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Valuation of Conservation Commodity of the Sinharaja Forest: Towards Total Economic Value

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ABSTRACT

Conservation of wet zone forests in Sri Lanka is not a debatable point but yet economic justification for such programs are absolutely important. In one hand gradual decrease in forest cover as well as on the other hand limited amount of available resources for biodiversity conservation put the forest policy makers in a difficult position. This paper examines this problem in the users point of view making enable the policy makers to understand their willingness to pay for such efforts. Based on contingent valuation method it is found that average willingness to pay for conservation of Sinharaja forest as Rs. 664 per year, per person on average basis. This highlights the importance of conservation of this unique biological reserve.

Introduction

The phase of destruction of forests in Sri Lanka has accelerated sharply with the increasing population of last 4-5 decades. It is estimated that in 1881 the forest cover as 84% of the land area and in 1900 it was about 70% (NARESA, 1991). This figure reduced to 44% by the year 1956 (Forest Department, 1956). According to the Survey Department of Sri Lanka (1981) now the country has only 24.9% of forest cover and the FAO (1986) revealed that the destruction rate as 42,000 ha per year during the period of 1956 to 1989. The latest estimate of forest extent in the country limits to 21-22% of total land area.

There are many reasons for destruction of forest cover in the country. Among these, land use for agriculture, irrigation development and inappropriate cultivation practices have contributed to a large extent for such degradation. The expectation of short term benefits by exploiting the forest cover may result long term

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environmental imbalances and hazardous effects to the economy. Among the low extent of forest lands in the country, the wet zone forests have higher environmental value due to unique bio diversity. But there are only 2-3% of total lands which can be considered as virgin forests in the wet zone. The amount that remains in the wet zone can be considered as critical and therefore strict conservation of wet zone forests become an important issue.

The Sinharaja is one of the least disturbed wet zone forests now remaining in the country. It is a unique natural resource due to it's higher bio diversity and other ecological and economic characteristics. Out of 25 plant genera endemic to Sri Lanka 13 are represented in Sinharaja. The preliminary studies on the fauna of the Sinharaja have revealed that 95% of the endemic birds of Sri Lanka are recorded in Sinharaja and endemism among mammals and butterflies are also greater than 50%. This character cannot be sighted in any other forest in Sri Lanka.

Although many conservation programmes have been implemented to protect the uniqueness of Sinharaja, most of them were not fully successful due to various reasons and this unique natural reserve is still under threat for mere survival. Therefore understanding why these programmes have not yet been able to implement properly and protect the Sinharaja forest is very important. Among various reasons grasping the social realities would be one of the prime concerns for the future conservation programmes to be successful.

It is true that the conservation of Sinharaja helps to provide a ecologically balanced environment while protecting a dense genepool. Although the impact of conservation programmes on various strata in the society may vary, if someone's livelihood depends on the benefits of the forest to a substantial extent, he may be effected by the conservation programmes. It is evident that a considerable number of people are living in peripheral villages of Sinharaja and their livelihoods at least partially depend on the forest benefits. Extraction of non-timber forest products such as rattan, bee-honey, medicinal plants, kitul sap and Dummala are some of the benefits they receive from the forest. Therefore various strata of the society may become vulnerable to the conservation programmes of Sinharaja forest depending on the allowable limit to extract such materials.

Objective

As a result of various human activities, the wet zone forests which are of the highest environmental values are being destructed. Consequently, the necessity of strict

conservation of unique wet zone forests such as Sinharaja has arisen. Economic aspects of the programmes play an important role in conservation and management of forests. On the other hand the prime objectives of the present development strategies may not consider the effectiveness of the balanced environment into a better livelihood. As an example if the development is targeted to fulfil the basic requirement of houses by destructing the forest cover extensively, it may lead to diminish the quality of livelihood. Therefore, the objective of this study is to assess the economics of the commodity of conservation with respect to the Sinharaja forest in Sri Lanka.

Method

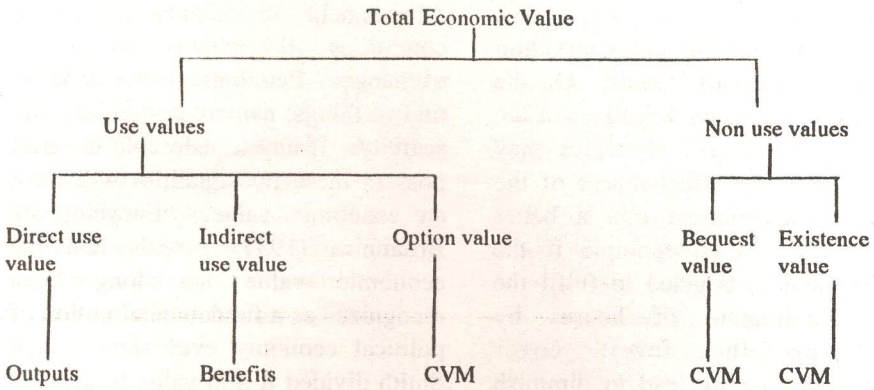
Although the economic and social importance of natural environmental is very distinguishable, valuation of them is not common. That is because the non-market nature of most of the segoods and services. But, in rational decision making, it is necessary to consider the costs and benefits of such events otherwise decisions will be biased. Accordingly, it is very important to consider the economic impact of conservation programs as much as possible. Therefore, despite the limitations of non-market valuations it is necessary to place a monetary value for the flow of environmental and natural resources in assessing alternative policy options.

Fundamentally the value is described as the esteem in which a thing is held. In ordinary commercial conditions it means power in exchange. Economic value depends on two things; namely desirability and scarcity. If any transferable material possess these two qualities will have an economic value. Encyclopedia Britannica (1957) reveals that the economic value has long been recognized as a fundamental notion of political economy ever since Adam Smith divided it into value in use and value in exchange. It has been defined thus the former as the utility of objects for human needs and the later the power to induce or compel persons to any other valuables for the use of them.

Economic Valuation is based on measuring individuals preferences that gives maximum satisfaction among many alternatives. Money is used as measuring rod in valuation of transferable materials and benefits despite its limitations in measuring most of the environmental and natural resource values (Vincent, 1990). Despite such limitations, the concept of total economic value has been suggested to capture the benefits of unique and rare entities.

The concept of total economic value represents the comprehensiveness of the benefits and costs that can be acquired form the preservation and improvement of natural environment; especially for

Figure 1: Total economic value of a wetland



Notes:

CVM	= Contingent Valuation Method
TCM	= Travel Cost Method
IOCO	= Indirect Opportunity Cost Method
IS	= Indirect Substitute Approach
( )	= Valuation Methodology to be used with care

Source: Barbier et al., 1991

unique heritages. It affords a broader prospective to value them and to recognize the costs and benefits in a divisible manner. The total economic value comprised of five distinguish components as such direct values, indirect values, option value, existence value and bequest value. This is explained in figure 1 taking a wet land as an example.

Valuation of Forest Resources

The most commonly used and the easiest way of valuing any good or service is to use market price. This way of valuation is however, confined only to marketable goods and services. The difficulty of valuing non-marketable goods and services. The difficulty of valuing non-marketable goods and services can be avoided by considering the opportunity cost of them provided that they have closely related alternatives. A natural or environmental resource such as forest, provides various types of benefits for mankind. Most of such benefits of forests are non-marketable in nature. Therefore, valuation through market price is not acceptable because it does not capture the total benefits of a forest. Subsequently, it is necessary to use other methods to value the forest resources. Therefore, alternative ways of valuing forest resource must be explored.

"It is reasonable to assume that a positive preference for something would reflect in willingness to pay for that particular good or service. Though each individual preference can be aggregated to obtain a total willingness to pay (W.T.P.)" (O.E.C.D., 1989). Since an individual's willingness to pay is more than the market price, sometimes it may not reflect the total benefits at market price. The amount that would be obtained excessively from this is known as consumer surplus. There are two methods to measure consumer surplus namely the Marshallian measure of consumer surplus and the Hicksian measure of consumer surplus. When the income effect is negligible there will not be any defence in using either one of these methods. Assuming income effect of forest benefits is marginal W.T.P. method used was in this study without any dispute.

Study Area

The Sinharaja forest lies in the South-West lowland Wet zone of Sri Lanka at latitudes 6^0 21^1 -6^0 26^1 and longitudes 80^0 21^1 -80^0 24^1. The Sinharaja Natural Heritage Wilderness Area spans over the administrative districts of Ratnapura, Galle and Matara. The present reserve is a narrow sliver of land 21 km in length and 3.7 km in width covering 11,187 ha of land. According to Gunatilake and Gunatilake (1980) more than 70% of the tree species in Sinharaja are endemic to Sri Lanka. High level of endemism are perhaps true for the

lower plants like ferns, epiphyts as well. Since the Sinharaja is one of the most known forest reserves in the country it is considered as the study site for this exercise.

Data Collection

To observe the differences in willingness to pay, three different areas of the country were selected to proceed with the survey. Kandy and Colombo represented the urban population and three villages in the vicinity of the Sinharaja namely, Petiyakanda, Kudawa and Pitakelle were used to represent the peripheral population. The survey was conducted with randomly selected eighty individuals from each strata. A structured questionnaire consists of socio economic information and willingness to pay questions were used to obtain the necessary information. The respondents were given a prior explanation about the benefits of Sinharaja forest and asked their willingness to pay for the commodity of forest conservation. The survey was conducted during the mont of October 1992.

Prior to implementation of the formal survey, two pre-visits to the area particularly to the locality of Sinharaja periphery were made. During such visits many arrangements were made to fulfil some of the rudimentary requirements to proceed with the survey successfully. Getting familiar with the villagers, fulfilling the accommodation facilities and pretesting of the questionnaire were the prime objectives of these visits. Apart from the visits to the villages of the vicinity of Sinharaja, pretesting was done in the area of Kandy too. It ameliorated making some of the necessary adjustments in the questionnaire and helped to increase the familiarity of the parts of the questionnaire which require more explanation. The above were facilitated to uplift the accuracy and efficiency of the formal survey to a respectable level. All these pretesting were done outside the study areas.

A Sinhalese translation of the questionnaire was used in the survey because the majority of the respondents were in a position to understand Sinhala. Tamils and Muslims who were participated in the survey were inquired with the help of a reliable tamil translator. High awareness was kept about the exact meanings of technical terms in the process of translating the questionnaire into Sinhala as well as into Tamil languages.

In the periphery of Sinharaja, the pretesting was prevailed at the time of finalizing the first draft of the questionnaire. Basically it helped to obtain a prime indication of the validity and reliability of the questionnaire. Since the questionnaire was in the process of finalization in the particular period, pretest were conducted in an informal way.

Conversations were made individually with the peripheral villagers who were randomly selected from places other than Kudawa, Pitakelle and Petiyakanda. The questions which were to be asked were informally introduced during the conversations and carefully received their answers. About fifteen individuals were informally interviewed during that period. Further, prior to finalize the formal questionnaire eight individuals were selected from the locality of Kandy and the questionnaire was tested with the help of them. Then the necessary adjustments were made prior to print the questionnaire in it's finalized form. The individuals which were participated into the pretest were not included into the final survey sample.

Directly asked questions on willingness to pay were used as the contingent valuation technique in this study. Contingent valuation was mainly concerned to create hypothetical market for the various benefits of the forest. Although the awareness of the respondents about hypothetical market creation and valuation of forest benefits is not affected the results of the study it was experienced the difficulty of handling such a evaluation with a group of people whose awareness about such concepts is much low. Therefore, it was necessary the repetition of particular questions more than once and explain them well at the moments of introducing questionnaire to the respondents. Finally the respondents were asked to behave in the particular market and obtained their monetary suggestions for each of the benefits component separately.

Three questions were included in the questionnaire to evaluate the respondents participation towards forest conservation. It was asked whether the respondent is a member of an environmental conservation related society or not. Another question was raised to decide whether they believe that the forest conservation is beneficial or not. Finally, they were asked for their willingness to pay to obtain a membership of a club to conserve Sinharaja forest. Out of the above three questions latter two were specifically structured by considering the Sinharaja forest.

Results and Discussion

Almost all the respondents both in peripheral and urban areas thoroughly accepted that the forest conservation is a vital issue. Out of 240, only two respondents were believed that the forest conservation is not so important. Some of the respondents suggested that the Sinharaja forest must absolutely be protected. There were 11 and 3 environment related club members in peripheral and urban samples respectively. Most of the others emphasized that they fail to give their actual participation for a such club due to various limitations.

Although a bid elicitation procedure was included into the questionnaire the suggestions were not considered in the evaluation because it asked suggestions only for a conservation club and it did not mentioned the benefits of the Sinharaja forest as described in the concept of total economic value. Therefore, that question was used to get an idea about the participation of general public towards the conservation of Sinharaja forest.

All the respondents in the sample wanted to be members of a club in which the main objective is protection of Sinharaja. Out of eighty respondents in the periphery, 6.25% did not agreed to pay for a membership as suggested in the questionnaire. This percentage was 3.13% in the urban sample. A detailed description about the willingness to pay for a conservation club of Sinharaja is presented in Table 1.

The people living in the vicinity of Sinharaja agreed that the conservation of Sinharaja is essential, but they expressed the fear that conservation projects and programmes would adversely effect on them. Figures for willingness to pay for a Sinharaja conservation club are as follows. Peripheral people suggested an average of Rs. 38.04 per year and the urban people suggested an average of Rs. 156.26 per year. Those values were significantly different from each other at 5% level according to t statistics.

The obstacle of confusion of the respondents was arisen mainly in the case of assessing monetary value for the hypothetical commodity of Sinharaja forest conservation. Hypothetical nature lead them hesitate in giving answers. This hesitation was observed in assessing monetary values for some of the components of total economic value in a high frequency. Especially in the case of existence value it was observed. Although the frequency of repetition of the questions and explanations were increased, as a result of the pretest some of the exceptional respondents showed hesitation in suggesting monetary values for the hypothetical commodity, but the number was negligible with compared to the total sample.

Since the total economic value consists of five major distinguishable components, the willingness to pay for each of the component was evaluated in a divisible manner. The concept of total economic value further describes each of the component and shows the differences between them. Therefore, the aggregation of the values of willingness to pay for the separate component gives the willingness to pay for thetotal economic value of the conservation commodity of the Sinharaja forest. Nothing but the extraction of a value for the existence

Table 1: Willingness to pay for a membership of a conservation club of Sinharaja forest

Willingness to pay (Rs/Year)	Peripheral Respondents (Number)	Urban Respondents (Number)
1. < 25	50	13
2. 25 - 50	14	28
3. 51 - 75	3	3
4. 76 - 100	3	54
5. 101 - 150	3	10
6. 151 - 200	1	17
7. > 200	1	30

of the forest was more difficult. As mentioned previously the pretest identified this inconvenience of getting suggestions for the particular component and made the necessary adjustments such as careful explanation and repetition of the question. Since the total economic value separately describes the five value components, it was observed meaningful differences of the suggestions of respondents.

Willingness to Pay for Direct Benefits

As direct benefits it was emphasized recreation, fuelwood and non-timber forest products which can be obtained directly from the forest. The urban respondents often receive only recreational benefits while the peripherals receive all the above direct benefits. Therefore the urban respondents tend to suggest low amount for direct benefits and the peripheral respond suggested higher amount than the urbans.

The peripheral community was willing to pay more amount for non-timber forest products than any other direct benefits while 20.6% of the urban respondents have had recreation benefits from the Sinharaja at least one occasion of their lives. The survey resulted an average of Rs. 56.20 and Rs. 12.47 per year respectively in peripheral and urban samples for the specified direct forest benefits. With regard to the other components this amount is the lowest for urban group.

Willingness to Pay for Indirect Benefits

Environmental balance and the reduction of soil erosion were the major indirect benefits that were

stressed in this study. Natural environmental balance further explained as flood control, rainfall regulation and regulation of other natural cycles. Twelve respondents in the peripheral sample were not willing to pay for these indirect benefits at all. The average willingness to pay for these benefits by the peripheral group was Rs. 45.30/year. The urban respondent characterized the importance of indirect benefits by suggesting an average of Rs. 192.50 per annum.

Option Value

It has been observed that the majority of peripheral people tends to consider option value as a use benefit while the urbans people tend to consider ti as a non-use benefit because most of the urban respondents stressed that they will not be able to reach the Sinharaja forest to receive it's recreational benefits. The average in the peripheral community was Rs. 54.70 per year and Rs. 204.50 per year for urban community. The suggestion of the people living in the vicinity of Sinharaja was much closer to their willingness to pay for direct benefits, indicating that they understood the option fairly well.

Existence Value

As in the other case some of the respondents were unable to understand what the existence value is. Accordingly they required repeatable explanations about the value of existence. At last peripheral suggested an average of Rs. 41.30 per year while the urbans suggested an average of Rs. 171.60 per year, for the particular component with the understanding of that this is just for the existence of the forest.

Bequest value

Out of the five major components of total economic value the respondente were willing to pay the most for this component. Peripherials and urbans suggested Rs. 41.30 and Rs. 271.20 per annum respectively. Majority of the respondents had a clear understanding that the destruction of forests would disturb the living standerd of future generations.

Two out of the total in the peripheral sample refused to pay for direct and indirect benifites while 11 in the urban sample refused to pay. As mentioned earlier three peripherals and one urban respondent were much willing to pay for future options. Sixteen in the periphery and 6 in the urban areas rejected to pay for the extistanse of the Sinharaja forest. All the respondents except one were willing to pay for conservation of the forest for the future generations. The mean values of the respondents for each component are presented in Table 2.

The urban people were willing to

pay higher amount of money for indirect benifits than for direct benifits while the peripherals were willing to pay more for direct benifits than for indirect benifits. Quite interestingly both types of respondents have suggested higher amounts for the bequest value than any other components of total economic value. It was Rs 72.30 per year in the peripheral sample while Rs 271.20 per year in the urban sample. Further, the option value was higher than the existance value in both samples. Therefore, in general it can be said that the society would prefer to pay more attention for intangible benifits than for direct tangible benifits of the Sinharaja forest.

The people living in the vicinity of Sinharaja recive comparatively higher amount of tangible benifits. But in the sence of willingness to pay, their average suggestion for the commodity of forest conservation was much lower than the suggestion by the urbans for the same. In the economic perspective it is true except in inferior and luxery goods, people consume low amount of perticular good at a higher price while consuming higher amount at a low price. The average of total willingness to pay for the commodity of Sinharaja forest conservation of the whole sample is Rs 663.64 per year.

The variations in willingness to pay according to the location, dependency ratio, age, income and educational level were also considered in this study. The relationship between willingness to pay and above factors obtain with the help of a multiple regression model (Table 3).

$$W.T.P. = \alpha + aX_1 + bX_2 + cX_3 + dX_4 + eX_5 + fX_6$$

Where,

W.T.P. = Willingness to pay
α = Intercept
X^1 = Age
X_2 = Location
X_3 = Dependency ratio (below 15)
X_4 = Dependency ratio (over 15)
X_5 = Income
X_6 = Educational level
a, b, c, d, e, f = X Coefficients

The positive sign of the coefficient of the age of the respondents indicates that increase in age would result in higher in willingness to pay. This may be due to the reason that with the maturity people persuade the importance of the benifts of forest conservation.

The positive sign of the coefficient of the location shows that the willingness to pay increases with the urbanization. Although the residents in the vicinity benefited with comparatively high amount of tangible

Table 2: Avrage values of willingness to pay for the conservation of Sinharaja forest.

Location		Direct Values	Inderect Values	Option Value	Existent Value	Bequest Value
Peripheral Community	A	56.20	45.30	54.70	41.30	72.30
	B	121.20	122.70	135.00	129.20	155.30
	C	29.20	18.00	24.60	12.50	37.80
	D	83.20	72.60	84.70	70.00	106.90
Urben Community	A	12.47	192.50	204.50	171.60	271.20
	B	30.18	261.10	234.20	272.30	317.20
	C	7.66	150.60	167.90	129.10	221.70
	D	17.28	234.40	241.10	214.10	320.70

A = Mean, B = Standerd Error, C = Minimum value (5 % significant level)
D = Maximum value (5 % significant level)

Table 3: Results of the multiple regression

Variable	B	t value
Age	6.339	1.023
Location	189.270*	2.263
Dependency ratio (below 15)	-316.270	-1.397
Dependency ratio (over 15)	-346.385	-1.019
Income	0.066*	3.737
Educational level	60.540	1.221

Constant = -95.694 R^2 = 0.2402 Significant level = 5 %

benefits from the forest their willingness to pay for the whole forest is low. It is true in the sense of economics, the consumer would be willing to pay higher price for a particular good or service when a scarcity is exsisting and increasing.

The residents in the vicinity were benefited by higher amount of direct benefits before the conservation programmes.With the conservation programmes they had to change their life style and were forced to reduce the forest dependency. During the survey it was observed that the most

of them didnot like the conservation programmes of Sinharaja, because they belive that the development of infra structural facilities being restricted by the conservation programmes. This may be the other reason of defer in willingness to pay with the change of location.

The positive sign of the coefficient of income indicated that an increase in consumer would result in increase in willingness to pay towards the conservation of Sinharaja. In an economic prospective it is true with the increase in income, individuals would also raise their willingness to pay towards the alternative other than the basic needs for the sake of satisfaction. Since conservation of wet zone forests will result ecologicaly balanced environment. This may be the reason for increase in willingness to pay with the higher levels of income. In other words those who with higher purchasing power would buy higher amount of commodity of conservation.

Positive sign of the coefficient of educational level shows that and upliftment in educational level increases the willingness to pay towards the conservation of Sinharaja forest. As previously mentioned, with the upliftment of educational level, the knowledge about the importance of the forest conservation will increase. Therefore, with the upliftment of the educational level the value of the conservation of Sinharaja forest will increase. In the multiple regression model coefficient of location and income were statistically significant at 5 % level. Age and dependency ratio were not significant at the 5 % level. Further overall model explanations power was also not very high (24 %). But it is not unusual to get low explenatory levels in this type of model where assosiation of various factors are more important than the consality between them.

Before the regression analysis, the problem of multi colinearity was tested in thre data set with the correlation matrix. Between two variables namely age and the dependency ratio, the corelation coefficient was about 0.61. The calculated Condition Number for all the variables however, showed that all the values were less than 14. In fact only one was 14 and all the others were less than even 9. Therefore a decision was made to leave all originally tested variables in the model. The joint significant test revelead that the variables of age and dependency ratio over 15 years were not jointly significant since the calculated value of - 0.359 was much below than the table value of 19.5. Therefore it was decided to present the regression analysis results despite low explanatory power of the model.

Conclussions and Policy Implications

The study resulted and average of Rs 663.64 of hypothetical market value for the commodity of Sinharaja forest conservation. The urbans' suggestion was higher when compared the peripherals' suggestion. The W.T.P. of the respondents showed signifacant variation according to the location and the income. Further more it has been observed a signifacant differensce between urben and peripheral communities in willingness to pay for the commodity of forest conservation.

Both types of respondents suggested the highest amount of money for bequest value. The W.T.P. value for the intangible benifits is higher than the tangible direct benifits in the both samples. Therefore it is to say that the people need to conserve the Sinharaja unique natural heritage for altruistic benifits rather than for direct tangible benifits.

On the other hand the average value reflects the value of the benifits of Sinharaja forest conservation. Therefore, it may be possible to use the resulted value in extended cost benifit analysis. But there was a significant difference in willingness to pay between the peripheral and urban samples and the peripheral community tends to under value the forest benefits except in direct benifits. Therefore the conservation programme would be successful when it is possible to make the general public to pay for the implimentation of conservation programmes. Since the willingness to pay is high in the urben group, it may reasonable to make them to pay a higher propotion of cost of conservation programmes. Further, the simultanious launching of educational campains about the importance of forest conservation with the implementation of conservation activities would enhance the successfulness of the conservation programmes.

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Results and Discussion

Almost all the respondents both in peripheral and urban areas thoroughly accepted that the forest conservation is a vital issue. Out of 240, only two respondents were believed that the forest conservation is not so important. Some of the respondents suggested that the Sinharaja forest must absolutely be protected. There were 11 and 3 environment related club members in peripheral and urban samples respectively. Most of the others emphasized that they fail to give their actual participation for a such club due to various limitations.

Although a bid elicitation procedure was included into the questionnaire the suggestions were not considered in the evaluation because it asked suggestions only for a conservation club and it did not mentioned the benefits of the Sinharaja forest as described in the concept of total economic value. Therefore, that question was used to get an idea about the participation of general public towards the conservation of Sinharaja forest.

All the respondents in the sample wanted to be members of a club in which the main objective is protection of Sinharaja. Out of eighty respondents in the periphery, 6.25% did not agreed to pay for a membership as suggested in the questionnaire. This percentage was 3.13% in the urban sample. A detailed description about the willingness to pay for a conservation club of Sinharaja is presented in Table 1.

The people living in the vicinity of Sinharaja agreed that the conservation of Sinharaja is essential, but they expressed the fear that conservation projects and programmes would adversely effect on them. Figures for willingness to pay for a Sinharaja conservation club are as follows. Peripheral people suggested an average of Rs. 38.04 per year and the urban people suggested an average of Rs. 156.26 per year. Those values were significantly different from each other at 5% level according to t statistics.

The obstacle of confusion of the respondents was arisen mainly in the case of assessing monetary value for the hypothetical commodity of Sinharaja forest conservation. Hypothetical nature lead them hesitate in giving answers. This hesitation was observed in assessing monetary values for some of the components of total economic value in a high frequency. Especially in the case of existence value it was observed. Although the frequency of repetition of the questions and explanations were increased, as a result of the pretest some of the exceptional respondents showed hesitation in suggesting monetary values for the hypothetical commodity, but the number was negligible with compared to the total sample.

Since the total economic value consists of five major distinguishable components, the willingness to pay for each of the component was evaluated in a divisible manner. The concept of total economic value further describes each of the component and shows the differences between them. Therefore, the aggregation of the values of willingness to pay for the separate component gives the willingness to pay for thetotal economic value of the conservation commodity of the Sinharaja forest. Nothing but the extraction of a value for the existence

Table 1: Willingness to pay for a membership of a conservation club of Sinharaja forest

	Willingness to pay (Rs/Year)	Peripheral Respondents (Number)	Urban Respondents (Number)
1.	< 25	50	13
2.	25 - 50	14	28
3.	51 - 75	3	3
4.	76 - 100	3	54
5.	101 - 150	3	10
6.	151 - 200	1	17
7.	> 200	1	30

of the forest was more difficult. As mentioned previously the pretest identified this inconvenience of getting suggestions for the particular component and made the necessary adjustments such as careful explanation and repetition of the question. Since the total economic value separately describes the five value components, it was observed meaningful differences of the suggestions of respondents.

Willingness to Pay for Direct Benefits

As direct benefits it was emphasized recreation, fuelwood and non-timber forest products which can be obtained directly from the forest. The urban respondents often receive only recreational benefits while the peripherals receive all the above direct benefits. Therefore the urban respondents tend to suggest low amount for direct benefits and the peripheral respond suggested higher amount than the urbans.

The peripheral community was willing to pay more amount for non-timber forest products than any other direct benefits while 20.6% of the urban respondents have had recreation benefits from the Sinharaja at least one occasion of their lives. The survey resulted an average of Rs. 56.20 and Rs. 12.47 per year respectively in peripheral and urban samples for the specified direct forest benefits. With regard to the other components this amount is the lowest for urban group.

Willingness to Pay for Indirect Benefits

Environmental balance and the reduction of soil erosion were the major indirect benefits that were

stressed in this study. Natural environmental balance further explained as flood control, rainfall regulation and regulation of other natural cycles. Twelve respondents in the peripheral sample were not willing to pay for these indirect benefits at all. The average willingness to pay for these benefits by the peripheral group was Rs. 45.30/year. The urban respondent characterized the importance of indirect benefits by suggesting an average of Rs. 192.50 per annum.

Option Value

It has been observed that the majority of peripheral people tends to consider option value as a use benefit while the urbans people tend to consider ti as a non-use benefit because most of the urban respondents stressed that they will not be able to reach the Sinharaja forest to receive it's recreational benefits. The average in the peripheral community was Rs. 54.70 per year and Rs. 204.50 per year for urban community. The suggestion of the people living in the vicinity of Sinharaja was much closer to their willingness to pay for direct benefits, indicating that they understood the option fairly well.

Existence Value

As in the other case some of the respondents were unable to understand what the existence value is. Accordingly they required repeatable explanations about the value of existence. At last peripheral suggested an average of Rs. 41.30 per year while the urbans suggested an average of Rs. 171.60 per year, for the particular component with the understanding of that this is just for the existence of the forest.

Bequest value

Out of the five major components of total economic value the respondente were willing to pay the most for this component. Peripherials and urbans suggested Rs. 41.30 and Rs. 271.20 per annum respectively. Majority of the respondents had a clear understanding that the destruction of forests would disturb the living standerd of future generations.

Two out of the total in the peripheral sample refused to pay for direct and indirect benifites while 11 in the urban sample refused to pay. As mentioned earlier three peripherals and one urban respondent were much willing to pay for future options. Sixteen in the periphery and 6 in the urban areas rejected to pay for the extistanse of the Sinharaja forest. All the respondents except one were willing to pay for conservation of the forest for the future generations. The mean values of the respondents for each component are presented in Table 2.

The urban people were willing to

pay higher amount of money for indirect benifits than for direct benifits while the peripherals were willing to pay more for direct benifits than for indirect benifits. Quite interestingly both types of respondents have suggested higher amounts for the bequest value than any other components of total economic value. It was Rs 72.30 per year in the peripheral sample while Rs 271.20 per year in the urban sample. Further, the option value was higher than the existance value in both samples. Therefore, in general it can be said that the society would prefer to pay more attention for intangible benifits than for direct tangible benifits of the Sinharaja forest.

The people living in the vicinity of Sinharaja recive comparatively higher amount of tangible benifits. But in the sence of willingness to pay, their average suggestion for the commodity of forest conservation was much lower than the suggestion by the urbans for the same. In the economic perspective it is true except in inferior and luxery goods, people consume low amount of perticular good at a higher price while consuming higher amount at a low price. The average of total willingness to pay for the commodity of Sinharaja forest conservation of the whole sample is Rs 663.64 per year.

The variations in willingness to pay according to the location, dependency ratio, age, income and educational level were also considered in this study. The relationship between willingness to pay and above factors obtain with the help of a multiple regression model (Table 3).

$$W.T.P. = \alpha + aX_1 + bX_2 + cX_3 + dX_4 + eX_5 + fX_6$$

Where,

W.T.P. = Willingness to pay
α = Intercept
X^1 = Age
X_2 = Location
X_3 = Dependency ratio (below 15)
X_4 = Dependency ratio (over 15)
X_5 = Income
X_6 = Educational level
a, b, c, d, e, f = X Coefficients

The positive sign of the coefficient of the age of the respondents indicates that increase in age would result in higher in willingness to pay. This may be due to the reason that with the maturity people persuade the importance of the benifts of forest conservation.

The positive sign of the coefficient of the location shows that the willingness to pay increases with the urbanization. Although the residents in the vicinity benefited with comparatively high amount of tangible

Table 2: Avrage values of willingness to pay for the conservation of Sinharaja forest.

Location		Direct Values	Inderect Values	Option Value	Existent Value	Bequest Value
Peripheral Community	A	56.20	45.30	54.70	41.30	72.30
	B	121.20	122.70	135.00	129.20	155.30
	C	29.20	18.00	24.60	12.50	37.80
	D	83.20	72.60	84.70	70.00	106.90
Urben Community	A	12.47	192.50	204.50	171.60	271.20
	B	30.18	261.10	234.20	272.30	317.20
	C	7.66	150.60	167.90	129.10	221.70
	D	17.28	234.40	241.10	214.10	320.70

A = Mean, B = Standerd Error, C = Minimum value (5 % significant level)
D = Maximum value (5 % significant level)

Table 3: Results of the multiple regression

Variable	B	t value
Age	6.339	1.023
Location	189.270*	2.263
Dependency ratio (below 15)	-316.270	-1.397
Dependency ratio (over 15)	-346.385	-1.019
Income	0.066*	3.737
Educational level	60.540	1.221

Constant = -95.694 R^2 = 0.2402 Signiicant level = 5 %

benefits from the forest their willingness to pay for the whole forest is low. It is true in the sense of economics, the consumer would be willing to pay higher price for a particular good or service when a scarcity is exsisting and increasing.

The residents in the vicinity were benefited by higher amount of direct benefits before the conservation programmes.With the conservation programmes they had to change their life style and were forced to reduce the forest dependency. During the survey it was observed that the most

of them didnot like the conservation programmes of Sinharaja, because they belive that the development of infra structural facilities being restricted by the conservation programmes. This may be the other reason of defer in willingness to pay with the change of location.

The positive sign of the coefficient of income indicated that an increase in consumer would result in increase in willingness to pay towards the conservation of Sinharaja. In an economic prospective it is true with the increase in income, individuals would also raise their willingness to pay towards the alternative other than the basic needs for the sake of satisfaction. Since conservation of wet zone forests will result ecologicaly balanced environment. This may be the reason for increase in willingness to pay with the higher levels of income. In other words those who with higher purchasing power would buy higher amount of commodity of conservation.

Positive sign of the coefficient of educational level shows that and upliftment in educational level increases the willingness to pay towards the conservation of Sinharaja forest. As previously mentioned, with the upliftment of educational level, the knowledge about the importance of the forest conservation will increase. Therefore, with the upliftment of the educational level the value of the conservation of Sinharaja forest will increase. In the multiple regression model coefficient of location and income were statistically significant at 5 % level. Age and dependency ratio were not significant at the 5 % level. Further overall model explanations power was also not very high (24 %). But it is not unusual to get low explenatory levels in this type of model where assosiation of various factors are more important than the consality between them.

Before the regression analysis, the problem of multi colinearity was tested in thre data set with the correlation matrix. Between two variables namely age and the dependency ratio, the corelation coefficient was about 0.61. The calculated Condition Number for all the variables however, showed that all the values were less than 14. In fact only one was 14 and all the others were less than even 9. Therefore a decision was made to leave all originally tested variables in the model. The joint significant test revelead that the variables of age and dependency ratio over 15 years were not jointly significant since the calculated value of - 0.359 was much below than the table value of 19.5. Therefore it was decided to present the regression analysis results despite low explanatory power of the model.

Conclussions and Policy Implications

The study resulted and average of Rs 663.64 of hypothetical market value for the commodity of Sinharaja forest conservation. The urbans' suggestion was higher when compared the peripherals' suggestion. The W.T.P. of the respondents showed signifacant variation according to the location and the income. Further more it has been observed a signifacant differensce between urben and peripheral communities in willingness to pay for the commodity of forest conservation.

Both types of respondents suggested the highest amount of money for bequest value. The W.T.P. value for the intangible benifits is higher than the tangible direct benifits in the both samples. Therefore it is to say that the people need to conserve the Sinharaja unique natural heritage for altruistic benifits rather than for direct tangible benifits.

On the other hand the average value reflects the value of the benifits of Sinharaja forest conservation. Therefore, it may be possible to use the resulted value in extended cost benifit analysis. But there was a significant difference in willingness to pay between the peripheral and urban samples and the peripheral community tends to under value the forest benefits except in direct benifits. Therefore the conservation programme would be successful when it is possible to make the general public to pay for the implimentation of conservation programmes. Since the willingness to pay is high in the urben group, it may reasonable to make them to pay a higher propotion of cost of conservation programmes. Further, the simultanious launching of educational campains about the importance of forest conservation with the implementation of conservation activities would enhance the successfulness of the conservation programmes.

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