An Assessment of Recreation Value of Rumassala Coastal Region in Sri Lanka

Wijaynayake, N.P.M., Udugama, J.M.M. and Guruge, T.P.S.R.

Department of Agribusiness Management, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka, Makandura, Gonawila (NWP)

**Corresponding Author:*
Email: menukaudugama@gmail.com

ABSTRACT

The coastal ecosystem is an important ecological resource generating multiple activities associated with outdoor recreation in many coastal communities that endorse protection and management of coastal lands. Lack of assessments of the benefits of coastal lands against the associated costs is one of the growing problems among the coastal conservation and management. This study was used to examine the recreational demand for Rumassala coastal area in Sri Lanka a coastal ecosystem situates within the wet zone of Southern Sri Lanka which consist of continuous rocky substratum interspersed with boulder fields and dead coral beds. In this study, the recreational demand of local visitors was derived through individual travel cost method, where the number of visits that the individuals actually made to the site during a specified period of time that depends on the travel cost, time costs, monthly household income and other individual characteristics. The recreational demand for Rumassala coastal area was derived through welfare that visitors derive from recreational activities (Rs. 15,797). The total consumer surplus generated from the community would be far higher if we were to incorporate other use- and non-use values into it. Coastal area can contribute to diversifying the recreational activities through an entrance fee (Rs. 35) for the restoration and managing of the sites.

KEYWORDS: Coastal ecosystems, Non- market valuation, Recreation, Rumassala coastal area, Travel cost

Introduction

Coastal ecosystems are viewed as important ecological resources to generate multiple activities associated with outdoor recreation in many coastal communities that endorse protection and management of coastal lands. Assessing the benefits of coastal lands against the costs associated with their protection and management has led to a growing literature of recreational value of coastal ecosystems (Ghermandi et al., 2010).

Recreation provides opportunity and a nexus for managing the interaction between ecosystems and people, including the development and protection of ecosystems. Recreational activities, such as walking, boating, photography, nature study and swimming, offer an opportunity for many people to experience the benefits of the ecosystem directly. Further recreation fulfils the psychological wellbeing through aesthetic experiences, intellectual stimulation, and inspiration.

In literature, recreation in form of everyday or short term in nearby green spaces, day tourism, and overnight tourism are often lumped and discussed together (Guruge et al., 2017).

Researchers have generally estimated the recreational value by using nonmarket valuation techniques, which can be broadly categorized under two methods, (a) direct and (b) indirect. Direct methods use surveys to ask an individual's valuation of goods in a hypothetical market and indirect the methods rely on the behaviour of consumers in related markets to reveal their valuation of non-market goods (Haab and McConnell, 2002). There are three basic approaches to estimate the recreational value: single site demand (Travel Cost) method, site choice (Random Utility) method, and stated preference (Contingent Valuation) method. These methods have been used either individually or in combination, to estimate the welfare changes resulting from quality changes in recreational sites.

The Travel Cost Method (TCM) is a revealed preference method based on observed behaviour reflecting utility maximization subject to a constraint (Freeman, 1993). TCM estimates the Marshallian consumer surplus that is bounded by the compensating variation (CV) and equivalent variation (EV) welfare measures. This method uses the travel cost as a proxy for the price of recreation and the decision variable as the number of visits paid by the consumer to a certain recreation site within a particular time period. Travel cost varies with distance from the recreational site and possible to derive a surrogate demand curve from the varying cost information (Brander et al., 2006; Gunatilake, 2003). There are two basic methods depending on the definition of the dependent variable: Individual Travel Cost Method (ITCM) and Zonal Travel Cost Method (ZTCM). ITCM is appropriate for sites with high individual visitation rates and ZTCM is applicable for sites with very low individual visitation patterns. ITCM has distinct advantages over ZTCM as it accounts the inherent variation in the data by using a smaller number of observations. Further the method is more flexible, statistically efficient, theoretical consistent, and can be applied to a wide range of sites (Bowker and Leeworthy 1998; Rolfe and Prayaga, 2007).

This study was used to examine the recreational demand for Rumassala coastal area in Sri Lanka. The study locality is a coastal ecosystem situates within the wet zone of Southern Sri Lanka which consist of continuous rocky substratum interspersed with boulder fields and dead coral beds. Rumassala (6.015524°N and 80.236281°E) lies in a marine protected area called Rumassala Marine Sanctuary (RMS). Rumassala. A small near-shore coral reef named Bouna-Vista growing on hard substrate around the base of the Rumassala hill. The hilly headland steps towards the Bouna-Vista reef via the intertidal rocky shore and the shore area is referred to as "jungle beach" in local folklore. There is a restricted naval security zone towards the North that makes human access limited. Snorkelling, trampling, SCUBA diving, coral viewing, skim boarding, collection of certain species, research, overturning rocks, and photography are some of the recreational activities of visitors that were observed.

With this background, the purpose of the present study is to derive recreational demand for Rumassala coastal area to motivate and sustain public support for coastal protection and conservation through monetary signals.

Methodology

Theoretical Framework

Individual preferences for non-market goods are derived in correspondence to the costs of travel to acquire is known as travel cost method. This method is predominantly applied to outdoor recreation modelling and is applicable to valuation of certain amenities in biodiversity and ecosystem. It is often assumed, that there is an associated cost with the recreational experiences as a direct or an opportunity cost. The change of the quality or quantity can be valued through the demand function for visiting the site that is being studied. There are a range of issues including; analyst's judgements with regard to the treatment of costs, extent of the access (closer sites with large number of visitor and restricted areas with no value under the TC), and difficulty in recognizing the importance or existence of a site (Chee, 2004; Farber et al., 2002). Travel cost model is based on that the cost of travelling to a site as an important component of the full cost of a visit and also wide variation in travel costs across any sample of visitors to that site. According to McConnell (1992), the individual's utility "*u*" depends on bundle of other commodities (x), number of visits to the recreational site (r), quality of the recreational site (q); and the individual visitor will maximize following utility function;

$$Max = u(x, r, q) \quad [1]$$

The consumer faces the budget constraint:

$$M + pw.t_w = x + c.r \quad [2]$$

Where M is exogenous income pw is wage rate t_w is hours of work and c is monetary cost of a trip. In addition to the above budget constraint, the consumer faces the following time constraint:

$$t^* = t_w + (t_1 + t_2)r \quad [3]$$

Where t^* is total discretionary time, t_1 is round trip travel time, and t_2 is time spent at site. Substituting the $\mathbf{t_w}$ to budget constraint;

$$M + pw.t^* = x + r[c + pw(t_1 + t_2)] \quad [4]$$

This equation implies that the total income of the individual is spent on recreation site as well as the bundle of other commodities.

Total income has two facets *i.e.* the exogenous income and the potential income earned by allocating all the available time for work.

Consumer's expenditure includes cost of the other commodities and cost of recreation. The price of recreation (Pr) $[c + pw(t_1 + t_2)]$ includes the monetary cost of travel to the site (*c*), the time cost of travel to the site and the cost of time spent at the site $pw(t_1 + t_2)$. The monetary cost of travel has two components; the admission fee and the monetary cost of travel. If the admission fee represents by f and the monetary cost of travel is given by $p_d.d$ wherep_d, is the cost of travel/Km and d is the distance travelled. Thus, the utility maximization problem of the consumer can be represented as $\text{Max: } u(x, r, q)$;

$$St.M + pw.t^* = x + r[f + p_d.d + pw(t_1 + t_2)] \quad [5]$$

The Lagrangian function of the maximization problem is;

$$L = u(x, r, q) + h(M + pw.t^* - [x + r\{f + p_d.d + pw(t_1 + t_2)\} \quad [6]$$

Where *h* is the marginal utility of money income. By using the first order necessary conditions of the utility maximization problem are;

$$M + pw.t^* = x + r\{f + p_d.d + pw(t_1 + t_2) \quad [7]$$

This equation shows the consumer's income to his expenditure. Solution to the above equations provides demand function for number of visits to the recreation site that can be expressed as; $r[p_r(f, p_d, d, pw, t_1, t_2), M, Q]$

And the estimated consumer surplus for an individual, which makes r visits to relevant site, in case of a linear form is given by

$$CS = -r^2/2\beta \quad [8]$$

Then the total recreational value of the site can be estimated through adding consumer surplus and total cost of the visit. Therefore, the basic model for this study can be specified as follows;

$$r_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 \quad [9]$$

Where, r_i: the dependent variable which stands for the number of visits by the i^{th} individual to Rumassala per year, Where, X_1: total cost which includes time cost, fuel cost, food cost, accommodation cost and on site expenses, X_2: individual's income, X_3: age of visitor, X_4 : visitor's highest level of education, X_5 : household size, X_6 : park quality, X_7 : income and X_8 : gender which was taken as a dummy variable.

Economic valuation of a recreational site involves the estimation of the demand for recreation through calculation of the associated consumer surplus. Observable Marshallian demand curve is used to estimate the value.

Those who live close to the recreational site would be expected to make more visits to the site as implicit price measured in terms of travel and time cost is lower than the other visitors. Therefore, according to the law of demand the visitation rate should have a negative relation to the travel cost. Consumer surplus is expected to be lower for the other visitors than for the visitors from adjacent. Thus, the demand function for an un-priced commodity can be estimated by using visitation rate and the travel cost that can be used to calculate the total consumer surplus or the welfare derived from the recreational site.

In this study, the recreational demand of local visitors was derived through individual travel cost method (ITCM), where the number of visits that the individuals actually made to the site during a specified period of time that depends on the travel cost, time costs, monthly household income and other individual characteristics.

Data Collection

Data were collected from July 2to September 2020 from Monday to Sunday (to identify the variation within weekdays and weekends). Pre-tested and numbered questionnaires were used at the entry point to collect data from those who are more than 16 years of age. One member per group was selected to minimize the homogeneity. Data were collected from only local (domestic) visitors due to very low visiting rates and multi-destination trips. A set of n=400 pre-numbered questionnaires were filled by respondents who were visiting the site. Then we generated random numbers and weighted the sample of 200 visitors to capture the variation by obtaining a representative sample.

Recreational demand of local visitors was derived through ITCM and number of average trips per month taken by an individual to the recreational site was taken as the dependent variable. The explanatory variables include the travel cost per individual to the site, age, and household income. Gender, type of employment, educational level, and marital status were used as dummy variables. Travel cost was derived by aggregating round trip travel cost to the site and opportunity cost of the time. Different modes of transport were considered and average per km travel cost was calculated using the data from the questionnaire (Guruge et al, 2020).

Total time was derived by adding round trip time with the onsite time. Time cost was derived by multiplying a fixed fraction (0.004/hr on weekday and 0.002/hr on weekends) of the wage rate as proxy to the opportunity cost of time. Therefore, data were analysed by using negative binomial regression in generalization of Poisson regression by generalized linear model. Consumer surplus of a local person per year was derived by using the travel cost and average visiting rate.

Results and Discussion

Characteristics of Visitors

The average visiting rate of the respondents was 3 times with a minimum of 1, and a maximum of 7 years and a standard deviation of 1 (Table 1).

The mean travel cost was Rs. 6125 and the mean monthly wage of the respondents was LKR 54,195 while the maximum was LKR 250,000. Majority of the visitors were ranked above the national urban minimum monthly income.

In the sample, nearly 66% (n= 132) of the visitors were male while 56% percent of the visitors were married. More than 50 percent of the respondents had a secondary education while the less literate percentage was comparatively low. Only 17% of the respondents were unpaid family workers or students over 16 years.

Table 1: Sample Statistics

Parameter	Mean Value
Visitation rate per person per year	3.11
Total cost of the trip	6,124.90
Number of family members	4.19

It is revealed that majority of the respondents visit Rumassala for the purpose of swimming (44.8%) rather than relaxing or watching scenic beauty. Most of the respondents were least prefer for sightseeing.

Results of Regression Analysis

Recreational demand for local visitors was derived through ITCM and was analysed by using negative binomial regression in generalization of Poisson regression by generalized linear model (Table 2).

Table 2: Results of the Regression Analysis

	Coefficient	SD	P Value
Constant	4.352	1.789	0.017
Total cost	-0.345	0	0.000*
Distance	-0.344	0.003	0.000*
Male (D1)	-0.086	0.561	0.291
Quality of the site	0.144	0.27	0.050*
Level of education	-0.063	0.228	0.431
No of family members	-0.017	0.246	0.82
Age	-0.017	0.313	0.831
Income	0.088	0.245	0.301

Distance to the site, travel cost, and quality of the site has significant impact towards the visitation rate at 95% significant level. All the other variables were not significant and lead to conclude that the age, gender, number of family members, income and educational level has no impact to the visitation rate.

The negative sign and the significance of the travel cost variable suggest a downward sloping demand curve and indicate that the visitation rate decreases as the travel cost increases (Figure 1). Consumer surplus of a local person per year was derived by using the travel cost and average visiting rate.

The negative sign of the distance to the site reveals demand for the study site is higher from those respondents who live far. Further the positive coefficient sign indicates that the quality of the park affects to the visitation rate positively. This implied that if the quality of Rumassala is improved, visitor would like to visit more. The education level of visitors, number of family members, and age bears a negative sign while income of the respondents has a positive sign.

But all those variables have insignificant relationship with the demand to the Rumassala. Recreational value of the site and the consumer surplus was calculated by using the demand curve.

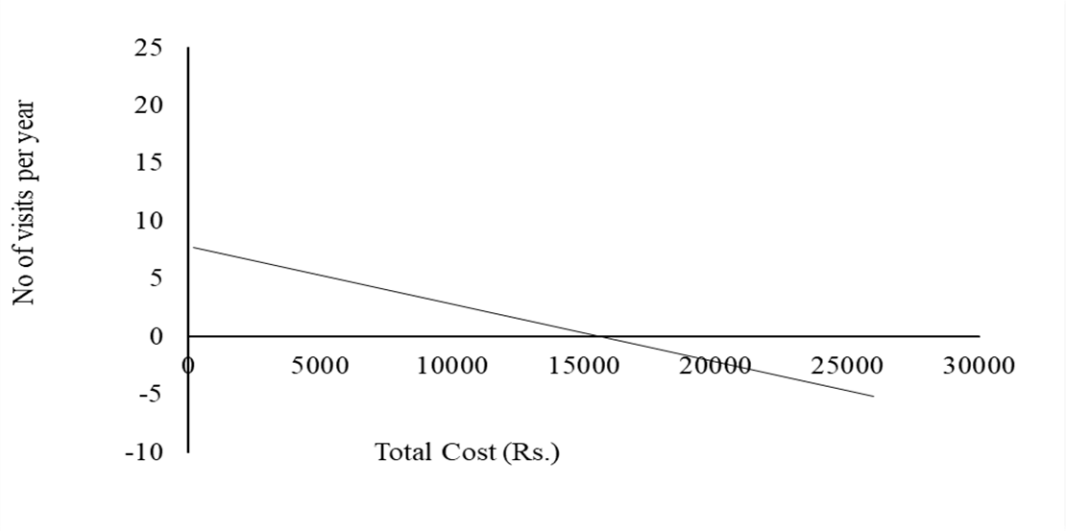

Figure 1: Demand Curve

The consumer surplus per person was Rs.9,672 which shows the value of the benefit that visitors gain through visiting Rumassala. The surplus also implies the amount that the visitors are willing to pay for enjoy the site's scenic beauty. The recreational value per person was Rs.15,797 (Figure 2).

Total value of the site couldn't be measured due to the unavailability of total visits of the site per year. Simulating entrance fee for this site was coming under one of specific objective. The importance of imposing an entrance fee to uphold the study site was identified. Number of the visitors based on their highest Willingness to Pay (WTP) was taken against the different entrance fees ranged from Rs.0 to Rs.110. Based on the highest responses the entrance fee that can be imposed was identified as Rs.35.

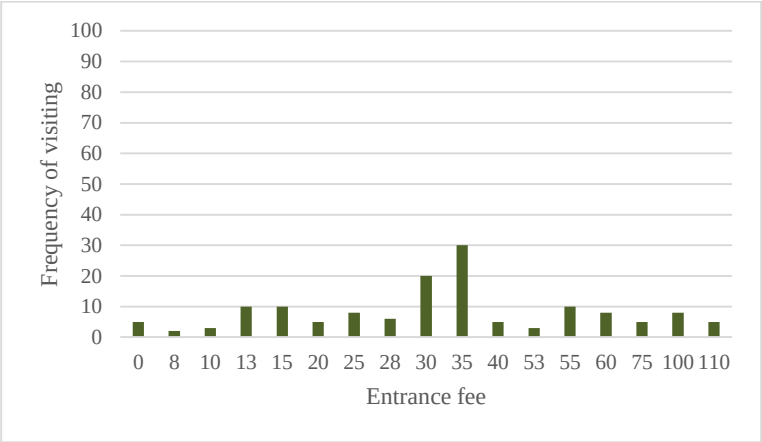

Figure 2: Willingness to Pay as Entrance Fee

Conclusion and Policy Implications

The Individual Travel cost method was used to estimate the recreational demand for Rumassala coastal area through welfare that visitors derive from recreational activities. The total consumer surplus generated from the community would be far higher if we were to incorporate other use- and non-use values into it. ITCM has been used to estimate the recreational value for local visitors as an innovative approach while identifying the most influential aspects on visiting rate. The socio-economic variables used in the study reveal important information that should be of interest to resource managers and planners. Coastal area can contribute to diversifying the recreational activities through an entrance fee for the restoration and managing of the sites.

The coastal area insists high potential for development into an important recreational site while both concern and criticism are growing. Study highlights the preference of visitors to enhance the quality of the site. Further the results highpoints people's willingness to pay for the recreational services provided by the Rumassala coastal area. The study therefore recommends that the authorities should develop recreational activities with least disturbance to the natural environment which include eco-friendly restaurants, nature trails, board walks, waterfront snack bars and viewing decks for bird watching and sunset. As an area experiencing rapid community and environmental transformations, there is a need to develop capacity for coastal ecosystem management to respond to changes and to develop policy directions that can help to enhance the outdoor recreations.

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