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Valuing Pachathuruthu: A Contingent Valuation Study on Willingness-to-Pay for Riverine Islet Conservation

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- Willingness to Pay
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- Tobit
- CRCH

Abstract

In evaluating the economic valuation of conservation in Pachathuruth (of Alakkode and Udayagiri Gram Panchayats) in Keralam, 212 individuals were surveyed for their responses. The Contingent Valuation Method was then employed to analyze the data with econometric calculations so that assessment of respondent's willingness to pay (WTP) for community based ecosystem restoration would be quantified. The analysis indicates that despite the small amount of WTP (Rs 282), as nearly all of the respondents stated being willing to pay at least this amount for the restoration, the value of WTP (both in terms of the sample mean and for any given old) increases at a higher rate than the responses of those in the bid categories below Rs 750. In addition, the econometric models performed yielded education levels as the only significant predictor of WTP. Age and income did not appear to exert significant influence on conservation value either; although there existed a general understanding of the ecological benefits that come with ecosystem conservation and many respondents were generally aware of this as a fact. Lastly, it is important to point out that even though individuals have an understanding of the impacts of conserving ecosystems and have a level of awareness regarding the same, some levels of institutional weaknesses still exist.

1. Introduction

Humanity relies heavily on nature for its survival; humanity relies upon nature as the foundation of our way of life. Examples of services that ecosystems provide to individuals include clean air, fresh and clean water, control of climatic conditions and maintenance biological diversity. Ecosystem services not only play an important role in supporting human life, but they also significantly impact the mental health and wellbeing of people. Under normal circumstances, ecosystem services do not have a measurable market value associated with them. The lack of value assigned to ecosystem services can lead to degradation of the environment, and over-utilization of natural resources. Therefore, it is vital for governments to identify ecosystem services and ascribe monetary values to them to enable the development of suitable policy and to support the promotion of nature-based industries. In Keralam, for example, the development of environmentally sustainable projects has been supported by community involvement and the decentralized administration of resources.

The Pachathuruth project located in Keralam aims to use native plant species to establish a green space on former riverine islands (e.g., islets). The new micro-forests will also help boost biodiversity, sequester carbon, and create opportunities for community members to actively participate in conservation efforts. However, while these types of projects have significant economic costs associated with them, they often do not have an easily identifiable monetary value, making it difficult to determine the level of community interest and to distribute resources appropriately. This paper uses the Contingent Valuation Method (CVM) to assess how much residents living near Pachathuruth are willing to pay for the project.

2. Review of Literature

Increased interest in studying the value of ecosystem services arises from the simultaneous rise in the global focus on sustainable development and biodiversity. Costanza et al. (1997) developed the concept of ecosystem services in economics and calculated that the total global value of ecosystem services is in the trillions of dollars. The Economics of Ecosystems and Biodiversity (TEEB, 2010) defined ecosystem services into four major categories: provisioning, regulating, cultural and supporting. While De Groot et al. (2002) provided a typology of ecosystem services as well as a valuation of the economic contributions of provisioning ecosystem services using market mechanisms.

In India, Balasubramanian (2019) studied the economic importance of regulating ecosystem services and their contribution to mitigating climate-related risks, maintaining hydrological cycles. Supporting services, such as soil formation and nutrient cycling, are essential for the

production of all other ecosystem services. Shanavas**,** P. *H* & Karunakaran, N (2019, 2024) and Sharma et al. (2023) recognized their foundational role in maintaining biodiversity and ecosystem productivity in India. Anitha et al. (2024) explored how ecosystem services in the forests of the Western Ghatsdirectly support community well-being. Through their findings regarding both theoretical and practical benefits of applied use, Lakerveld's (2015) research revealed that Odisha's forests contain many interconnections to the socio-economy of tribal culture in that area. Likewise, Sandhu's (2023) research on the economic valuation of ecosystem services from Indian common lands also established that ecosystem services can be easily valued as a means of providing an estimated monetary value for our natural resources, which are typically viewed as 'externally' or 'publicly' owned through a policy lens (Pearce, et al, 2006).

The Contingent Valuation Method (CVM) can serve as an investigative economic tool by administering surveys designed for the measurement of non-market environmental values via establishing how much individuals are willing to pay or are willing to accept in return for improving the quality of environmental conditions (Mitchell & Carson, 1989). Some studies in India have used CVM to determine the value of environmental programs.

In 1993, Kramer et al. conducted a CVM survey in the US at a national level to determine people's willingness to pay (WTP) to protect tropical rainforests in support of the idea that the world shares responsibility for global conservation. Their results formed the basis for the development of contingent values used to guide future funding for global conservation efforts. Aheygunawardena et al (1999) reported that through the use of an open-ended CVM survey, the non-use value represented approximately 70% of the total value of the Sinharaja rainforest located in Sri Lanka. In 2015, Hema and Indira Devi conducted a CVM survey regarding the monetary value of the ecosystem services produced by mangroves in Keralam, India. Their results indicate that the community is willing to pay for the management of mangrove ecosystems due to the high relative value assigned by community members to service categories such as storm protection, fish nursery habitat, and carbon sequestration.

Paul et al. (2024) conducted a study applying CVM and travel cost analysis to evaluate cultural ecosystem services within the context of the Peechi Reservoir in Thrissur, Keralam, India. Results from their research showed a significant amount of ecotourism and recreational activities related to cultural ecosystem services, thus reinforcing the importance of assessing the cultural and aesthetic benefits of ecosystems when planning for their conservation. Another example of incorporating cultural values into conservation techniques can be demonstrated by Soman et al. (2025), who assessed the heritage and spiritual values as important motivations

for community-based conservation efforts at the Parambikulam Tiger Reserve. Additionally, Merin and Kumar (2021) assessed the value of the ecosystem services generated from the Ramsar site of the Ashtamudi wetlands using a CVM approach and determined that every 100 m^2 of land produces USD 820 in ecological and socioeconomic value annually. Dhyani et al. (2021) used participatory mapping and spatial analysis to identify non-material value hotspots within the Sundarbans region of India.

Researchers have increasingly acknowledged the ecological importance of the mangrove and estuarine ecosystems located along the coast of Keralam. The ecological degradation of mangroves in Kochi is in urgent need of conservation-driven initiatives that will lead to sustainable livelihoods; ecosystem valuations can be used to connect conservation ecology with community-based initiatives (Siregar et al., 2024). Anitha et al.'s (2024) study of the forest ecosystems found that two regulatory ecosystem service benefits (climate regulation) and provisioning ecosystem service benefits (firewood) are the community's priorities in relation to the value of the ecosystem services provided to them.

Valuation studies have been done successfully in Keralam; however, there has been little policy incorporation of the findings. According to Panicker et al. (2024), the valuation of ecosystem services should be incorporated into decentralized governance under Sustainable Development Goals (SDGs) such as,13 (Climate Action) and 15 (Life on Land). Examples such as the Pachathuruth wetlands show that investments in ecosystem services are likely to produce greater returns to society than would be accrued through the exploitation of these resources. Global studies reinforce Keralam's need for equitable conservation policies. Future research should expand cultural service valuations (e.g., spiritual, heritage values), strengthen policy linkages through local governance integration and adopt machine learning and spatial modelling for dynamic ecosystem assessments.

3. Research Problem and Objectives

Despite the benefits, riverine islets remain undervalued in economic and policy frameworks due to the absence of market-based pricing and limited empirical evidence on public perception. Numerous studies in India have identified a strong correlation between socio-economic characteristics and the WTP for ecosystem services. For instance, Ekka & Pandit (2012) examined the Sundarbans and highlighted that higher education and awareness levels significantly influence positive WTP outcomes for mangrove restoration. Bhatt & Shah (2014) found that WTP for wetland biodiversity preservation in Kashmir reflects not only ecological values but also cultural and social linkages. Ramya Abhijith et al. (2024) emphasized that people's socioeconomic dynamics, such as income and occupation, substantially affect their

attitudes and WTP for estuarine ecosystem restoration in Keralam. These literatures highlights that WTP for environmental conservation is influenced by socio-economic characteristics such as income, education, and occupation. Despite there being many studies, almost none have been conducted on riverine islands known as micro-ecosystems. This creates a gap in our understanding of how people living nearby appreciate the ecology of these ecosystems and if they are willing to help support conservation efforts financially. Therefore, the primary focus of this research will be on determining how much people living near these types of micro-ecosystems are aware of these and are willing to pay to help conserve them.

4. Research Methodology

A quantitative methodology has been used with surveys to determine attitudes regarding public perceptions and willingness to pay for the conservation of Pachathuruth in Udayagiri and Alakkode Gram Panchayats of Kannur district, Keralam. Primary data were obtained via a questionnaire survey from 212 respondents. The selection of the sample was made using purposive and stratified random sampling methods. Demographic data, environmental awareness, perceptions of ecological benefits, willingness to pay for conservation activities, were gathered from the respondents. The contingent valuation method (CVM) was used to estimate willingness to pay using a dichotomous choice question with bid values of 50 Rupees, 100 Rupees and 200 Rupees and the ability to determine if there were any protest bids. Data were processed using both descriptive and inferential statistical procedures. Econometric models were constructed to analyze the determinants of willing to pay.

4.1. Topography and Ecological Significance of the Study Area: Udayagiri's geographical topography is mountainous and is located on Taliparamba Taluk in the district of Kannur, bordered by the state of Karnataka to the North and to the West by the forests of Karnataka. Udayagiri has an elevation above 1400 feet above sea level and receives an average annual total rainfall of 4000mm of rain; this is above, the expected annual average rainfall of 3000mm in the Keralam state, however, Udayagiri's mountainous terrain is extremely steep, up to a 30° - 60° slope, resulting in approximately 90% of the rain that falls into the region draining through surface water runoff within 24 hours, resulting in a Drought that lasts for three months from March through June (Haritha Keralam Mission, 2021); therefore, it is imperative to implement water conservation as well as to rehabilitate the land. Close to Udayagiri is Alakkode Gram Panchayat, which has almost the same nature and geographic characteristics as does Udayagiri. In the areas upstream of the Kuppam River in Udayagiri and Alakkode Panchayats lie ideal areas for the creation of river islets. Known as thuruths, these occur on the Kuppam River and vary in formation, with some having larger amounts of cobble stone and others using boats as

marshland. The main plants in the area include Cher, Vellapino, Neermathalam, and Athamb. The current project focused on creating productive green patches from degraded and flood-prone areas, utilizing local community participation, the use of native plants, and working with state programs (e.g. MGNREGS). The results of this work led to significant ecological benefits, which include increasing the amount of groundwater stored; providing water for use during dry periods; improving biodiversity and tree cover; increasing the fish population; and establishing an ecotourism opportunity through the creation of mini forests.

5. Results and Discussion

5.1. Socio-Economic Profile of Respondents: Table 1 displays the demographic characteristics of the respondents surveyed; these characteristics include regions of the country where the participants live (rural versus urban), the level of income of those individuals (low versus high), as well as the level of education those individuals received (high school or lower versus college graduate). The total number of respondents was 212; there were more respondents from Alakkode than Udayagiri. The gender breakdown of responses was equal (gender was not asked), however, females made up the greatest proportion of respondents at 53.3% of total respondents. There were also a fair number (60.4%) of the respondents who had only attained a primary level of education.

Table 1: Socio-Economic Profile of Respondents

Variable	Category	Frequency (N=212)	Percentage (%)
Residence	Udayagiri Panchayat	87	41
	Alakkode Panchayat	125	59
Gender	Male	99	46.7
	Female	113	53.3
Education	Primary (≤5th)	128	60.4
	Secondary (6th–10th)	31	14.6
	Higher Secondary/Diploma	1	9.9
	Bachelor's Degree& Above	26	12.3
	Others	6	2.8
Occupation	Student	7	3.3
	Salaried Employee	4	1.9
	Private Sector	10	4.7
	Self-Employed	96	45.3

	Homemaker	87	41
	Retired	2	0.9
	Unemployed	6	2.8
Sector	Agriculture	199	93.9
	Industry	3	1.4
	Service	10	4.7
Land Ownership	Yes	193	91
	No	19	9
Land Use Type	Residential	117	55.2
	Agricultural	76	35.8
	Others	19	9
Source: Primary Survey			

The majority of the respondents are self-employed (45.3%) or housewives (41%). Relatively few respondents have other types of occupations. The most common occupation among sample respondents is agriculture, with 93.9% of the participants involved in agricultural activities. Only a small number of sample participants work in industrial or service sector jobs. The majority of the sample participants own land for personal use (91%).

Table 2: Descriptive Statistics of Age and Monthly Income

Statistic	**Age (Years)**	**Income (INR)**
Number of Respondents	212	212
Mean	53.34	10,225.24
Standard Deviation	11.71	9,245.27
Skewness	-0.283	1.858
Kurtosis	1.025	3.998
Source: Primary Survey		

Participants had an average age of 53.34 years (SD ±11.71, table 2) indicating that they are fairly similar by age, and the data was slightly skewed left. The mean income of participants was Rs 10,225.24 (SD = Rs 9,245.27), indicating that there is a high level of income disparity amongst participants, and a significant amount of left skew for the income distribution,

indicating that there are many participants with low income, and that there are also many outlier responses (i.e., very high income).

5.2 Awareness, Perception, and Institutional Dynamics: There are many articles in which the distinction between awareness of the environment and action on it has been discussed because, even though someone may be aware of the environment, there are numerous reasons (financial limitations, distrust, lack of opportunity) for why that person may not take action on the environment (ElHaffar et al. 2020). The example of Pachathuruth's conservation and awareness level has a remarkably high level of awareness, with 99.5% of respondents expressing that they are aware of the issue; however, when looking at the participation measures for Pachathuruth's conservation, they are low (42.9% and 11.3%, respectively, table 3).

Table 3: Awareness and Environmental Engagement

Variable	Category	Frequency	Percent (%)
Familiarity with Pachathuruthu	Yes	211	99.5
	No	1	0.5
Membership in Environmental Groups	Yes	91	42.9
	No	121	57.1
Donation for Environmental Causes	Yes	24	11.3
	No	188	88.7

Source: Primary Survey

Among the respondents, there is a strong cognitive awareness of Pachathuruth's ecosystem and the services it offers. In response to questions regarding ecological benefits of conservation, respondents overwhelmingly agree that conservation results in ecological benefits with respect to biodiversity (87.7% agree), environmental gains (85.8% agree), and water resources (83.5% agree). This suggests that the project has produced abundant ecological benefits. In addition to these results, many respondents perceive that conservation has resulted in agricultural production benefits (71.7%). However, there is relatively less knowledge of the ecological functions of conservation such as the protection of native freshwater fish species (44.3% agree) which indicates a lack of ecological knowledge among the respondents (Table 4).

Table 4: Perceptions on Benefits and Challenges

Category	Variable	Yes (%) / Effective (%)	No (%) / Ineffective (%)
Perceived Benefits	Improved Environmental Quality	85.8	14.2
	Increased Biodiversity	87.7	12.3
	Agricultural Productivity	71.7	28.3
	Scenic Beauty	79.2	20.8
	Water Quality & Quantity	83.5	16.5
	Protection of Fish	44.3	55.7
Perceived Challenges	Lack of Funding	45.3	54.7
	Community Engagement	57.1	42.9
	Environmental Degradation	89.2	10.8
	Policy Issues	88.2	11.8
	Encroachment	52.4	47.2
	Awareness Issues	59	41
Source: Primary Survey			

The majority of participants recognize Pachathuruth conservation as significantly important, but their perceptions of governmental institution's performance concerning the conservation program are overwhelmingly negative. Almost all respondents believe that the conservation process has been ineffective or minimally effective. In addition, there is a considerable lack of trust in local governance institutions (approximately 75% of respondents report having little or no trust in such institutions, Table 5).

Table 5: Attitudes, Participation, and Institutional Perception

Variable	Category	Frequency	Percent (%)
Collaboration with Authorities	Yes	99	46.7
	No	113	53.3
Importance of Pachathuruth	Not important at all	4	1.9
	Slightly important	7	3.3
	Moderately important	12	5.7
	Very important	61	28.8

	Extremely important	128	60.4
Interest in Conservation	No interest	3	1.4
	Slightly interested	16	7.5
	Moderately interested	39	18.4
	Very interested	68	32.1
	Extremely interested	86	40.6
Satisfaction with Efforts	Very dissatisfied	72	34
	Dissatisfied	79	37.3
	Neutral	20	9.4
	Satisfied	14	6.6
	Very satisfied	27	12.7
Perceived Effectiveness	Not effective	85	40.1
	Slightly effective	70	33
	Moderately effective	19	9
	Effective	8	3.8
	Very effective	30	14.2
Trust in Local Government	No trust	85	40.1
	Slight trust	75	35.4
	Neutral	20	9.4
	Trust	13	6.1
	Full trust	19	9
Source: Primary Survey			

The discrepancy between people's strong value of ecosystems and low trust in institutions represents an important question. People understand ecosystems' values but may not be willing to act with or invest in them because of their belief that they are poorly managed. This is demonstrated through the use of the contingent valuation method whereby people may undervalue the value they would place on an ecosystem service because they may not wish to pay for what appears to them to be limited in management ability.

The current research seeks to assess how much the local community will pay for the conservation of Pachathuruth, specifically for the restoration of Islets as reported by their local community. The Willingness to Pay (WTP) helps to assess the economic value assigned to such actions given the environmental service does not currently have any formal market mechanism in place by which its value can be assessed. Therefore, the researchers will use a

Contingent Valuation Method (CVM) to measure the WTP for conservation initiatives, which in turn will allow for the measurement of both use and non-use values relating to such environmental services.

5.3. Analysis of Willingness to Pay: The next step will be to present the distribution pattern of WTP for conserving Pachaturuth from a CV perspective. The pattern shows that most bids were placed at or near zero or 100 Rupees, and as the bidding price increased there were fewer and fewer bidders. This results in a positively skewed distribution, with a long tail on the high-priced end. The percentage of yes responses to respective bid prices decreases as the bid values were increasing (i.e., for example at bid value Rs 50, 80% agreed to pay that amt, but only 35-40% would agree to pay Rs 200).

The Ordinary Least Squares (OLS), Tobit, Censored Regression with Conditional Heteroskedasticity (CRCH), and Logit Model were used as models to test various factors affecting the willingness to pay (WTP). Since the WTP values were censored, the Tobit Model was the most appropriate model to be used in this study. The CRCH Model provides similar estimates but does not significantly improve the overall fit of the model compared to the OLS or Logit Models. Therefore, the Censored Regression and the Censored Logit Model would not have been appropriate for this study as they are unable to provide any statistical evidence regarding the relationship that exists between the WTP and each of the independent variables used in this study.

Table 6: Determinants of Willingness to Pay - Comparison Across Models

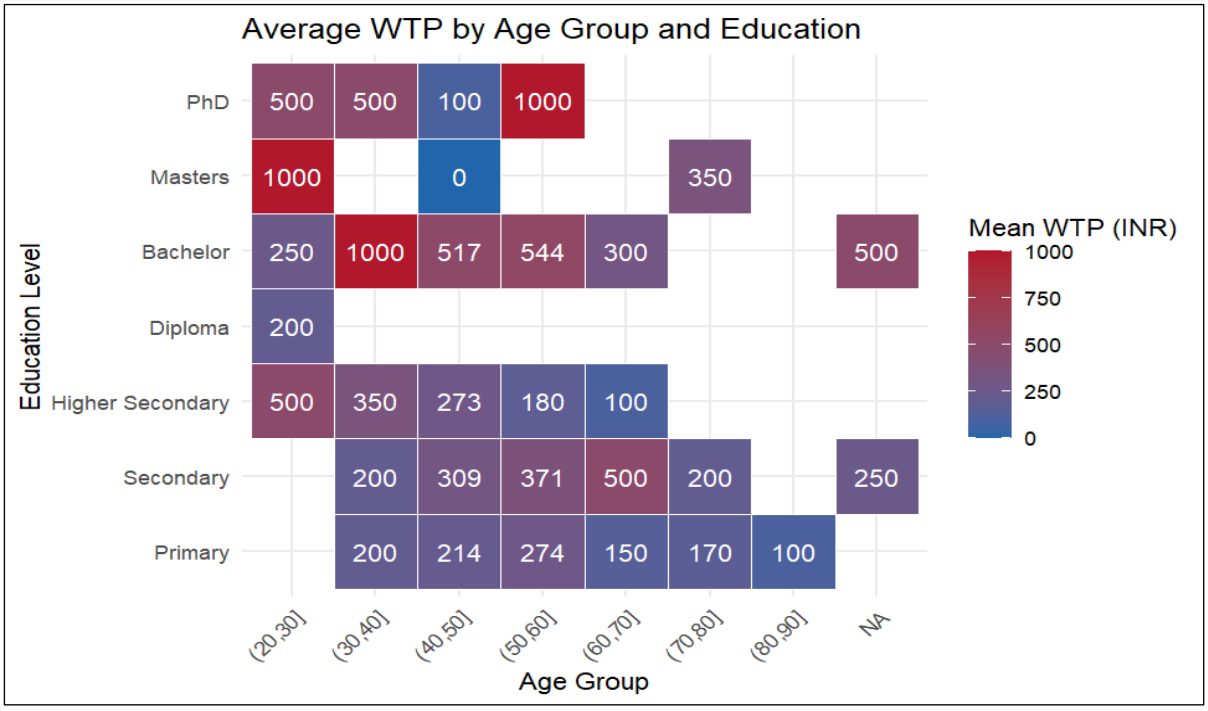
Models	**OLS**	**Tobit**	**CRCH**	**Logit**
Variables	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)
Intercept	279.32*** (95.21)	266.17** (111.89)	267.40** (111.88)	2.033** (0.977)
Age	–1.27 (1.62)	–1.59 (1.91)	–1.61 (1.91)	–0.0078 (0.0165)
Income	0.0018 (0.0023)	0.0015 (0.0027)	0.0015 (0.0027)	–0.000016 (0.000021)
Edu: Secondary	96.53* (52.38)	99.36 (61.41)	99.90 (61.40)	–0.066 (0.52)
Edu: Higher Secondary	21.99 (63.47)	19.67 (74.81)	18.61 (74.81)	–0.101 (0.625)

Edu: Diploma	–52.47 (262.32)	–30.99 (302.42)	–46.24 (302.41)	12.751 (882.74)
Edu: Bachelor	240.76*** (67.35)	259.55*** (78.57)	259.02*** (78.57)	0.549 (0.738)
Edu: Masters	194.09 (130.38)	195.83 (153.23)	194.85 (153.24)	–0.280 (1.186)
Edu: PhD	260.43** (117.33)	275.67** (137.05)	274.62** (137.05)	0.344 (1.213)
Observations	212	212	212	212
*Note: Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.10*				
Source: Author's computation based on primary survey data.				

The analysis of education as an important variable affecting WTP indicates that people with a bachelor's degree have a WTP greater than Rs 250 on both the Tobit and CRCH models and at the 1% level of significance. Age and income, however, do not seem to influence WTP at all according to the various models used in this research (Table 6). Income appeared to be a positive predictor of WTP in the OLS, Tobit, and CRCH models but not significantly. Similarly, the age variable showed a negative but insignificant correlation to WTP indicating little variance for different age categories (Table 6). Since the dependent variable is censored, it is suggested that analytical methods utilizing models which allow for the presence of zero values will adequately estimate WTP. Based on this examination of the Tobit and CRCH models, it can be noted that the coefficient estimates and significance levels from each model are relatively consistent.

5.4. Predicted WTP by Education Level and Models: In addition, all three estimates support the connection between education level and WTP prediction. The data indicates that all three groups of educational levels (i.e., Bachelor's degree, Master's degree, and PhD) predict a higher WTP than the two educational levels of primary or secondary school (Table 7). For example, the WTP for the econometric model for individuals with "Primary" education is estimated to be about Rs 266 according to the Tobit estimates but for "PhD" individuals, the WTP is between Rs 526 and Rs 540.

Figure 1: Heat Map Showing Average WTP by Age Group and Education



5.5. Average WTP across Age Groups and Educational Qualifications: Average WTP across all age groups and levels of education increases as educational level increases (with the exception of a few instances). People with a Bachelor's degree or higher generally possess greater WTP than those with lower levels of education, particularly when individuals fall into the age groups of 30-49 years or 50-59 years (with an average greatest than Rs 400 and Rs 500, Figure 1).

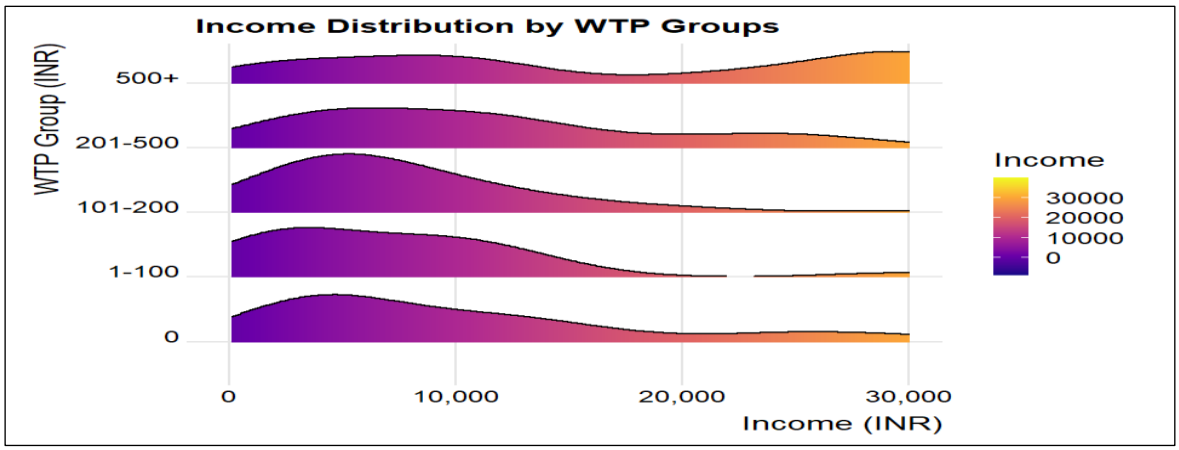
Table 7: Predicted WTP (INR) by Education Level and Model

Education Level	Tobit (Rs)	OLS (Rs)	CRCH (Rs)
Primary	266	279	267
Secondary	365	376	367
Higher Secondary	386	401	386
Diploma	235	226	221
Bachelor's Degree	525	520	524
Masters Degree	462	473	461
PhD	541	539	539

Source: Author's computation based on primary survey data (N = 212), estimated using R.

In contrast, the average of those with either the lowest or highest level of education has a lower WTP than those that have received either a primary or secondary education. The average WTP for either a primary or secondary education is only marginally more than Rs. 200 for each demographic over the age of 20 to 29, 30 to 39, and 60 to 69 years old (note that the younger age group will have more than one WTP category). The average WTP of the peak earning category (40 to 59 year old) is greater than that for any other demographic over 29 years of age, in part due to expected higher levels of WTP resulting from education. 5.6. Income Stratification based on WTP Groups: The average WTPs of both the younger group (20 to 29) and older groups (70 to 79) are much lower than those of individuals between 40 and 59 years of age. The graph of the number of WTP dollars received between educational groups shows the disparity in the income distribution of respondents based on the WTP groupings of 40 and older. Individuals who indicated high WTP amounts (Rs 201 - 500+), like many individuals found in the high-income classifications of respondents, mostly fall within the high-income classification ranges and indicate that there is a positive correlation between WTP and income levels. Respondents with a WTP of zero are found primarily in the low-income category; however, respondents that fall into the Rs 1-100 and Rs 101-200 WTP categories fall equally into both the low and middle-income categories (Figure 2). There is also an observable regression in the average income for the various WTP categories listed from the low to middle incomes as you move from the groups, on average, receiving the greatest dollars of taxable income.

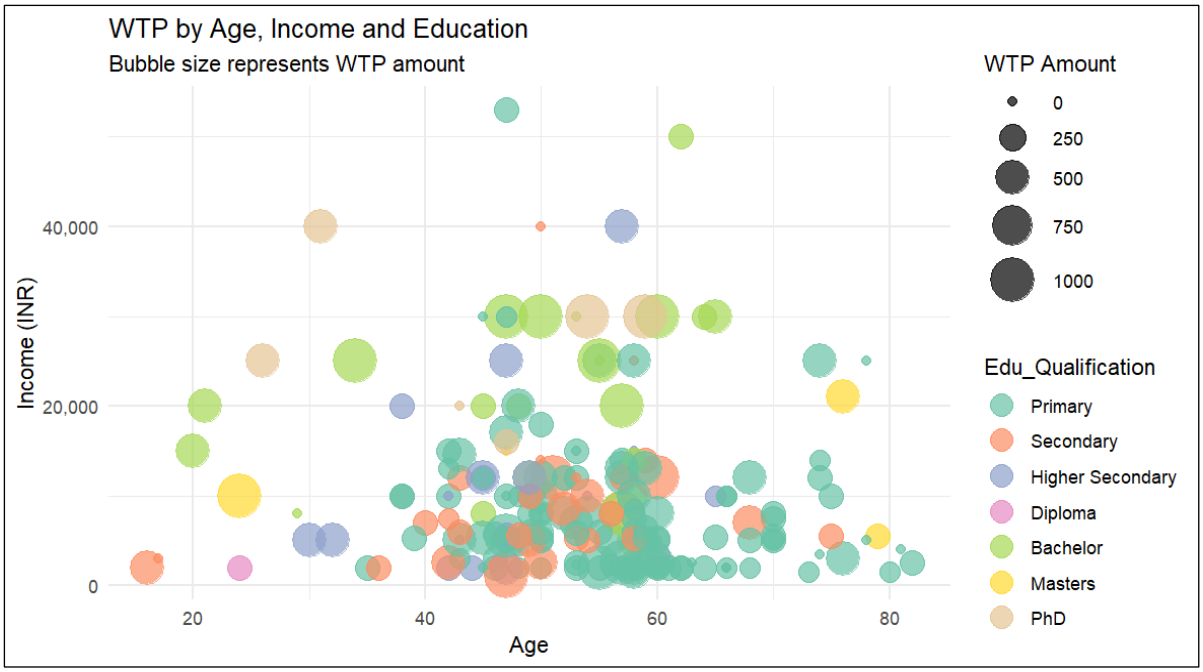
Figure 2: Ridge Line Plot Showing Income Distribution by WTP Groups



5.7. WTP by Age, Income, and Education: A Multidimensional View: The three-dimensional bubble chart depicts the correlation between age, income, and educational background on a

person's willingness to pay for the conservation of Pachathuruth. Each bubble denotes whether or not there is a correlation between age and income while the size of each bubble represents a person's value of WTP; bubble colour indicates a respondent's education level. The correlation between income level and WTP is evidenced by the larger number of higher-income respondents having larger bubbles, which supports the conclusions that the level of income has an effect on a respondent's WTP for Pachathuruth (Environmental Economic Theory). Bubbles indicating a higher level of WTP primarily were identified under the age of 30 or between the ages of 30 and 55. However, bubbles above the age of 55 had a relatively low WTP regardless of their income level, compared to someone who is 55 years old or younger. Respondents with a bachelors, masters, or doctoral degrees have large bubbles with high incomes; conversely, those with primary or secondary school have small bubbles with low incomes (Figure 3).

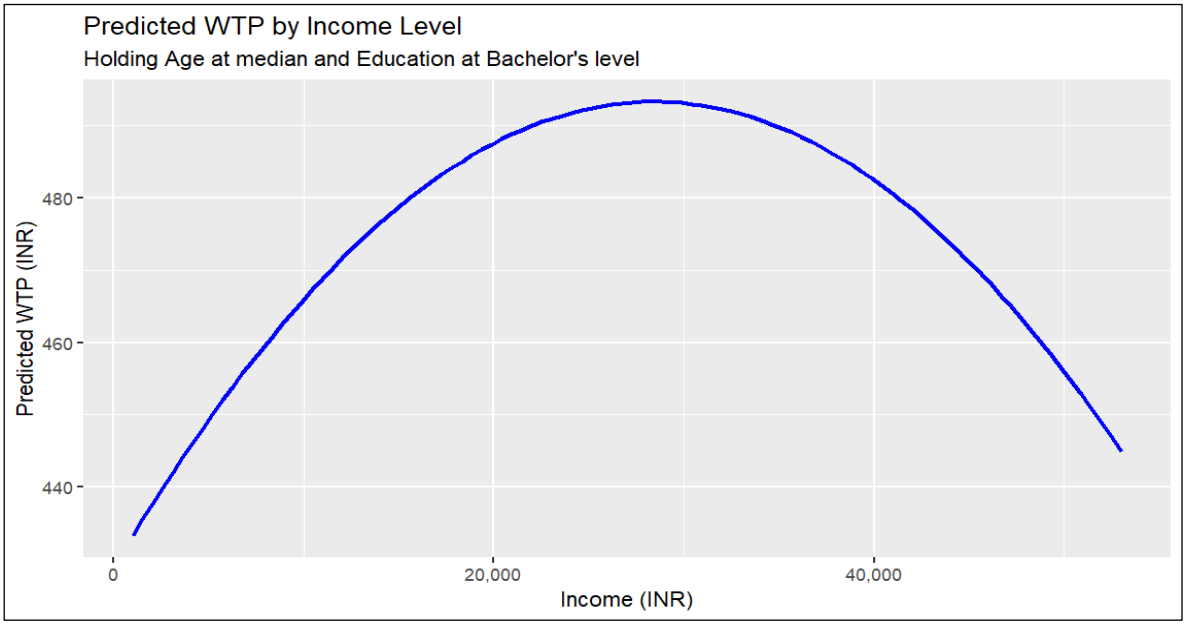
Figure 3: Bubble Chart showing WTP Distribution by Education Level



5.8. Predicted Willingness to Pay (WTP) by Income Level: Using a Tobit regression model, generated the predicted WTP for different income levels and found that income has a nonlinear and positive relationship with WTP for the conservation of Pachathuruth. Therefore, in this analysis, we have maintained the respondent's age (the median respondent age was 53 years) and education (the mean respondent's education level was held constant at a college degree) in order to examine the effects of income only and not include the other variables influencing WTP. When examined the predicted WTP by looking at the lowest income respondents' (less than Rs10,000), found that the WTP was quite low and ranged between Rs150-Rs250;

however, as income continued to increase above Rs10,000, the WTP continued to increase (as shown in figure 4). The increase in WTP was not at a constant rate as, once it reached a certain income threshold, the increase in WTP began to decrease, resulting in a nonlinear response. The nonlinear response is due to having performed a second-order polynomial transformation on the income variable in order to arrive at Tobit regression. If someone is able to pay more due to higher income, as their income continues to increase, there is a decrease in the increase they experience in WTP.

Figure 4: Predicted WTP Distribution by Income Level

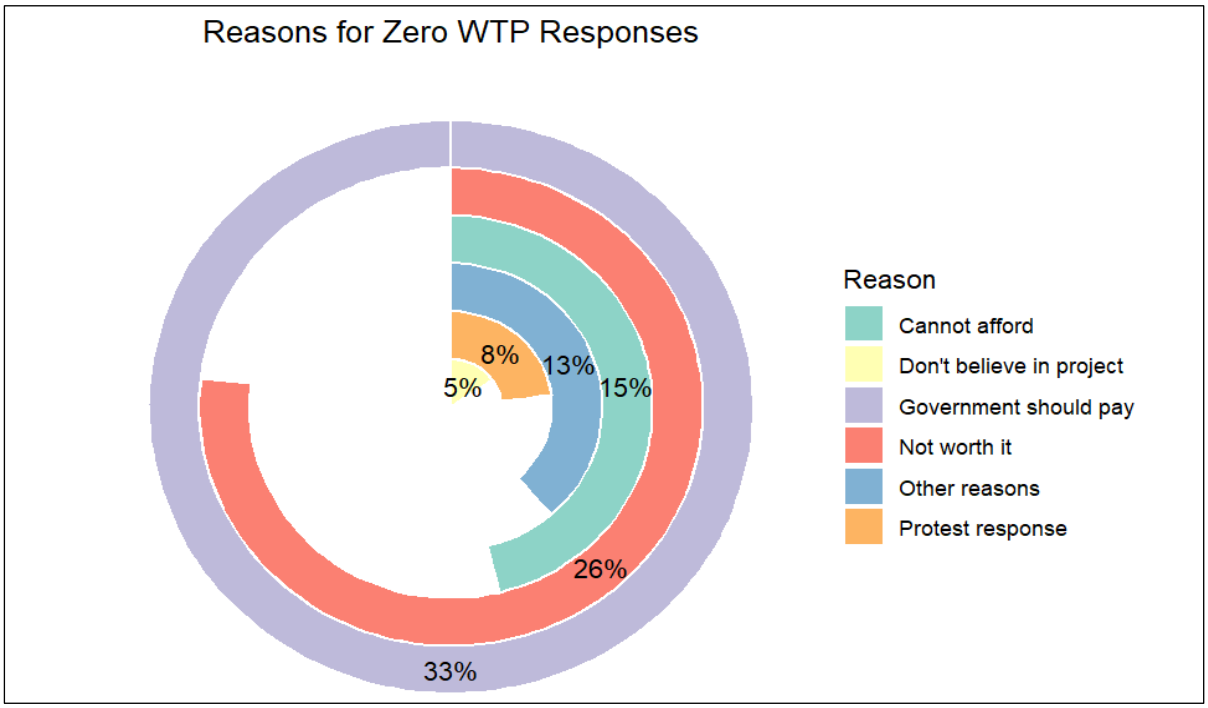


5.9. Predicted Probability of Positive WTP by Education Level: Based on their age, income and education, the logit model predicts the likelihood of an individual being willing to contribute to the conservation of Pachathuruth. The dependent variable, dichotomous in nature, will equal 1 when Maximum WTP > 0 or 0 otherwise. For an individual 53 years old with an income of Rs 7500, the model assesses the independent influence of education alone on whether that individual will say "Yes" to contribute. As indicated in Table 8, there are statistically significant and monotonic increases in the likelihood of willingness to contribute based upon the level of education attained. Even individuals who only possess a primary education have a base probability of willingness to pay of approximately 87%. Although there are no statistically significant differences in terms of the probabilities, there is an identifiable and consistent pattern such that the highest probabilities exist for individuals who possess at least a bachelor's or PhD level of education.

Table 8: Predicted Probability of Positive WTP by Education Level (Logit Model)	
Education Level	**Predicted Probability (P[WTP > 0])**
Primary	87.10%
Secondary	88.40%
Higher Secondary	88.10%
Diploma	88.90%
Bachelor's Degree	89.80%
Master's Degree	89.20%
PhD	89.60%
Source: Author's computation based on primary survey data (N = 212).	

5.10. Protest Analysis - Reasons for Zero WTP: According to the review of zero WTP responses, some people will say they don't have available cash to pay for their contribution. However, there are many responses you'll find that have answers typical of other forms of protest used in contingent valuation studies. Of the zero WTP responses, 33% indicate that they believe conservation is a responsibility of their government rather than an individual's responsibility. These types of responses can be found in contingent valuation studies, where survey participants will not participate due to a protest against the survey, rather than a lack of interest or inability to pay (Arrow et al., 1993). Secondly, 26% indicated that they felt it wasn't worth it. In addition, 15% of people indicated that they don't have the ability to contribute and the remaining 13% indicated that they gave "other reasons" for not being able to contribute (figure 5). For protest motives to occur, future systems will need to offer transparency, include people in the decision-making process, and give real and tangible conservation results to improve people's perception of whatever the conservation project or program is about.

Figure 5: Protest Analysis – Reasons for Zero WTP Responses



6. Conclusion

The research on the social and economic aspects of community attitudes toward the conservation of the Pachathuruth in Keralam focused on three aspects: social, economic, and perceptual; the researchers used both Contingent Valuation Method (CVM) and multi-model econometric analyses to establish the communities' willingness to pay (WTP) for ecosystem conservation and identify key factors that impact that value; the findings indicate that the respondents are aware of the necessity for conservation but are generally unwilling to pay; from an econometric viewpoint, education is the most important factor influencing WTP, especially among those holding Bachelor's or PhD degrees; however, unlike previous studies, neither of the income or age variables were significantly related to WTP; the Tobit regression model is found to be the best model to predict the latent value of the ecosystem; many survey participants were willing to pay between Rs. 0 to Rs. 100- the willingness to accept bids declines substantially above this amount. The lack of trust for governmental and institutional management of environmental concerns, combined with the generally poor level of conservation performance, necessitates the use of locally oriented environmental planning and feedback to fill the credibility gap between those who live in the area and the institutions that manage it. Conservation practices must not only be compatible with the socio-economic

conditions of the area, but they also must be based upon the culturally and ecologically important values of the area. Participation and involvement through education, equitable resource use, participatory governance, and links between livelihoods and riverine islet conservation practices will be the foundation for achieving sustainable conservation of these islets. The current condition of Pachathuruth is representative of the challenges that exist to effective environmental management in India.

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