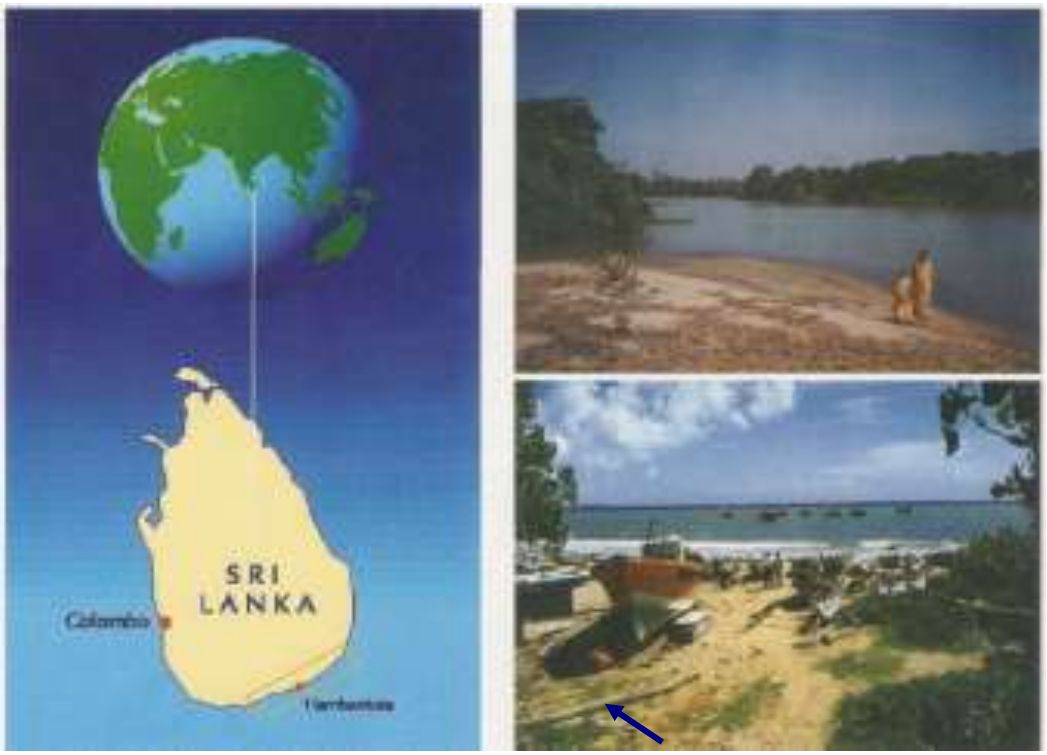
Hambantota HICZMP

Integrated Coastal Zone Management Project

HICZMP Output No.2c

Economic Valuation of Kudawella Blowhole



SOUTHERN DEVELOPMENT AUTHORITY OF SRI LANKA

COAST CONSERVATION DEPARTMENT

HICZMP - Report

A project funded by the Government of Norway			
HICZMP Office:		***Southern Development Authority (SDA)***	***Coast Conservation Department (CCD)***
15 May Street		*14 A, Akuressa rd.*	*4th Fir Maligawatta Secretariat 10*
Hambantota		*Matere*	*Colombo*
Sri Lanka		*Sri Lanka*	*Sri Lanka*
Phone: (047) 20616/21003		*Phone: (041) 27333/20076*	*Phone: (01) 449756/54*
Fax: (047) 21002		*Fax: (041) 27334*	*Fax: (01) 438005*
e.mail: hiczmp@panlanka.no			

Title	**Serial No.**	**Date**
Economic valuation of Kudawella Blowhole - Hummanaya	02/2000	16.11. 2000
	Report No. Sub-No. 2c	Pages Price
Local consultant (s) **Professor K.N.J. Katupotha** Dr. Upali Wickramasinghe Mr. Indra Ranasinghe	**Topic group** HICZMP Output 2	**Distribution** Free
	Geographical area Hambantota District, Sri Lanka	**Printed** Sri Lanka

International Consultant(s) / Task manager(s)	**Consultant ref.**
Norwegian Institute for Water Research Kari Nygaard hjelpelinje på 4 pt som gir "luft" etter siste linje - skrives ikke ut - er "hidden"	O-97214 hjelpelinje på 4 pt som gir "luft" etter siste linje - skrives ikke ut - er "hidden"

Abstract

This Report presents the findings of a study carried out to ascertain the demand for viewing the blowhole spectacle and determining its recreational value based on a willingness to pay survey. The socioeconomic impact of the blowhole in the area is evaluated and a set of recommendations is developed for sustainable management of the bolwhole and the surrounding areas.

Jan Sorensen
Project manager

K.Nygaard
Task Manager

Claude Fernando
Project Director

ISBN 5257-2006 82-577-4983-4

The digital version of this publication could be obtained from the Coastal Resource Referral Center at the Chamber of Commerce – Hambantota

For further details

Address:- Coastal Resource Referral Center (CRRC)
Hambantota District Chamber of Commerce
Tangalle Road, Hambantota.
Tel no :- 047-2220940/1
E-mail :- info@hdcc.lk/hiczmp/crrc
Web :- www.hdcc.lk/hiczmp/crrc

PREFACE

The Hambantota Integrated Coastal Zone Management Project (HICZMP) is an umbrella project comprising14 sub-projects (including project administration), which have been implemented in the course of the current phase 1997-2000 (titles are abbreviated):

1) Integrated zoning plan for the coastal area of Hambantota district
2) Special Area Management (SAM) process at two prioritised sites: Mawelle lagoon and Hambantota dunes
3) Awareness campaign on coastal resources management
4) Mapping of environmentally sensitive areas, including recommendations for preservation
5) Identification of adverse impacts on the environment from development activities and implementation of mitigation measures
6) Existing legal provisions reviewed for the purpose of streamlining
7) Institutional strengthening in support of coastal zone management in Hambantota District
8) Mechanisms for project coordination, implementation and effective law enforcement
9) Technical support to the coastal extension centre/foundation at Rekawa lagoon
10) Coastal and marine pollution monitoring program, including baseline survey
11) Consultative mechanism to obtain participation of stakeholders in the management and development process
12) Program for utilising existing and planned environmental facilities
13) Environmental guidelines for developers, and the public
14) Project administration.

The project has been funded by a grant from the Government of Norway. The Southern Development Authority of Sri Lanka (SDA) and the Coast Conservation Department (CCD) has been responsible for the co-ordination and the implementation of HICZMP respectively. Inter-ministerial commitment has been ensured through representation in the National Steering Committee (NSC), while the Project Co-ordination Committee (PCC) has been the main forum for the local authorities, non-governmental organisations, and other stakeholders. The project office located in the town of Hambantota has functioned as the focal point for the project activities.

All the sub-projects has been carried out by Sri Lankan consultants with technical support provided by the Norwegian Institute for Water Research (NIVA), and with assistance from the Norwegian Institute for Urban and Regional Research (NIBR).

This report part of the activities carried out under HICZMP sub-project no. 2: **Special Area Management (SAM) process at two prioritized sites: Mawlle lagoon and Hambantota dunes.** The other documentation referred to in the report (e.g. working papers/technical papers, reports of meetings, training programmes, etc.) are also published and will be made available for those interested.

It is hoped that this report and the other supporting documents will be useful to the stakeholders in Hambantota district as well as for all those parties, such as state agencies, non-governmental organisations, planners, researchers and donor-agencies, who are involved in coastal zone management in Sri Lanka.

We wish to place on record our appreciation of the devoted work of all those who have participated actively in the implementation of the project, the authors/consultants for preparing the documents and the project management for publishing them.

S. Amerasekera
Secretary Ministry of Fisheries
and Aquatic Resources
Chairman NSC, HICZMP.

A. P Amaratunge
District Secretary
Hambantota
Chairman PCC, HICZMP

CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

DSD	Divisional Secretariat Division
HICZMP	Hambantota Integrated Coastal Zone Management Project
Km	Kilometers
PV	Present Value
WTP	Willingness-to-pay

THE HO……..O – MANAYA!
A MYSTERY CAVE!

Being your tour by seeing the Ho…..O-maniya! I ask you. Had I said Blowhole, you might not have given much thought to it – but Hoo…..Manaya It spells mystery

At Nakulugamuwa, off the 117th mile on the South Coast Road, a minor track branches off making for the coast. I do not vouch that it is motarable, but having covered a mile, or a little more, you arrive on the seashore, which reveals a sheltered bay with its entrance dominated, by picturesque cliffs. They call the spot Valle-Kale, meaning "the jungle on the sea-shore." Nonetheless, this stretch of beach is a veritable hive of industry.Fishing-nets and boats, and various other types of fishing gear lie scattered about, telling too plenty that the prosperity of the inhabitants of the nearby village depends entirely on what the bay and fishing banks further out have to offer. Here, no doubt, one may glean many thrilling tales of the sea-of-life and death struggles with the elements pitted against frail outrigger canoe and sail…But we follow a guide who waits to take us one of the flanking headlands.

An enourmous crowd, collected apparently from nowhere, has gone on before you, and forms a live wall on the further edge of the cliff. Hoo!…They shout and again Ho…o! Ho…o! The sea will not brook ridicule, they declare, but what is this you now hear? No! This sound seems different. The hoarse gurgling roar gathers the in volume then suddenly, a pillar of water churn to a dazzling whiteness gushes out somewhere up the cliff, and for the moment you stand against.

Up..up, it rushes, attaining may be even as much as 60 feet in height, then, standing vertically poised for a split second… It falls back in a glistering veil of spray. It is the only discovered blowhole in Ceylon.

R.L. Brohier (1965)
SEEING CEYLON, pp 170-171

1. INTRODUCTION

The blowhole[1] -*Hummanaya* in Sinhalese- is located on the Kudawella headland, which is a seaward extension of land in between two pocket beaches. This is located in the Kudawella fishing village of the Tangalla Divisional Secretariat Division (DSD) and 1.5 km away from the Matara-Tangalla main road (Figure 1).

Natural bays with a curved shoreline extending about 1.8 km including the blowhole have become attractive areas for local and foreign visitors. The stretch of sea from Galle to Hambantota where the blowhole is located is known to have by numerous natural and scenic features, including living corals, dead-submerged and emerged coral reef patches, beach-rock shoals, pocket bays, narrow and ephemeral beaches, embayments (e.g., Weligama Bay), rock promontories, headlands and cliff sectors. The area from Devundra to Tangalle is characterized by headland-bay-beaches. There are also barrier beaches with swamps, lagoons and lakes.

The recent exposure of the Blowhole and other natural splendors in the Kudawella area to the public by the electronic media has transformed the surrounding area into a busy tourist attraction. Associated with this transformation include the emergence of new business activities, environmental degradation of the surrounding area and certain social tensions. The observed visitation rates suggest that there is a significant recreational demand for the blowhole by the public. At present, there is neither a proper mechanism in place to maintain the area properly nor method of meeting visitor requirements such as water, sanitation, access roads, etc.

The blowhole area is interesting in terms of geography and geology as well. Deep water in the area is nearby and sea is very strong during the monsoon periods. These monsoons and perennial swells result in a persistent wave attack upon the rocky shores in the area.

[1] A blowhole is vent to permit the escape of air, gas or water. In this case, columns of water are violently ejected through the vent, which is often a narrow exit at the top of the cliff. Water sprays are formed when waves are driven against the coast. A blowhole is formed by wave erosion of along a fault or a joint at the back of the sea cave; when a wave surges into the cave the compressed air forces spray violently up the narrow orifice (Whittow, 1984).

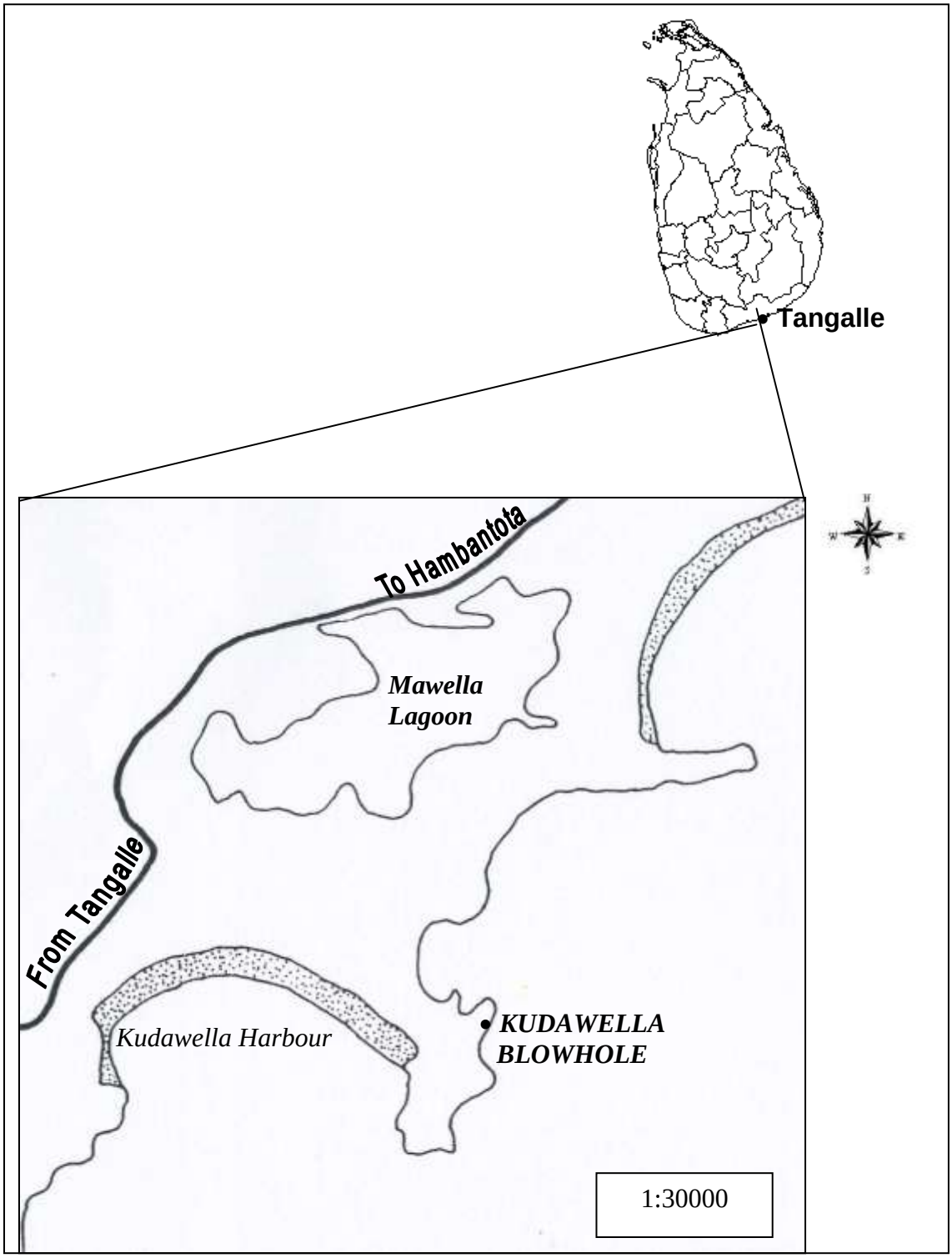


FIGURE 1. LOCATION MAP OF THE STUDY AREA.

The geological characteristics, including rock formation and landscape in the area are prone to erosional and depositional impact of winds, waves, currents and tides. Accordingly, relatively narrow sea cave at the top of the Kudawella cliff is formed by wave erosion along a faulted or

a jointed pre-Cambrian rocks in the margin of highland and Vijayan rock complexes, which water and spray are forced when waves are driven against the coast.

Within this background, it is pertinent to undertake a study on the blowhole and the surrounding environs to ascertain the extent of demand to the area, extent of demand for other services, potential for the development of the area and the measures needed to manage the area. If any government agency is interested in undertaking development activities in the area, it is natural not only to include narrow "profitability" criterion but also in the interest of wider "social" implications. Any study would be meaningful only if it includes both financial and economic analyses in addition to estimating the demand for the blowhole. A natural outcome of such a process would be to calculate the recreational value of the blowhole and the surrounding environs.

The objectives of the present study are to: ascertain the demand for the blowhole; determine the recreational value of the blowhole and the surrounding environs; determine the willingness to pay for the blowhole; evaluate the socio-economic impact of the blowhole on the area; and develop a set of recommendations for sustainable management of the blowhole and the surrounding area.

2. ECONOMIC VALUATION OF THE BLOWHOLE

The value of the blowhole derives not only from its present and future recreational value, but also from its uniqueness or mere existence. The actual recreational value of the blowhole derives from its use by individuals, which are termed as *user values,* or user benefits. Those who like to view the blowhole express their preferences by actually visiting the blowhole and spending on various other things to secure the benefits that can be derived from it. Visiting the blowhole is costly in terms of actual travel cost and the income foregone on the day of the visit. Besides, visitors may spend on other media such as photograph to secure the benefits from the blowhole. The recreational value of environmental resources such as the blowhole is expected to have an increasing demand with rising incomes of the people and over time. With regard to income, as it has been observed elsewhere, the demand for recreational activities tend to increase as income levels of people rise.

Option values, defined as the future recreational value, are related to the potential future benefits of the existence of the blowhole. Pearce and Turner, 1990 (p. 130) define option value as "an expression of preference for the preservation of an environment against some probability that the individual will make use of it at a later data". They have pointed out that increased awareness of *irreversibility* of environmental resources such as the blowhole and its *uniqueness* makes people to attach higher values for environmental resources with recreational potential over time. Blowhole has both these properties. It is irreversible since there will be little or no chance of regeneration of the blowhole if it is not preserved. It is unique because it is the only blowhole in Sri Lanka and is considered to be a large blowhole in terms of height among the handful of known blowholes in the world. Therefore, the blowhole has what is known as "intrinsic value." Intrinsic values, as Pearce and Turner (1990, p. 131) discribe, are certainly fuzzy values since it is not clear as to how they can be defined. Generally, intrinsic values are estimated by using the willingness-to-pay to preserve environmental resources for the benefit of others.

Combining them together, one can write the total economic value function of an environmental resource such as the blowhole as a summation of actual value, option value and the existence value. Although the demand for an environmental resource such as the blowhole is determined by all these factors, in practice it is extremely difficult to estimate all these values. In this report, only the actual recreational value has been estimated to owe many limitations of this study.

3. ESTIMATING THE RECREATIONAL VALUE OF THE BLOWHOLE

Demand for environmental services is usually implicit. Actual prices are generally not paid, and values have to be determined by indirect methods. The blowhole does not have an established demand with directly observable prices. Therefore, it is difficult to estimate a demand function in comparison to a commodity with an established demand and observable prices. This compels researchers to use indirect evaluation techniques such as willingness-to-pay and travel cost approach to estimate demand functions. This study utilizes these two techniques in order to estimate the recreational value of the blowhole. In addition, these estimates are supplemented by survey information on directly observable economic activities of the area.

Willingness-to-pay (WTP) is a method, researchers often utilize for estimating demand for environmental resources that do not have directly observable prices. Under this method, respondents are directly questioned about the amount they are willing to pay for accessing a resource. Hufschmid, James, et.al., (1983, p. 235) point out that, "willingness to pay in order to avoid a loss of a good and willingness to accept compensation for that loss are usually not the same. People are usually willing to accept a higher compensation for a loss than they are willing to pay to prevent the same loss". In such situations, eliciting preferences as more difficult and often lead to inaccurate values unless proper techniques are not utilized. The most common method of eliciting preferences in such circumstances is to use bidding games with two types of questions: willingness to pay for service and a willingness to accept compensation. The way these questions are asked from the respondents makes a significant difference as far as the values are concerned. This is particularly important in the context where WTP is dependent on information and knowledge of environmental resources.

The travel cost approach is a method designed to avoid this subjectivity since the method depends on the directly observable variables that the researchers can verify. For this reason, this study uses the travel cost approach as the main method in estimating the value of the blowhole. The basic model used under the travel cost approach assumes that an individual's choice of a site depends on a number of factors such as travel cost, time spent in travelling, substitute sites, and income. Some consider other variables such as travel time, substitute sites

and taste in similar equations. Since travel time is highly correlated with cost, it was not included in this study. People combine many places in one trip to maximize their enjoyment of the trip. As such, sites can be treated as complementary to each other rather than substitutes. The availability of places with various qualities attracts people to such an area. Taste is a theoretical argument one can include, but their choice of a place depends on their taste and hence a visit can be considered as a revealed preference of the taste of a person. Travel cost and average incomes of visitors are used as the variables in this model. Mathematically, the relationship can be summarized:

$$V_i^0 = f\left(\frac{C_i}{n}, Y_i\right)$$

where V_i^0 = visitation rate at zero admission fee

C_i = round trip travel cost from origin area i

n = number of important places visited in the trip

Y_i = average income per person in area i

i = origin where the trip was started

In several studies, admission fee has been incorporated to estimate the demand curve by modifying the above equation as follows,

$$V_i^0 = f\left(\frac{C_i}{n} + x, Y_i\right)$$

where x is the admission fee. The visitation rate, thus, becomes a function of the admission fee x: $\overline{V}^x = g(x)$. By varying the admission fee, one could then derive the demand curve for the site under consideration. In this study, we use incremental travel cost rather than an admission fee to derive the demand curve.

The area under the demand curve represents the gross value of consumer's surplus and thus the gross value of the recreational site for one year. Assuming that the site will last indefinitely into the future, the present value (PV) of the site can be estimated by using the following formula: $PV = \frac{W}{d}$, where W is the consumer's surplus or the area under the demand curve that gives us the recreational value of the site for a given year and d is the discount rate. In fact, the

PV so calculated would be smaller than the actual value that will prevail in the future due to increase in population and increase in value of natural sites and open spaces in the future. Therefore, the value must be considered as the minimum expected PV or base value of the blowhole.

The WTP approach is used for the purpose of comparing the results derived by using the travel cost approach. In addition, the paper uses direct observation of business opportunities that have been created by the renewed interest of visitors on the blowhole. The following section elaborates the travel cost approach used in this study.

4. THE DATA AND LIMITATIONS OF THE STUDY

In order to estimate the value of the blowhole, an enumeration was conducted together with a questionnaire survey to obtain detailed information needed to estimate travel cost and willingness-to-pay. In addition, another questionnaire survey was conducted among the people living in the area to ascertain the socio-economic impact of the high visitation rates. The enumeration of visitors was undertaken during two periods: November 6 to 16, 1998 and August 4 to 13, 1999. The enumerators were stationed at the entrance to the blowhole and asked to count the total number of visitors entering the blowhole area in between 8 am and 5 pm. Information thus obtained was then used to estimate the annual visitation rate. To see if the visitation rate is far off from the average number of visits per day, residents were also asked about the monthly variation of visitors into the blowhole area.

The major drawback of the method is that it does not take into account the observed monthly variation of the visitation rate, which depends on holidays, major festivals in Southern Sri Lanka and the activity level of the blowhole. Enumeration spanning for a longer period at fixed intervals, preferably for a year, would have made the estimation more accurate. The study was not intended to be comprehensive to design project proposals for the area for commercial utilization. Rather, it was intended to illustrate that the blowhole must be included in a future development program as a major component with detailed analyses on its commercial potential and economic value including the intrinsic and option values. Such an elaborate exercise was not feasible due to budgetary constraints at this stage. The results should thus be interpreted carefully taking into account possible biases. The latter part of the year has several important festivals in the Southern Sri Lanka, which may affect the estimates. For example, people tend to visit Kataragama more often during July and September, while Devinuwara festival falls in August.

To estimate travel costs and WTP, two hundred visitors were randomly selected and interviewed. The variables considered in this exercise include: the starting point of the visit; the mode of transportation; final destination; whether the visit to the blowhole was the primary or secondary objective and the number of places visited during the entire journey. Apart from the known theoretical limitations of these two methods, the estimations have certain limitations. First of all, the sample periods are very limited to justify them to be sufficiently accurate to

derive policy implications and implement major development programs. Such a study should carry out surveys spanning for a year with regular intervals. Second, the estimates depend on certain strong assumptions with regard to mode of transportation, the average cost of traveling and the allocation of travel cost between other attractions en route to the blowhole from their original destinations. Third, the study does not include precise information on the income foregone by visitors. Instead, the slightly high travel cost per kilometer was used to capture this impact, ignoring the income differential of visitors. Given the limited scope of the study, these assumptions are justifiable.

To find out about the economic activities that have arisen due to the blowhole, 26 residents were also interviewed.

5 . RESULTS OF THE STUDY

5.1 Visitation Rate

Annual visitation rate to the blowhole based on the enumeration during the period between November 6 to 16, 1998 is discussed first. There was a marked difference between visitation rates between weekdays and weekends. According to the enumeration, on average 520 visitors have arrived during weekdays while 2300 people have visited during the weekend. This amounts to a simple average of 1028 visitors per day[2]. This is equivalent to an annual total of 375,220 (1028x365) visits to the blowhole. Instead of this method, one can also calculate the visitation rate for the weekdays and weekends separately add them up to get the total visitation rate –average per day times weekdays per year + average per weekend times weekend days per year. This yields 374,920 visits per year[3]. The difference between these two estimates is insignificant; therefore, the simple average is used in further calculations in further calculations.

The information collected from the residents of the area revealed that there is a variation of visitation rate between seasons, which is given in Table 1. To take this into account in our estimations, a simple ranking method was devised based on the information provided by the residents in the questionnaire survey. To estimate, rank of one was allocated to November -the month the enumeration was conducted- and the rest of the months were given ranks as given in Table 1. The adjusted estimate is 359,029 visits per year[4].

The enumeration conducted during August 1999 for 10 days has resulted in an average of 1570 per day. This is equivalent to 573,058 total visits (1570 x 365) to the blowhole, which is substantially higher than the previous estimate. Similarly, an adjusted total visitation was calculated using Table 1. This resulted in a total visit of 548,322 in year 1999. This can be considered as the value that represents the upper limit of the visitation rate. In the subsequent analysis, the lower estimate is used.

[2] (520 visitors x 5 weekdays + 2300 visitors x 2 weekend-days)/ 7 days.
[3] (520 visitors x 261 week days per year + 2300 visitors x 104 weekend days per year)

TABLE 1. MONTHLY VARIATION OF VISITATION RATE

MONTHS	QUALITATIVE RANK	CONVERSION RATE
April, May, June, July	Very High	1.25
August, September, October, November	High	1.00
December, January,	Average	0.75
February, March	Low	0.50

Source: Questionnaire Survey, 1998

5.2 Travel Cost

To estimate the travel cost, visitation rates from each zone are needed. A district is considered to be a zone in the analysis, and according to the survey visitors have arrived from 16 districts. The visitation rate from districts and annual estimated visitors from each district are given in Table 2. The total visitors were allocated to zones using the sample visitor rates. For this, only the unadjusted visitation rates are considered.

The average travel cost was then estimated for each district by using the following method. The respondents were asked various types of questions to elicit information as accurately as possible to estimate the travel cost. These include such information as the starting point of the journey, the route of the journey, mode of transport (whether public, private van or car, hired vehicle as a group), number of days or hours it took to reach the blowhole from the original point, the number of places visited in the journey, the place visited before and the place intended to visit after the blowhole. From the information provided by the respondents, the total distance in terms of kilometers was calculated. The total distance divided by the number of places visited, including the blowhole, n, is taken as the distance allocated to the blowhole. The blowhole is equally weighted just as other places of interest to visitors in this estimate.

[4] 1028 visits x [122 days x 1.0 + 121 days x 1.25 + 62 days x 0.75 + 59 days x 0.5] = 359,029.

TABLE 2. DISTRICTWISE DISTRIBUTION OF VISITORS TO THE BLOWHOLE

DISTRICT	SAMPLE		ESTIMATED ANNUAL VISITATION RATE
	Visitation Rate	%	
Colombo	29	14.5	52,059
Kurunegala	5	2.5	8,976
Puttalama	5	2.5	8,976
Hambantota	28	14.0	50,264
Gampaha	24	12.0	43,083
Kalutara	25	12.5	44,879
Matara	14	7.0	25,132
Nuwaraeliya	1	0.5	1,795
Moneragala	12	6.0	21,542
Kegalle	3	1.5	5,385
Galle	23	11.5	41,288
Matale	2	1.0	3,590
Rathnapura	11	5.5	19,747
Badulla	12	6.0	21,547
Kandy	4	2.0	7,181
Anuradhapura	2	1.0	3,590
Total	**200**	**100**	**359,029**

Source: Questionnaire Survey, 1998

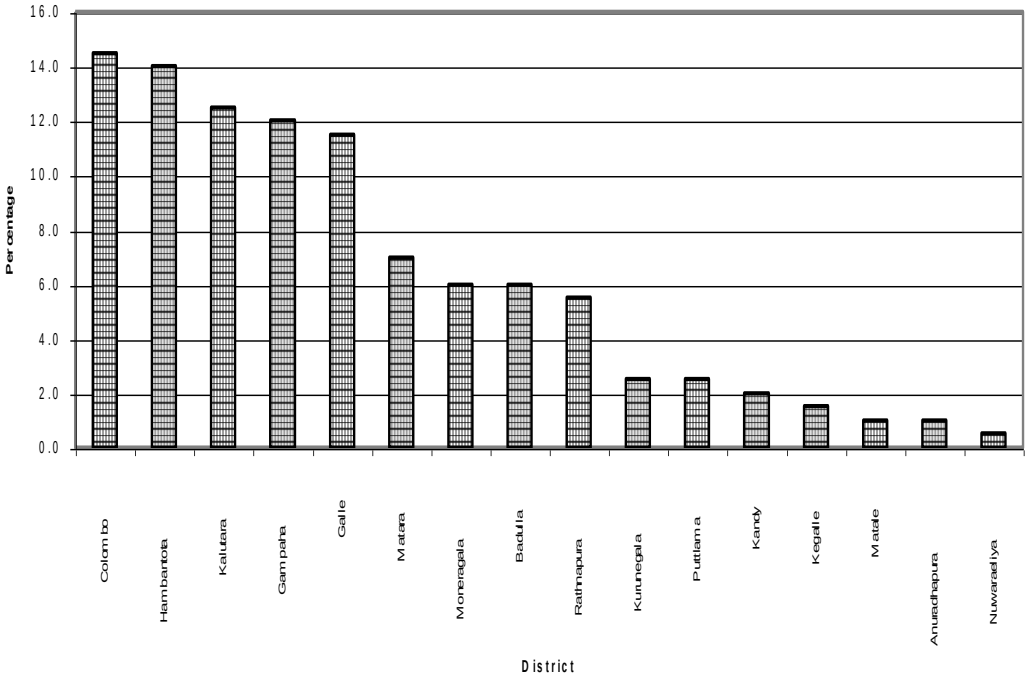


FIGURE 2. DISTRICT-WISE DISTRIBUTION OF VISITORS TO THE BLOWHOLE

The average travel cost for each district is given in Table 3 and Figure 2. To be accurate, one has to estimate the travel cost for each mode of transportation. In addition, the other costs including the income foregone due to the visit, expenses for food, lodging, etc. should also be estimated and added to the cost. However, these estimates were not attempted in this study since the study is intended only to provide some preliminary estimates on the value of the blowhole and the socio-impact of high visitation into the area. Therefore, it was assumed that on average a visitor has to spend Rs.5.00 per kilometer. As the distance from the origin rises the amount that a visitor must spend also increase. This is an acceptable proposition since the visitor has to pay a higher amount for each kilometer traveled and the time it takes to reach the destination is also higher, which increases the income a person has to forgo. If one were to calculate the average bus fares, this figure can be considered to be too high. However, from our experience, a large number of visitors to the area use their own transportation including hired buses and spend two-to-three days for a journey of this nature. The figure is also justifiable on the total cost one would have to spend for a journey of this nature.

TABLE 3. AVERAGE TRAVEL COST ACCORDING TO DISTRICT

District	Average Distance Round Trip km	Average Distance Allocated to Blowhole km	Travel Cost at the rate of Rs. 5.00/Km Rs.
Colombo	298	50	250.00
Kurunegala	570	95	475.00
Puttalama	624	104	520.00
Hambantota	92	92	455.00
Gampaha	464	77	385.00
Kalutara	298	60	300.00
Matara	62	62	310.00
Nuwaraeliya	426	71	355.00
Moneragala	352	70	350.00
Kegalle	600	120	600.00
Galle	78	78	390.00
Matale	638	80	400.00
Rathnapura	170	34	170.00
Badulla	163	33	165.00
Kandy	586	98	490.00
Anuradhapura	728	73	365.00

Source: Sample Survey, 1998 &1999

A regression equation was estimated assuming a linear demand function of the form: $\overline{V}_i = a - bTC_i$, where $\overline{V}_i$ is analized visitation rate from each district, TC_i is average travelling cost allocated to blowhole. The estimated equation is given below[5]:

$$\overline{V} = 40{,}877 - 49.36TC$$
$$t: \quad (2.73) \quad (-1.29)$$
$$R^2 = 0.106 \qquad \overline{R}^2 = 0.042$$

This equation is used for estimating the demand function, which provides one point on the demand curve, which is considered to be the minimum necessary to visit the blowhole. From this point on, one can think of situations where travel cost rises due to various other factors such as introduction of an admission fee, parking fees, etc. These costs can be added to the minimum travel cost at an ascending order and substitute for the equation above and solve for

[5] The estimated regression suggests that travel cost is significant only at 0.218 probability level and the goodness of fit is very low. Travel cost is only one variable that has been considered in the study. Other relevant variables should significantly improve the predictability of the regression. Given the limited scope of this study, this is considered as adequate for illustrative purposes.

the visitation rates. As the total cost inclusive of the admission fee rises, people reduce their demand for the blowhole. These points are calculated until visitation rate becomes zero. Since the demand curve cannot be estimated for all the values, large intervals of Rs. 50.00 were selected and Annex 1 provides the number of visitors to the blowhole under various travel costs, and the resulting demand curve is given as Figure 3.

It is rational to think that some visitors will stop coming to visit the blowhole even with a slight increase in travel cost. Some visitors may be willing to pay higher travel costs to visit such a natural splendor. The mere existence of demand for a particular place or commodity does not necessarily mean that consumers pay all these differentiated prices or prices that match their true demand. All the consumers pay only the market- determined price regardless of their true demand. The area under the demand curve and above the price they pay is considered to be the consumer surplus reflecting the idea that certain consumers immensely benefit by paying the market price.

The consumer surplus is calculated by using the demand curve and is illustrated in Figure 3. Calculations show that demand for the blowhole declines slowly with rising travel cost. Using the estimated demand curve, the consumer's surplus was then calculated which yields the value of Rs. 8,967,221.00 in terms of 1998 prices[6]. The PV of the blowhole, assuming an indefinite time horizon and 10 percent discount rate, is equivalent to Rs.89,672,221.00.

[6] This value is derived by estimating the total area under the demand curve above the average cost of visiting the blowhole without any admission fee –i.e., Rs. 373.67.

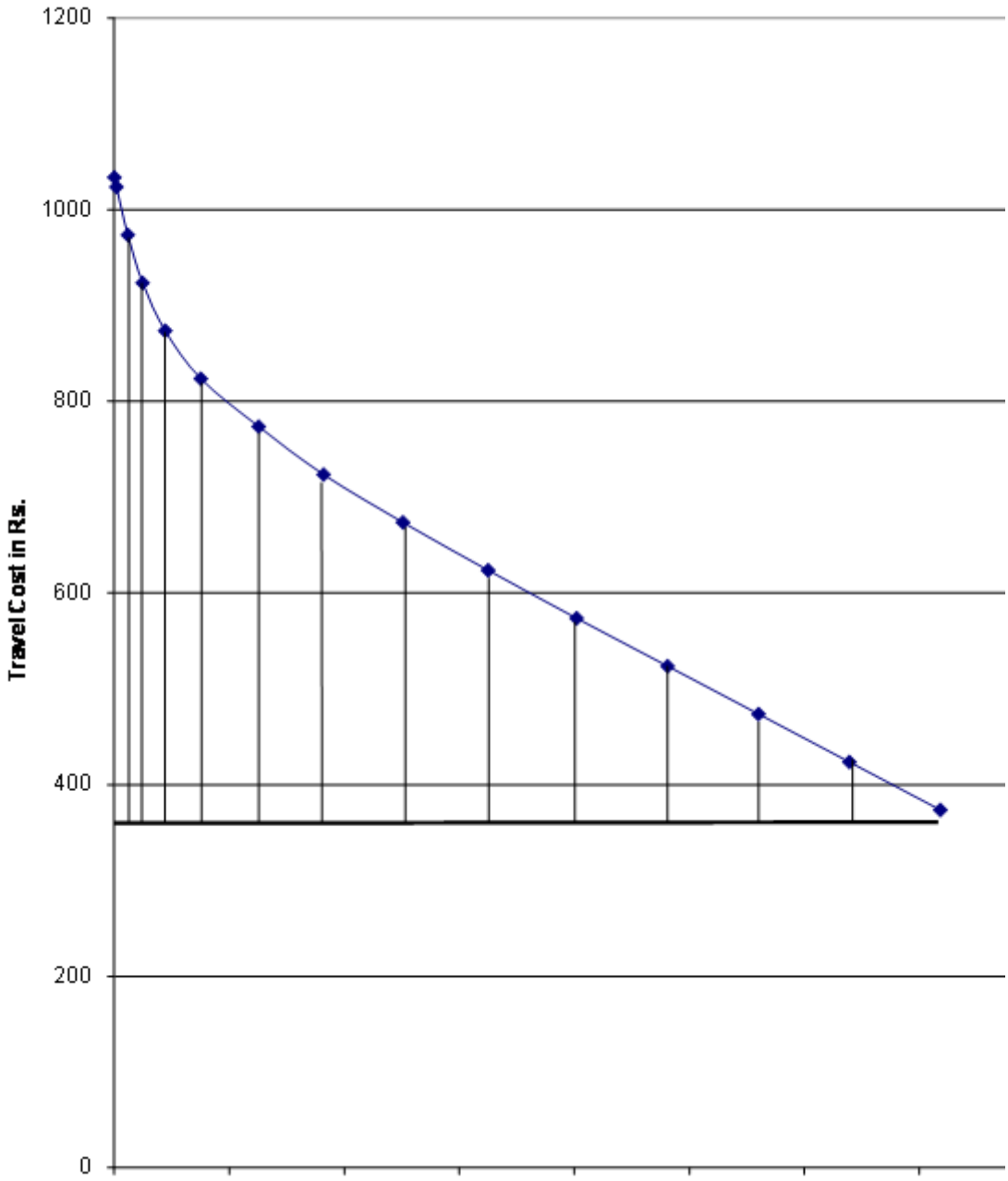


FIGURE 3. DEMAND FOR THE BLOWHOLE

The impact of an admission fee will be severely felt among the visitors that live close to the blowhole since the cost of the admission fee will be high relative to their total travel cost. This calls for some remedial action if an admission fee is going to be imposed on visitors. A better alternative would be to charge a fee for the vehicles that enter into the blowhole area and transfer them to a Blowhole Management Fund.

5.3 Willingness-to-pay Estimates

The same respondents were asked about their willingness-to-pay for visiting the blowhole. The responses received are given in the Table 4.

Table 4. WILLINGNESS-TO-PAY BY VISITORS

Hypothetical Admission Fee (Rs.)	Number of people who are willing to pay	
	At present level	After Development
1-10	198	136
10-20	2	63
20-30	0	1
	200	200

Source: Sample Survey, 1998 &1999

This information was converted into annualized figures by appropriately adjusting the total number of visitors that was estimated earlier. When a visitor indicates that he/she is willing to pay between Rs.1-10, the upper limit was taken to calculate the social value of the park. Contingent value generated by visitors without any improvement into the area is calculated as follows:

$$\frac{359{,}029 \times 198 \times 10}{200 \times 2} = Rs.1{,}777{,}193.00$$

$$\frac{359{,}029 \times 2 \times 20}{200 \times 2} = Rs.35{,}903.00$$

These values are added to obtain the total WTP of the visitors, which amounts to be Rs.1,813,096. Similarly, the contingent value after the development of the site is estimated to be Rs.2,378,567.00[7]. Interpretation of these results must be done carefully to avoid reaching any unwarranted conclusions. As for the difference between contingent values before and after improvement is significant showing that people have a strong demand for various amenities

[7] $359{,}029\left[\left(\frac{136}{200}\right)\left(\frac{1}{2}\right)10 + \left(\frac{63}{200}\right)\left(\frac{1}{2}\right)20 + \left(\frac{1}{200}\right)\left(\frac{1}{2}\right)30\right] = Rs.2{,}378{,}567.00$

such as toilet facilities, drinking water, etc. In any case, these are essential amenities that must be provided regardless of the results.

To find out whether the visitors have indicated their true willingness-to-pay and whether they really think that the blowhole is a valuable place, we ask them to rank the blowhole. Table 5 gives the results. Out of 200 respondents, 123 (62%) indicated this as an extremely valuable place while 53 (27%) indicated this as valuable place. Only 11 6% respondents indicated this as a not attractive place.

TABLE 5. VALUE OF THE BLOWHOLE ACCORDING TO VISITORS

Value of the Blowhole	Number of Visitors made the rank	Percentage
Extremely Valuable	123	62
Valuable	53	27
Rare place	13	07
Other	11	06
Total	200	100

Source: Sample Survey, 1998 & 1999

5.4 Impact of the blowhole on the local economy

To evaluate the impact of the renewed interest on the blowhole by visitors, a questionnaire survey was conducted among the residents around the blowhole area. The income profile generated by the questionnaire is given below (Table 6).

TABLE 6. INCOME PROFILES OF PEOPLE ENGAGED
IN ECONOMIC ACTIVITIES IN THE AREA

Level of Income (Rs.)	Number of people	
	Week Days	**Week Ends**
0-99	8	2
100-199	13	6
200-299	4	9
300-399	0	1
400-499	0	5
500-599	1	1
600-699		0
700-799		1
800-899		1
Total	26	26

Source: Questionnaire Survey, 1998

A majority of people doing business[8] earns Rs.200 or below during weekdays[9]. At least a few sellers earn income up to 500 during weekends. The difference of incomes between weekdays and weekend can partly be attributed to differences between visitation rates. The low-income figures are partly due to under-quotation of income and partly due to low spending by visitors. As we have observed, other than for vehicle parking fees and for some drinks, people do not spend money in this area. It is difficult to figure out whether the stated income includes "personal income" other than what is related to the blowhole.

The blowhole has created additional economic opportunities. One indication is the number of people who have changed their major employment from other economic activities to trading after the blowhole became popular. According to information provided by the people doing some business in the area, 35% has come from other traditional activities such as fishing, fishing mechanics, trading activities elsewhere, etc. (Tables 7 and 8). This indicates that economic activities in the area are attractive compared to what they have done previously. In economic terminology, the opportunity cost of their previous employment must have been

[8] The term businessman is defined here in a very loose sense. Any person who is involved in selling food, drinks, souvenirs, etc.and those who charge parking fees are considered to be businessmen.

[9] A common tendency that can be observed in questionnaire surveys of this nature is to quote lower incomes than they actually are.

smaller compared to economic activities they can find around the blowhole. The income they can generate must be higher and at least stable for them to prompt to new activities.

Table 7 indicates that 54 percent of the people who are engaged in some economic activities had been unemployed before, while 31 percent consider this as an additional source of income for the family. Only 15 percent have really shifted from other economic activities due to low income and difficulty of their previous employment.

TABLE 7. REASONS FOR SHIFTING TO TRADE AROUND THE BLOWHOLE

Reasons	Number of People	
	Actual	Percentage
Low income or difficulty of previous job	4	15
As an additional source of income	8	31
No previous employment	14	54
Total	**26**	**100**

Source: Questionnaire Survey, 1998

TABLE 8. INCOME PROFILES ACCORDING TO PREVIOUS EMPLOYMENT

Previous Employment	Number of People	Average Present Income	
		Week Days	Week Ends
Fishing	4	113	225
Fishing Mechanic	2	225	550
Coir industry	2	140	300
Trading	2	125	300
Laborer	1	30	80
Unemployed	14	113	214
Sales Assistant	1	500	800
Total	**26**		

Source: Questionnaire Survey, 1998

6. DEVELOPMENT REQUIREMENTS OF THE AREA

To find out the development requirements of the area from both the visitors' point of view and the residents, we asked a set of questions. According to the responses, most of the visitors felt that access road is not adequate (Table 9). Lack of safety is ranked at the second place. Lack of safety comes from several reasons including the road access and lack of fence around the blowhole, etc. As for the road access, visitors have to use a winding road that goes through residential houses, and sometimes through backyards. No proper parking places are available. As we observed, some visitors venture into the blowhole cliffs when the blowhole appear to be calm in order to see the inside. Sudden wave action can lead to fatal accidents. Drinking water is a major problem of the area. This is true not only for visitors but also for residents. Water requirements have increased with the increased visitor rates to the blowhole in terms of drinking water and other requirements.

TABLE 9. DIFFICULTIES FACED BY VISITORS

Type of Difficulty	Frequency	Rank
Access Roads	165	1
Lack of Safety	91	2
Parking	66	3
Drinking Water	61	4
Toilets	61	4
Other	19	

Source: Sample Survey, 1998 &1999

We also asked them to provide development requirements as they see it. The results are summarized in Table 10. Visitors have ranked improvement of drinking water facilities as the most important requirement, followed by toilet facilities and access roads. Other proposals include a fence around the blowhole, a resting-place and development of proper garbage disposal system.

TABLE 10. PROPOSALS FOR DEVELOPMENT

Proposals	Frequency
Drinking Water	187
Toilet facilities	187
Access Road	166
Fence around the blow hole	46
Resting Place	37
Shops	15
Proper Garbage Disposal	9
Other	28

Source: Questionnaire Survey, 1998

7. CONCLUSIONS & RECOMMENDATIONS

7.1 Conclusions

The blowhole –*Hummanaya*- which became a popular attraction recently after it was exposed to the public by electronic media, provides a good background to evaluate economic costs and benefits of a natural resource. The popularity has created opportunities for the residents living around the blowhole to exploit it commercially while, without proper management, the value of the blowhole might be degraded. The challenge is therefore to allow the visitors to enjoy the blowhole and the surrounding area without allowing any social problems to be emerged or damage the blowhole or the surrounding natural environment. The study evaluated the recreational value of the blowhole with the purpose of developing a set of recommendations for the sustainable management of the blowhole and the surrounding area.

Economic value of environmental resources is generally estimated by combining user, option and intrinsic values, which is known as the total value. User values are calculated in this study by using the travel cost approach, which is a common approach that have been applied elsewhere under similar situations. In the absence of a market, this method provides a convenient way of estimating the user value of an environmental good. In addition, willingness-to-pay was also estimated using survey data.

Travel cost and willingness-to-pay estimates indicate that the blowhole is a valuable natural asset with high annual recreational value. The travel cost estimates are relatively more reliable than WTP estimates as the former does not depend on subjective values. The estimates are based on several critical assumptions and they can vary substantially with changes of parameters or modifications of the method of estimation. The values calculated in the study must be considered as some approximations and therefore must be interpreted cautiously.

These estimates were supplemented by compiling profiles of income generated by residents in the area as a direct result of the blowhole. The blowhole has transformed the village community in many ways. It has created employment opportunities for residents. Those who have properties around the road access have ventured into various economic activities such as maintaining small shops selling tea, traditional handicrafts, photos, etc. Unused land has been converted into parking lots for the visitors generating some income for the residents.

All these point to the fact that the blowhole is an important natural asset that has a high recreational value. It also provides an opportunity to use it as away of generating income for the residents in the area. In order to realize these objectives, a proper management plan must be utilized for the whole area.

7.2 Recommendations

- Immediate action must be taken to protect the blowhole from unruly visitors who through various items into the blowhole;
- Erect a fence around the blow hole without destroying the esthetical value of the blowhole;
- Build an access road and provide proper parking facilities;
- Build and maintain a water scheme;
- Admission fee can be charged without so much impact on the visitation rate; however, this will negatively affect the residents that live closer to the blowhole area since that will deprive them of visiting the place as and when they desire to do so. Therefore, a better alternative is to build a parking place and charge vehicles according to an appropriate criteria and transfer income into a Hummanaya Management Fund.
- The management plan of the blowhole can perhaps be combined with the fisheries harbor development project to attract more visitors to the area. For example, the fisheries harbor can be developed as an educational institution that provides some education to the visitors on fishing activities, blowhole, and other coastal environments and ecosystems, etc. This may also be combined with recreational activities such as boat rides in the lagoon.

REFERENCES

Dixon, John A. and Hufschmidt Meynard M, 1986: Economic Valuation Techniques for the Environment: A Case Study Workbook, The Johns Hopkins University press, Baltimore and London

Hufschmidt Meynard M., David E. James, Anton D Meister, Blair T. Bower and John A. Dixon, 1983: Environment, Natural Systems, and Development: An Economic Valuation Guide, The Johns Hopkins University press, Baltimore and London

Pearce, David W. and R. Kerry Turner, 1990: Economics of Natural resources and the Environment, The Johns Hopkins University press, Baltimore and London.

Whittow, J., 1984: The Penguin Dictionary of Physical Geography. Penguin Books, Richard Clay, Great Britain.

APPENDIX 1: Estimation of the Demand Curve

Average Cost (Rs)	373	423	473	523	573	623	673	723	773	823	873	923	973	1023
	28637	26169	23701	21233	18765	16298	13830	11362	8894	6426	3958	1491		
Kurunegala	17433	14965	12497	10029	7561	5094	2626	158						
Puttalama	15212	12744	10276	7808	5340	2873	405							
Hambantota	18173	15705	13237	10770	8302	5834	3366	898						
Gampaha	21793	19325	16857	14389	11921	9453	6986	4518	2050					
Kalutara	26169	23701	21233	18765	16298	13830	11362	8894	6426	3958	1491			
Matara	25577	23109	20641	18173	15705	13237	10770	8302	5834	3366	898			
Nuwaraeliya	23356	20888	18420	15952	13484	11016	8549	6081	3613	1145				
Moneragala	23504	21036	18568	16100	13632	11165	8697	6229	3761	1293				
Kegalle	11263	8795	6328	3860	1392									
Galle	21628	19160	16692	14225	11757	9289	6821	4353	1885					
Matale	21196	18728	16261	13793	11325	8857	6389	3921	1454					
Rathnapura	32487	30019	27551	25083	22615	20147	17680	15212	12744	10276	7808	5340	2873	405
Badulla	32832	30364	27897	25429	22961	20493	18025	15557	13089	10622	8154	5686	3218	750
Kandy	16775	14307	11839	9371	6903	4435	1968							
Anuradhapura	22911	20444	17976	15508	13040	10572	8104	5637	3169	701				
Total	**358945**	**319460**	**279974**	**240489**	**201003**	**162594**	**125576**	**91121**	**62919**	**37787**	**22309**	**12517**	**6091**	**1155**