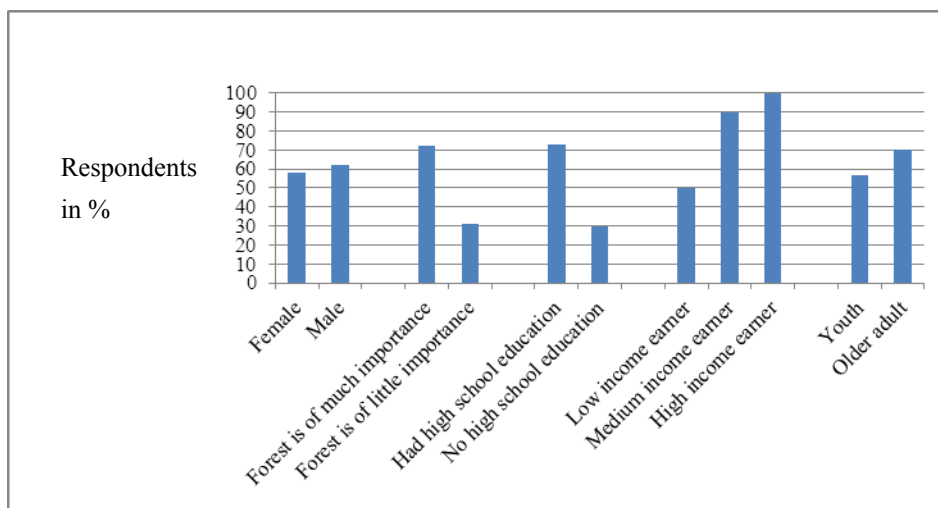


Figure 1. Willingness to pay for Mount Wilhelm

The binary logit model was used to account for socio-economic factors that might have influenced the respondent's willingness to pay ≥ 10 PGK for maintenance of Mount Wilhelm for its use in the future (Table 3). The likelihood ratio had a Chi-squared statistic of 41.14 and was statistically significant at 1% and approximately 76% of the respondents were correctly predicted to be in the group to which they actually belonged.

Table 3. Binary logit model results for willingness to pay ≥ 10 PGK for the maintenance of Mount Wilhelm

Variable	Coefficient	Std. error	Odds ratio
Constant	-2.19	1.02	
INCOME	0.001*	0.0003	1.00
GENDER	-0.27	0.48	1.31
LAND	1.68****	0.50	5.34
EDU	1.48**	0.57	4.41
FOREST	1.59***	0.58	4.48
AGE	-0.025	0.03	1.03
Log likelihood function			-57.39
Restricted log likelihood			-77.96
Chi squared			41.14
Prob[Chi squared > value]			0.0000****
McFadden Pseudo R ²			0.26
% correctly predicted			76.07
Hosmer-Lemeshow chi-squared			18.95
P value = 0.009			
Number of observations			117

*, **, ***, **** represent 0.1, 0.05, 0.01 and 0.001 levels of statistical significance, respectively.

The results showed that the respondents who have much money, willing to give up portion of their land for biodiversity conservation, had high school education and attach much importance to forest were likely to pay ≥ 10 PGK for maintenance of Mount Wilhelm (Table 3). In terms of odds ratio, the respondents who were willing to give up land for conservation were more than four times likely to pay ≥ 10 PGK. The respondents who had high school education and those that attach much importance to forest were more than three times likely to pay ≥ 10 PGK. An increase in income does not have effect on willingness to pay ≥ 10 PGK. The income elasticity of demand for maintenance of Mount Wilhelm is positive, i.e. normal good (Gravelle and Rees 2004). However, it is less than one, which indicates that recreation in Mount Wilhelm is a type of normal good known as necessity good. Willingness to give up land for conservation, education and importance attached on forests are the most important variables influencing willingness to pay ≥ 10 PGK for maintenance of Mount Wilhelm. Coefficients associated with gender and age was not statistically significant.

5. Discussion

The findings from this study revealed that, though there is no official access fee for recreation in Mount Wilhelm, most Kundiawa residents would pay for the maintenance of Mount Wilhelm. The findings indicate that Kundiawa residents held recreation value for Mount Wilhelm; however, the value varies in regards to personal attributes of the residents. This suggests the importance of managing Mount Wilhelm toward meeting societal recreational demands. The finding is in line with that of Ezebilo (2014) who found that locals near a national park in southern Nigeria were willing to pay for maintenance of dirt road leading to the park. This conforms to the premise that people often pay for activities that they expect to get benefit from (Chen & Llaw, 2012).

On average, high income earners had the highest WTP, followed by people who would give up portion of their land for biodiversity conservation, people who attached much importance on forests and those who have high school education. This may be that high income earners have much money, which could be used to take care of

their necessities and for enjoyment such as recreation. It may be so that the people who would give up their land for biodiversity conservation and those that attach much importance on forests often have much contact with nature and tends to appreciate the services it provides more than people who attach little importance to forests. Education has the potential to provide people with access to information such as benefits of recreation to human well-being. This could be a possible reason that people who had at least a high school education would pay more for the maintenance of Mount Wilhelm. This suggests that education is crucial in providing people with more understanding on the importance of a nature area. The respondents who do not have high school education and those that attached little importance to forests had the lowest WTP. A possible reason could be that, low level of education restricts access to information such as benefits of recreational activities. People who have little to do with forests may think that they get little benefits from nature and would tend to pay little for forest services. Moreover, the livelihoods of this group of people may not be linked to natural resources and they may not see reasons for paying much for the provision of ecosystem services such as recreational experience. They may think that it is a public good which should be provided by the PNG government (Chen & Jim, 2010).

The findings revealed that all the respondents who belonged to high income group would pay ≥ 10 PGK (3.3 US\$) for maintenance of Mount Wilhelm for future use. It was more than 70% for the case of the respondents who have high school education and those that attach much importance on forests, respectively. This implies that if the aim is to introduce access fee to Mount Wilhelm it is important to consider the income and preferences of visitors. The visitors should be well informed on what the fee will be used for and they should be educated on the contribution of services provided by forests to societal welfare. It is also important to involve locals in designing the strategy.

According to economic theory, people who have much money tend to have greater capacity to pay for goods and services (Gravelle & Rees, 2004). The finding from this study on income conforms to that theory. A possible reason may be that people who have much money have greater economic base and consequently purchasing power than those that have little money. It suggests that, if the aim is to introduce access fee for recreation in Mount Wilhelm, it might restrict poor people from using the area for recreation. The finding is in line with several previously published papers on economic values of nature. For example, in a Chinese study of tourists' willingness to pay for biodiversity conservation and environment protection of Dalai Lake Protected Area, Wang and Jia (2012) found that tourists who have much money would pay more for conservation. In a Nigerian study of public willingness to pay for ecosystem services provided by forests, Adekunle and Agbage (2012) found that Abeokuta residents who have much money would pay more for the services.

A person's belief is strongly linked to his or her attitudes and behaviour (Fisbein & Ajzen, 1975). In this way, people who held great value for biodiversity conservation would contribute positively to activities that could support recreation. This may be a possible reason that the respondents who were willing to give up portion of their land for conservation were likely to pay ≥ 10 PGK for the maintenance of Mount Wilhelm. The finding is in line to that of previously published paper on the subject. For example, in a Nigerian study, Ezebilo (2014) found that locals around the Cross River National Park in south-east Nigeria would pay for maintenance of dirt road that lead to the park for ecotourism. In a Vietnamese study of willingness to pay for mangrove restoration, Tuan et al. (2014) found that people whose livelihoods were strongly linked to mangrove would pay for it restoration. This highlights the importance of environmental attitudes in developing a recreation site management strategy.

Formal education often provides people with opportunities to access information and comprehend the benefits of e.g. nature-based recreation. In this study, it was found that people who have at least high school education were likely to pay ≥ 10 PGK for maintenance of Mount Wilhelm. This conforms to the findings of previously published papers such as Abuamoud et al. (2014) who reported that visitors to cultural heritage site in Jordan who had higher level of education would pay more to visit the site. In a Chilean study of residents' willingness to pay for a cultural heritage site, Bãez-Montenegro et al. (2012) found that residents who had higher level of education were willing to pay more for the site. This highlights the importance of education in designing strategy that promote access fee to Mount Wilhelm and raising awareness of its importance among residents.

People tend to have positive assessments for things that generate net benefits (Ezebilo et al., 2012). In this way, people who attach much importance to forest should be more aware of the services that forest provides and would likely pay not to lose these services (e.g. recreation) as shown by the findings from this study. A possible reason may be that forests contribute to the livelihoods of the people and this may tend to motivate them to support activities related to services provided by forests. The finding is in line with that of Tuan et al. (2014) who found that in Vietnam local residents that attach much importance to mangrove would pay more not to lose the services it provides.

Advocates of protected areas are often of the opinion that revenue from ecotourism will compensate locals for the reduced access to land for activities such as agriculture and gathering of forest products (Ezebilo, 2104). Moreover, if people expect to get benefit from a project, they will support it and promote activities that will help sustain the project (Chen & Jim, 2010). If the aim is to introduce access fee for recreation in Mount Wilhelm, efforts should be focused on educating people on the importance of the fee, how it would be collected, what it would be used for and how it would be managed. It is also important to educate people on the need for maintenance of amenities for recreation in Mount Wilhelm.

6. Concluding Remarks

This study aimed to investigate economic value of the highest mountain in Papua New Guinea to urban residents using the contingent valuation method. Although the method is new to people of the study area (i.e. Kundiawa town) the results revealed that it can be successfully applied on economic valuation of natural resources in Kundiawa and potentially other parts of Papua New Guinea. For example, the influence of income and education on willingness to pay for maintenance of Mount Wilhelm conforms to economic theory and typical findings in the economic valuation literature.

Although there is no access fee for recreation in Mount Wilhelm Kundiawa residents would pay for its maintenance for future use. However, some Kundiawa residents may not be interested in paying because they may consider that Mount Wilhelm is a public property and that access to it should be free. If the aim is to introduce access fee for maintenance of the Mount Wilhelm, it is important for managers to negotiate with locals in order to set the fee at a price that visitors to Mount Wilhelm could afford. It is also important for the managers to consider societal preferences and demands in designing a recreation area. For example, the existing footpath network that gives access to Mount Wilhelm for recreation could be improved and maintenance works carried out on poor footpath. The findings contribute to more understanding on the benefits and costs associated with recreation in Mount Wilhelm and how to manage conflict of interests arising from use of nature area for recreation. Further research is needed in areas such as visitors' preferences for various nature types found in Mount Wilhelm.

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