Valuing Stakeholder preferences on Improved Conservation and Management of Kol Wetland: A Contingent Valuation Study

A S Binilkumar and A Ramanathan
Department of Humanities and Social Sciences
Indian Institute of Technology Bombay, Powai, Mumbai, India

Abstract

Wetlands are one of the most important natural ecosystems, which help in sustaining human life by providing diverse goods and services. However, the benefits of those valuable resources are often unaccounted or undervalued due to their (benefits) intangibility nature. The indiscriminate exploitation of the said resources has resulted in a large scale destruction and degradation of the same. Urban wetlands or wetlands lying adjacent to the urban centres offer multiple benefits to the urban society. They act as the source of drinking water and also as a source for natural waste water disposal. In this respect, Kol wetland, which is a part of the largest Ramsar site in India (State of Kerala) known as Vembanad-Kol wetland, can be considered as a good example. It, simultaneously, (i) provides benefits for the urban society, and, (ii) ensures the livelihood options for thousands of rural population comprised of farmers and fishermen. This wetland is also considered as one of the important rice producing areas. Its ecological significance, being an important habitat of water fowls and migratory birds, is widely acknowledged. The wetland is also endowed with natural beauty with a long stretch of backwater zone that enhances its recreational value. But, due to the ever expanding population pressure and the unsustainable practices followed by the stakeholders including the farmers, the wetland is facing the serious threat of degradation.

The present paper has undertaken a Contingent Valuation study to assess the Willingness To Pay (WTP) of the urban stakeholders for the improved conservation and management of Kol wetland. The findings demonstrate a higher level of interest and WTP among the majority of the urban stakeholders. Also, the insignificant causal relationship found, between the educational level and the WTP, can be seen as an important theoretical implication.

1. Introduction

Wetlands are one of the most productive and life supporting ecosystems in the world, together with agricultural and forest ecosystems, which provide diverse tangible and intangible benefits on a sustainable basis. The benefits accrued from the wetlands can be classified as direct and indirect. The direct benefits include the products, aesthetic or recreational benefits or educational benefits. The indirect benefits are in the form of socio-economic and ecological functions which maintain and protect natural and human systems through services such as maintenance of water quality, flood control, storm protection, nutrient retention, cultural heritage etc. Despite their importance in maintaining the ecological balance and ensuring the sustainable livelihood of the human community, globally, wetlands are under heavy pressure due to unsustainable development practices followed (Mitsch and Gosselink, 1993). It has been noted that the main reason for excessive depletion and conversion of wetland resources is the failure to properly account their values, particularly, the non-use and functional values (Barbier *et.al.,* 1997).

The lack of pricing of wetland functions as well as the lack of cost recovery mechanisms have been the key determinants of inefficient and often inappropriate and excessive use of wetlands (Turner, *et.al*., 2003). In this regard, it has been cited that a significant step in determining what should be done about environmental damage is to value it (in economic terms) and compare it with the cost of preventing the damage (World Bank, 1992). Economic valuation of wetlands is an attempt to assign quantitative values to the goods and services provided by them, even if market prices are not available to assist (Barbier et.al., 1997). The approach helps to assess the relative efficiency of many alternative uses of wetland and to choose the option which yields maximum net benefits to the society. Efforts to assess the monetary value of environmental assets and ecosystem services play multiple and significant roles in managing the links between human and environmental systems. Further, it is seen that, in the recent years, the attitude towards wetland management has undergone a paradigm shift from reclamation to restoration (Sumana, 2004). In the restoration process, economic valuation will provide basic

benchmark information about the significant economic benefits of wetlands, which will assist the investment decisions. Also, in the case of urban wetlands or the wetlands which are lying in the urban peripherals, the pressure of alternative uses and reclamation will be higher. Kol wetlands (Kerala state) is a part of Largest Ramsar site in India, is a good example in this regard. The expanding urban centre named as Thrissur is burdening the wetland with huge pressure due to increase in population and the resultant increase in the demand for land for industrial and residential purposes. Also, as the wetland is dominated with the rice cultivating zones, the tendency of farmers to use high yielding varieties of seeds, fertilizers and pesticides affects it adversely. The farmers' practices not only pollute the wetland and the drinking water sources of nearby areas but also poison the food base of the migratory birds. Sand mining and clay mining are also rampant in some areas of the wetland. It is considered that the lack of awareness about the value of the wetland to be preserved drives towards the indiscriminate use of it. With the above background, the present paper makes an effort to examine the economic value of Kol wetland using Contingent Valuation Method (CVM). The specific objectives of the paper are,

a) To study the socio-economic dimensions of the stakeholders of the wetland;
b) To study the relationship between the socio-economic variables with the perception of stakeholders on the improved conservation of the wetland;
c) To find out the determinants of Willingness To Pay of the stakeholders for the improved conservation;
d) To estimate the total economic value of the wetland system within a framework of Contingent Valuation Method.

The paper is organised in seven sections. Section 1 has given the objectives and scope of the analysis. Section 2 narrates the background of the study area. Section 3 describes the Contingent Valuation Methodology used in the present study. Section 4 analyses the socio-economic dimensions of the stakeholders and their relationship with the perception of stakeholders about the improved conservation of the wetland. Section 5 provides a descriptive profile of the Willingness To Pay. Section 6 examines the determinants of

Willingness To Pay. It also reports the estimated economic value of the wetland based on the estimation process. The concluding observations of the analysis are outlined in section 7.

2. Background

Kol wetland is the part of Vembanad-Kol wetlands. The latter is recognized as the largest Ramsar site in India covering a total area of 151,250 ha. These sites are of international importance as the habitat of water fowls. It is also the largest brackish, humid and tropical wetland system in the south west coastal state of Kerala in India. On the other hand, Kol wetland covers an area of 18,632 ha, which is spread over Thrissur and Malappuram districts of Kerala state. It consists of low lying tracts located 0.5 to 1 meter below the mean sea level. In a major part of the area, the land is flat and it remains submerged for about six to eight months in a year. Karuvannoor and Kechery are the two major rivers in the wetland system. These rivers discharge water into the low lying Kol area and raise water level to more than three meters. So, the wetland functions as the flood basin for both the rivers. It regularly supports about 20000 migratory birds including water birds, broad-spectrum of prawns, fishes and mangroves. (The birds category includes 233 species of birds in 60 families out which 88 species are long distant migrants) (Sivaperuman, 2004; Nameer, 2003; Sivaperuman and Jayson, 2000)

The major part of Kol wetland is paddy fields. It forms the 'rice granary' of Thrissur and Malappuram districts. "Kol" is a term in Malayalam (a regional language in India) which means bumper crops. The whole Kol paddy fields were reclaimed from Kayal area by putting up temporary earthen bunds and cultivation of rice was carried out by enterprising farmers during December to May. Due to the profitability factor, farmers stick to single crop cultivation in the wetland though two dams were constructed to support irrigation facilities during the summer months. The water from the fields will be pumped out and stored in a network of canals interspersed throughout the area. The canals are connected to Arabian Sea in order to drain out excess water in the canals. They are protected with barrages in order to avoid saline water intrusion from the sea. These canals are also used

as irrigation canals to bring water from dams during the summer months i.e., February to May.

About 72 per cent of the total farmers are medium farmers having landholdings of 1 to 2 acres. Due to the medium holdings, the farmers resort to high yielding varieties of seeds and go for high rate of usage of fertilizers and pesticides. The excessive use of chemical fertilizers and pesticides in the cultivation is increasing at an alarming rate which (i) pollutes the wetland and adjacent water bodies and (ii) threatens the survival of migrant birds which visit the wetland during the period of September to March every year. The proportion of pesticide residuals in the drinking water sources of the adjacent residential areas which belong mainly to Thrissur Municipal Corporation is increasing in the recent times. (Thrissur is the nearest and most important urban centre which lies adjacent to the wetland). This aspect has become one of the major challenges in the management of the wetlands

Fishing is another important livelihood options available in the wetland particularly during the monsoon months. Different varieties of indigenous fish species are available in the wetland. Inland fishing community namely "*Dheevara*" are engaged in the activity together with some local community members. Recently, aquaculture has been initiated, particularly during monsoon months, when the paddy fields are flooded with water. As monsoon period is experienced as lean period for farmers, they consider aquaculture as an alternative source of income.

Kol wetland is endowed with the natural beauty with a long stretch of back water zone which has opening to the Arabian Sea. The paddy fields, with its dense greenery and water filled canals interspersed through the paddy fields, increases the aesthetic attraction of the wetland. There are many sites in the wetland, which have high potential for the development as recreational sites.

Thrissur Municipal Corporation is a city corporation which covers an area of 101.42 km^2 and is having a population of 3,17,526 with a density of 3031/km^2. The city doesn't have

a systematic and planned drainage facility to dispose the waste water and excess water during monsoons. Most of the drainage canals are connected to the irrigation canals of Kol wetland. The drinking water source, of the city and the surrounding areas, is largely depending on the Kol wetland due to the ground water recharge properties of the same. As the local paddy fields of Thrissur Corporation have been reclaimed for residential and industrial purposes due to increasing population pressure, the wetland became essential for the urban society to drain its waste water and excess water during the heavy monsoon months. During the summer, the water presence in the wetland helps to retain the groundwater level to a great extent. According to the reports, the water levels in the representative sample wells from Thrissur maintained an average water level of 6.32 meters in the 12 years period from 1996 to 2007. Even though in these years the consumption of water has increased manifold, due to the increase in the population level of Thrissur and the expansion of the city, the ground water level has remained almost same. This can be attributed to the ground water recharge property of the wetland.

3. Methodology

In the literature, there are mainly two broad groups of valuation techniques for fixing economic value of environmental assets. They are market based valuation methods and non-market valuation methods. Non-market valuation methods can be further classified into two, i.e., (i) observed or revealed preference methods and (ii) expressed or stated preference method. In the former case, the actual behaviour of the stakeholders is evaluated. On the other hand, the statements of stakeholders regarding their behaviour in a hypothetical situation are assessed in the latter case. Stated preference methods are considered superior over revealed preference methods due to the flexibility and applicability in a wide variety of environmental issues (revealed preference methods are based on the assumption that the non-marketed environmental good or service affects the preferences expressed by consumers about other marketed goods or services). The Hedonic Price Method(HPM) and Travel cost Method (TCM) are the most popular revealed preference methods. The contingent valuation method (CVM) and choice experiment method (CEM) fall under the stated preference method.

3.1 Contingent Valuation Method

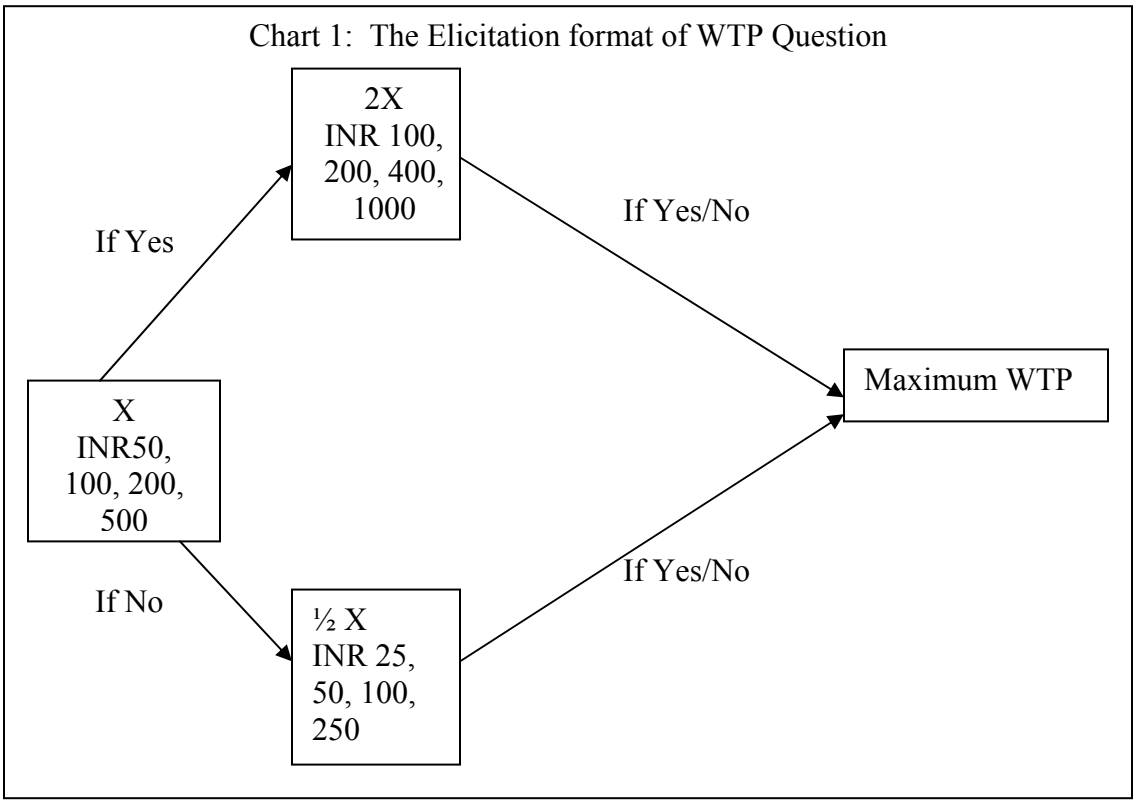
CVM has been the most commonly used approach in valuing non-market goods, the most popular being the closed-ended CVM surveys, in which respondents are asked whether or not they would be willing to pay a certain amount of money for realizing the level of non-market good described or, more precisely, the change in the level of the good (Bateman and Willis, 1999). CVM was first suggested as a method to study the non-marketed public good by Ciriacy-Wantrup (1947) in order to account the 'extra market benefits' of preventing soil erosion through eliciting one's willingness to pay for these benefits through a survey method (see Portney, 1994; Hanemann, 1994). The first study using CVM was conducted by Davis (1963) to estimate the benefits of goose hunting through a survey among the goose-hunters.

The goal of CVM is to measure the compensating variation or the equivalent variation for the good in consideration. The measure generally reflects the consumer surplus. The concept of compensating variation was introduced as a measure of utility change by Hicks (1939). It is an appropriate tool to measure the change in the stakeholders' welfare following an improvement of environmental quality. Similarly, equivalent variation is used to measure the change in the stakeholders' welfare when the quality of an environmental good gets deteriorated. In the former case, the stakeholders are asked to state their willingness to pay (WTP) for the improvement. Whereas, in the latter case, stakeholders will be asked to state their Willingness To Accept (WTA) for the welfare loss.

CVM became famous worldwide as a method to evaluate the damage caused to the existence value after the Exxon Valdez oil spill disaster which occurred at Prince William Sound, Alaska in 1989. The study conducted by Carson et. al. (1992) for the state of Alaska estimated the damage caused, to the existence value, for US residents as $3billion. It may be one of the reasons which motivated the Exxon to settle the law suit filed by the state of Alaska and federal government out of court for $1.15 Billion (Portney, 1994). National Oceanographic and Atmospheric Administration (NOAA) formed a panel of

experts following this incident which was chaired by Nobel Laureates Kenneth Arrow and Robert Solow to evaluate the reliability of CVM as a method to assess the lost non-use values. NOAA panel which submitted its report in early 1993 concluded that a well conducted CVM can produce reliable estimates that can be used as a starting point of a judicial process of damage assessment. The panel also recommended a significant revision of the structure of the CVM studies so that the reliability will be increased and the errors or biases will be reduced. Since then, CVM surveys have become one of the most commonly used methods for valuation of non-market goods, although its use has been questioned (see e.g. Diamond and Hausman 1994; Hanemann, 1994,). Over the period, when CVM has got developed, other types of stated preference techniques, such as choice experiments also evolved. However, the application of Choice Experiment Method (CEM) started in the case of marketing studies and transport economics (see Louviere and Woodsworth, 1983). Further, in recent times, CEM has been used in environmental valuation, as an alternative of CVM.

The present study uses a Double Bounded Dichotomous Contingent Valuation Model to collect the information on the WTP of the stakeholders. In the double bounded model, the initial bid determined was INR 50, 100, 200 and 500 as concurred by the focus groups from the study area (Chart 1). If the response to the initial bid question is 'yes' then the bid value doubles as to INR 100, 200, 400 and 1000 respectively. In the same way if the answer is 'no' for initial WTP the amount gets halved, that is INR 25, 50, 100, 250. Irrespective of the responses to the second bid, the stakeholders are asked to express their maximum willingness to pay. The maximum willingness to pay question is an open ended contingent valuation question. The payment vehicle used in the study is an 'Environmental cess' which may be collected by the Urban Corporation as part of corporation tax which all urban residents are required to pay. The responses to the maximum willingness to pay questions are considered for this paper to estimate the determinants and total economic value of the wetland.



Source : adapted from Markandya et.al, 2002.

The double-bounded CVM model is made with the responses of stakeholders to the choice elicitation questions. As explained in the chart 1, the individual is presented with the initial bid (BID_0) and asked whether she or he would pay the amount for the improvement kol wetlands. If the answer is 'yes' then the individual is presented with the higher second bid (BID_H). This will be double the amount of the initial bid. If the individual gave a 'no' to the initial question then he will be presented with the lower second bid (BID_L) which will be half of the initial bid. So the respondent is left with two alternative choices. One, the improvement in the kol wetlands that derive utility U^1 with the potential cost represented by BID_0, BID_H, BID_L and two, the status quo option with no potential cost and the utility level U^0 (Hanemann et.al., 1991). So there are four possible outcomes, they are both the answers are 'yes' (YY), both the answers are 'no' (NN), a 'yes' followed by 'no' (YN) and a 'no' followed by 'yes' (YN) (Hanemann et.al.,1991). Their corresponding likelihoods are $\pi^{YY}(B_i, B_i^U)$, $\pi^{NN}(B_i, B_u^L)$, $\pi^{YN}(B_i, B_i^L)$

and π^{NY} (B_i, B_i^L) respectively. The likelihoods can be derived as following Hanemann et.al. (1991).

$\pi^{YY}(B_i, B_i^U)$=Pr($B_i \leq$ max WTP and $B_i^U \leq$max WTP)=Pr($B_i^U \leq$max WTP)= 1-G(B_i^U, θ)(1)

$\pi^{NN}(B_i, B_u^L)$= Pr($B_i >$ max WTP and $B_i^L >$max WTP)= G(B_i^L, θ) (2)

$\pi^{YN}(B_i, B_i^L)$= Pr($B_i \leq$ max WTP $\leq B_i^U$)= G(B_i^U, θ)- G(B_i, θ) (3)

$\pi^{NY}(B_i, B_i^L)$= Pr($B_i \geq$ max WTP $\geq B_i^L$) = G(B_i, θ) - G(B_i^L, θ) (4)

Equation 1 and 2 allows to place both the upper and lower bound of the respondents unobserved true WTP whereas equation 3 and 4 helps to lower the upper bound and raise the lower bound(for eg. Hanemann et.al.1991). The log likelihood function of the respondent's choice of bid takes the form (Hanemann et.al., 1991)

$$\ln L = \sum_{i=1}^{N} \left\{ (\beta_i^{YY} \ln \pi^{YY}(B_i, B_i^U) + \beta_i^{NN} \ln \pi^{NN}(B_i, B_i^L) + \beta_i^{YN} \ln \pi^{YN}(B_i, B_i^U) + \beta_i^{NY)} \ln \pi^{NY}(B_i, B_i^L) \right\}$$

(5)

Where β^{YY}, β^{NN}, β^{YN} and β^{NY} are binary valued indicator variables.

3.2 The sample

The study largely depends on the data pertaining to the perceptions and preferences of the stakeholders on the improvement of Kol wetland. It was the urban population whom we took as the subject of the study because they are the largest segment of stakeholder population who reap the functional benefits of Kol wetlands in the form of (i) ground water recharging, (ii) source of drainage plain and (iii) the recreational benefits due to the aesthetic beauty of the wetland. They value the improvements on attributes of Kol wetlands as they feel that these improvements will have a positive impact on the benefits accruing to the urban population. In the case of rural population, mainly farmers, the wetland is the primary source of their livelihood. Rural stakeholders also showed very

high interest in the improved conservation of Kol wetland. However, in the focus group interviews they expressed their fears about the probable financial burden, which may, fall upon them (i) in the form of increased cost of cost of cultivation by switching over to organic farming and (ii) in the form of reduced production due to the birds attack. Infact, they demand financial aid from the part of the government to tackle the issue of high cost of farming operation. Due to these reasons, the research design of the present paper has spared the rural population from the sample. The sample is choosen from Thrissur City Municipal Corporation[1], which is the most densely populated city lying adjacent to the wetland

A total of 100 urban households have been chosen for the primary data collection. The sample households for the study have been identified using systematic random sampling. 50 divisions of the city corporation were taken for the study. These divisions are lying in varying distance from the wetland. The distance varies from 0.25 km to 23 km. two households were taken from each divisions comprising to 100 households. The road distance was taken for estimating the distance. The data collection took ten months starting from October 2006 to July 2007. It involved two stages. First stage was focus group interviews which were carried out in the study area during October – November, 2006. The pilot study and final household survey was conducted during March -July 2007.

4. Socioeconomic Dimensions and Environmental Perception of the Stakeholders

Perception is the judgment of people about something and it is an outcome of a process of evaluating the received information about that particular thing. It has got an important role in making peoples' decisions in a particular situation. Environmental perception is the perception of people on the status of environment and their opinion about the probable changes on the environment. It is essential to study the perceptions of the people who have some stake over the environmental resources to make appropriate policies for the conservation of the resources. Stakeholders' perceptions will be

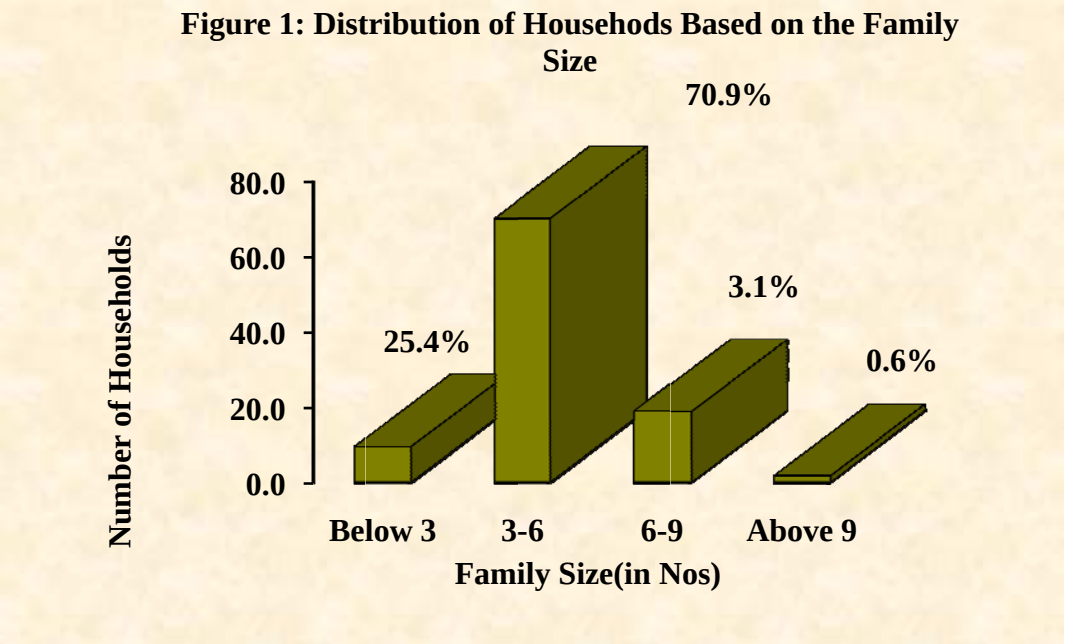
[1] Thrissur Municipal corporation added to the existing list of city corporations of Kerala in 2000.

influenced by their dependency level on the resources, the conservation awareness and their socio-economic features.

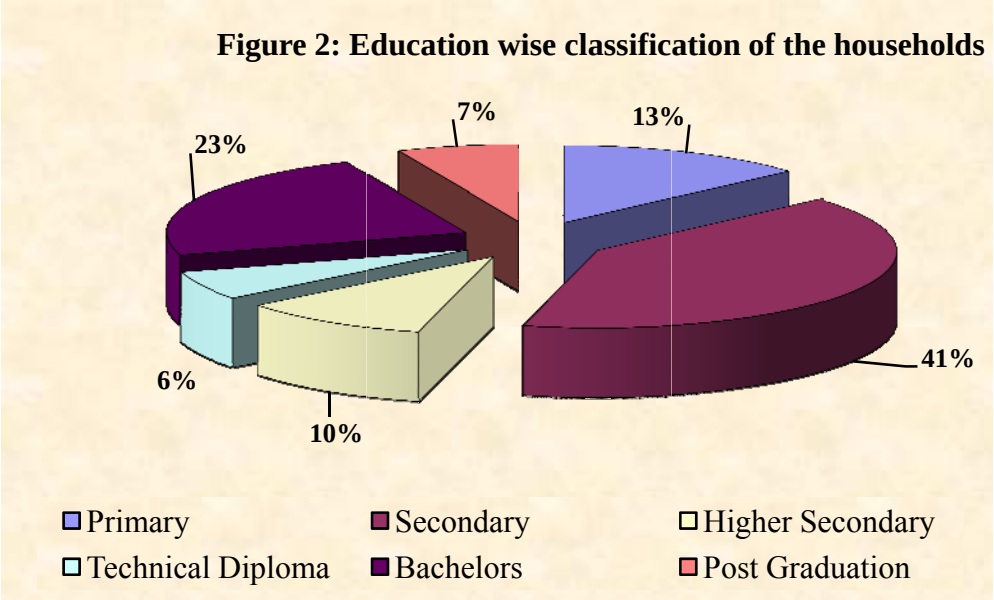
This section concentrates on the discussion over stakeholders' perception on the improvement of kol wetland. It also deals with the understanding of the socio-economic profile of the households of the study. The association between (i) select socio-economic factors on the one hand and (ii) perception about the conservation (of the stakeholders) on the other, also is discussed here.

4.1 Socio-economic profile of the households

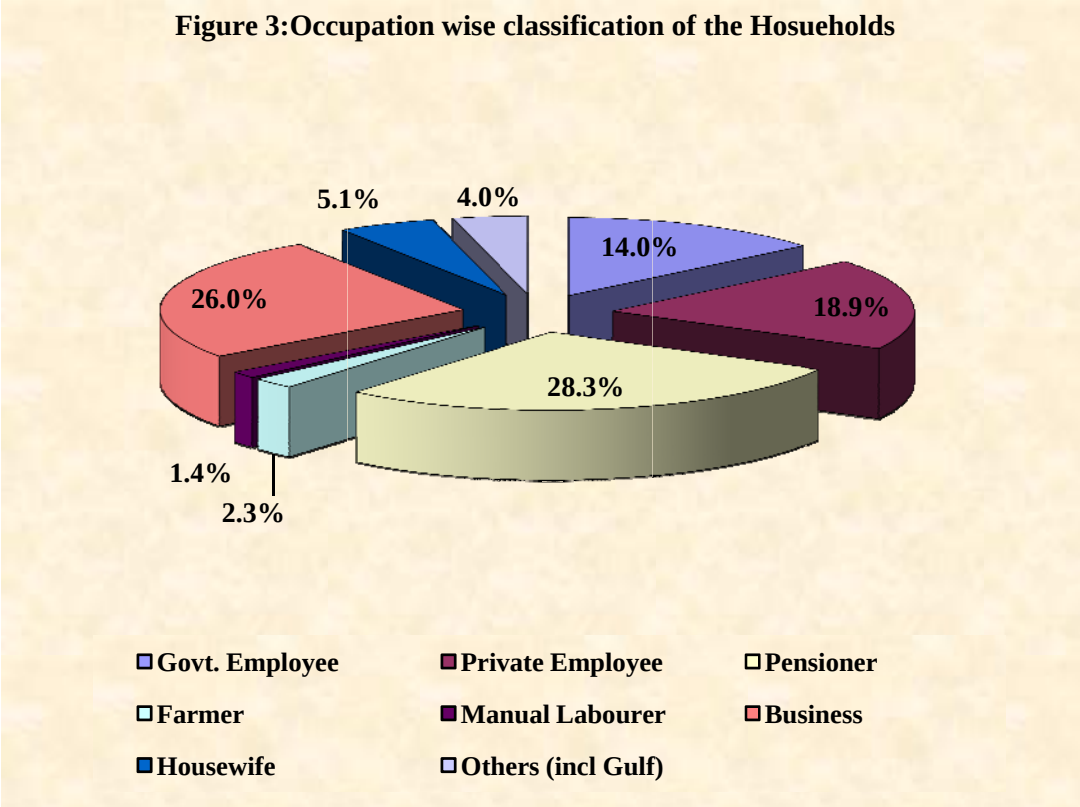
As regards the family size, the average family size was found to be 4 and it varies between 1 and 14 with a standard deviation of 1.6. (Figure 1 depicts the distribution of the sample households based on the family size). It is visible that majority of households are having a family size between 3 and 6. This implies that the sample households represents typical urban families in Kerala where, the family size varies between 3 and 6. Only less than 4 per cent follows the traditional group family system, having more than 6 members in the family. The number of the earning members of the family varies between zero to six. The majority of households, i.e., 53 per cent of the sample households, depend solely on one earning member where as 35 per cent of the households have two earning members. The number of dependent members varies between zero and twelve. 72 per cent of the households are having three or less dependents. And only 1 per cent households are having more than six dependents.



In the case of literacy, it's levels among heads of the household are found to be 100 per cent. (Figure 2 presents the distribution of households based on the educational level of the head of the family). The study has considered the literacy level of the head of the family only as the decision regarding Willingness To Pay for the improved conservation is usually taken by him/her. The corresponding data reveals that 40.6 per cent of he households are headed by a person who has got secondary education (Fig.2). 23.1 per cent of them are graduates and only 6.6 per cent are prost graduates.



As far as the occupational pattern is concerned, an interesting point is observed. To elaborate, the single majority segment among occupation is pensioners (28.3 %). (Figure

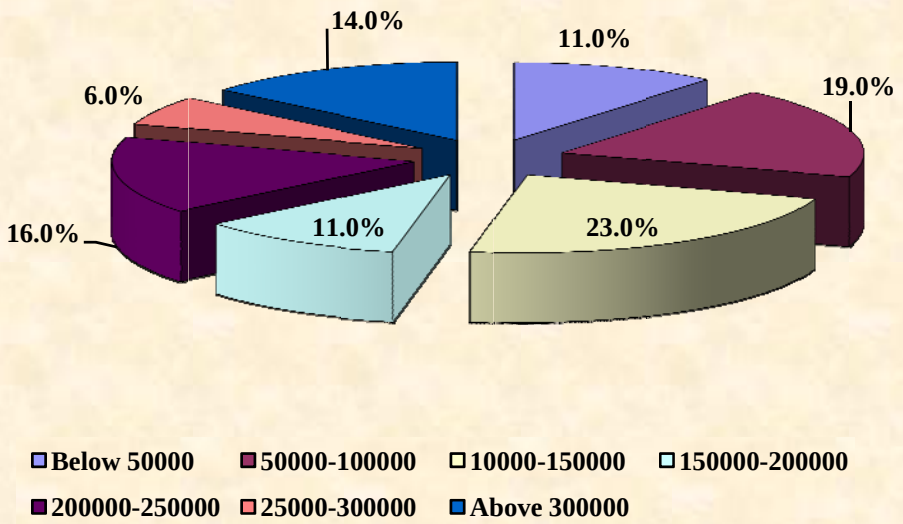


3 gives a detailed picture of the occupation of the head of the family). It is a recent phenomenon in Kerala that the number of aged is increasing and the main income source

of many households is the pension. 26 per cent of households are having business of their own and 14 per cent are Government employees. Being the urban population there were no agriculture labourers. Only 1.4 per cent of the households are depending on manual labour.

Aspects of income revealed the following: The level of annual income among the sample households varies between INR14,400 and 600,000. The mean income of the household is INR 139,608 with a standard deviation of 106,545. The annual income of 25.4 percent of the households ranges between INR 50,000 and 100,000 (Fig 4). 20.4 per cent of the

Figure 4: Income wise distribution of households

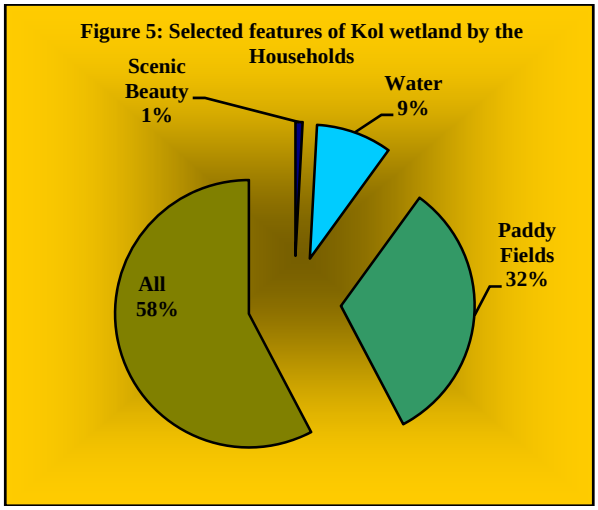


households are having an income of

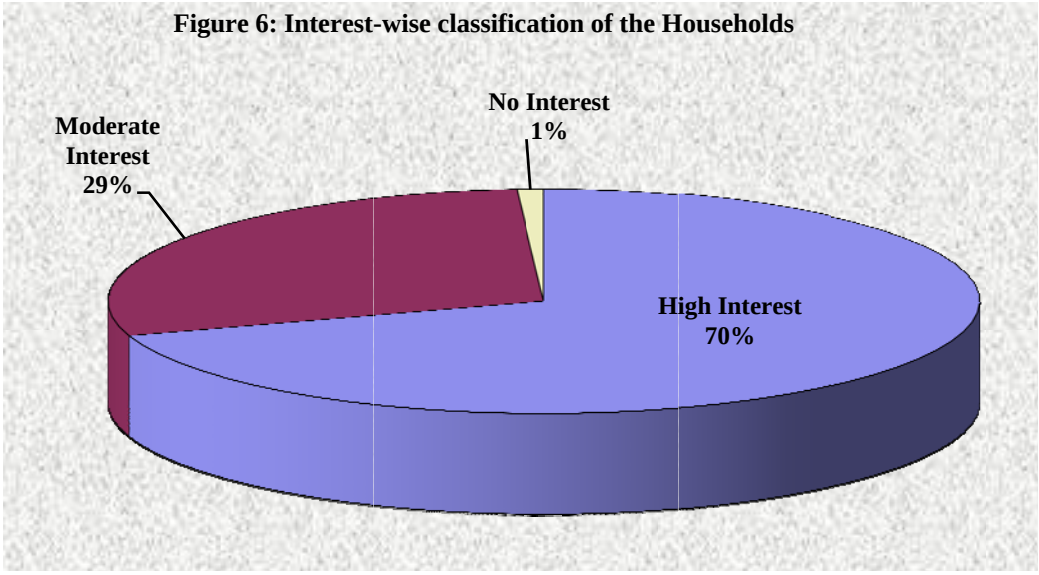
below INR 50,000. Only 6.9 per cent of the households are having annual income of INR 300,000 and above.

4.2 Stakeholders Perception on the conservation of Kol wetland: Some key aspects

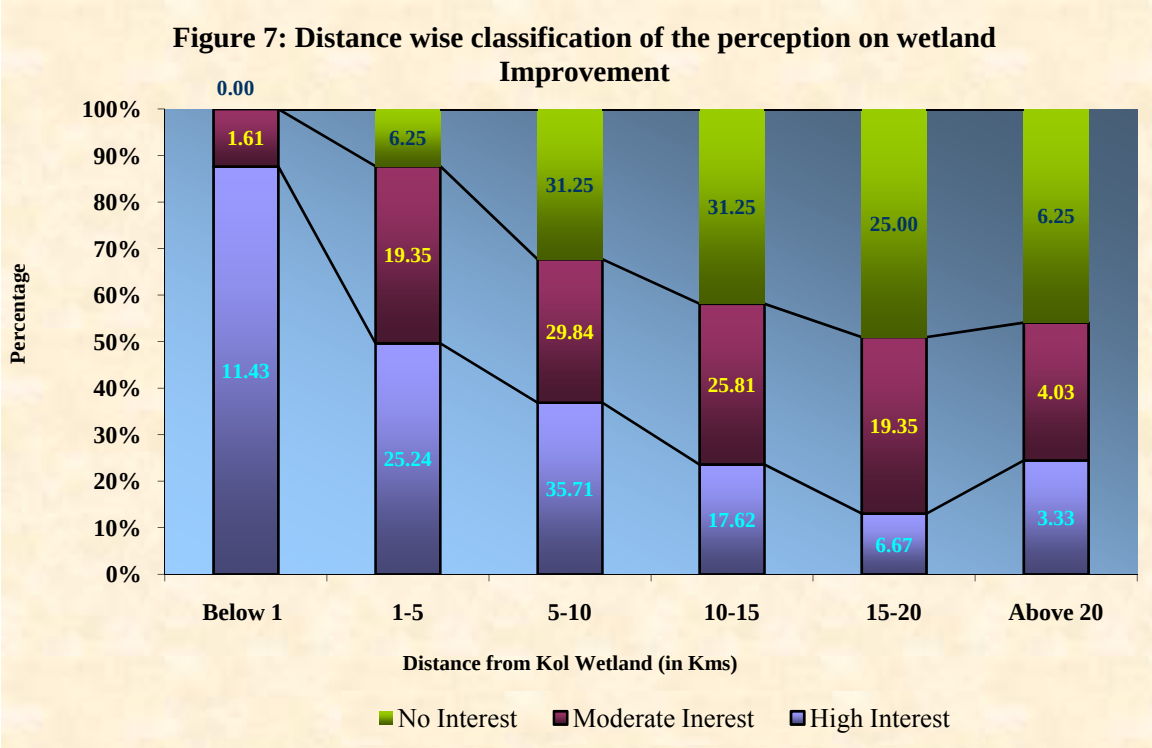
In this section, the interest of the sample households on conservation of the wetland is presented. The sample households' awareness about the wetland is assessed by asking them to identify the feature of the wetland that they consider to be most important (fig.5). The responses showed that 58 per cent households considered all the features of the wetland (which were listed to them as (i) scenic beauty (ii) birds (iii) water preservation and (iv) paddy fields). 1 per cent of the sample believes that the scenic beauty is more important feature where as 9 per cent gave importance to water preservation feature of the wetland.



Once the importance of wetland is understood, then it is essential to see whether the stakeholders use the interest to show the imrpved conservation of the wetland.70 per cent of the households shows high interest in the improved conservation of the wetland (Fig 6). Only 1 per cent holds no interest for the improved conservation of the wetland.



As we have discussed earlier the sample households are spread over different distances from the wetland. Though certain degree of dependency with the wetland exists, in almost all the area of Thrissur Municipal corporation, the distance factor appears to have some influence over the interests of the stakeholders for the conservation. Figure 7 depicts the distance wise classification of the stakeholders' interest on the improved conservation and management of the wetland. As expected, it is seen that there exists an inverse relationship between the distance and level of interest for the conservation. Majority of the stakeholders living closer to the wetland strongly agreed for the improved conservation. This may be attributed to the high dependency level on the one hand and being more informative about the constriants on conservation and management on the other. It is also observed that, as the distance increases, the proportion of stakholders not inclined towards conservation and management of the wetland also increases . This may be reflected in the Willingness To Pay for the improved conservation.



Education is one of the important elements which helps people to acquire knowledge on various fronts. It is expected that there will be direct and positive relationship between the education and interest for the wetland improvement. Table 1 displays the education-wise classification of stakeholders' perception on the improved conservation. As expected a direct and positive association between education and interest for conservation is visible. Out of total 23 graduates 83 per cent showed high interest in the improved conservation. 75 per cent of the post graduate people also expressed high interest in the conservation of the wetland. In general, it is observed that the stakeholders having education above the primary level have shown interest in conservation.

Table 1: Education-wise classification of perception of stakeholders on Wetland Improvement

Interest for Wetland Improvement / Education	More Interested	Moderately Interested	Not Interested	Total
Primary	3(50.00) [4.29]	2(33.33) [6.90]	1(16.67) [10.00]	6(100.00) [6.00]
Secondary	24(66.67) [34.29]	12(33.33) [41.38]	0(0.00) [0.00]	36(100.00) [36.00]
Higher Secondary	8(53.33) [11.43]	7(46.67) [24.14]	0(0.00) [0.00]	15(100.00) [15.00]
Technical Diploma	7(87.50) [10.00]	1(12.50) [3.45]	0(0.00) [0.00]	8(100.00) [8.00]
Bachelors	19(82.61) [27.14]	4(17.39) [13.79]	0(0.00) [0.00]	23(100.00) [23.00]
Post Graduation	9(75.00) [12.86]	3(25.00) [10.34]	0(0.00) [0.00]	12(100.00) [12.00]
Total	70(70.00) [100.00]	29(29.00) [100.00]	1(1.00) [100.00]	100(100.00) [100.00]

Figures in brackets are Percentage of the horizontal total; figures in square brackets are Percentage of the vertical total

Interest in the conservation is considered to reflect in the WTP. At the same time, WTP is expected to have a direct and positive relationship with the level of income of the stakeholders. Hence, it is important to examine the association between the stakeholders' interest and their annual income. Among the households whose annual income is above INR 300,000, 86 per cent shows high interest (Table 2). In fact, among the high income group all the stakeholders are invariably interested in conservation.

Table 2: Income-wise classification of perception of stakeholders on Wetland Improvement

Interest for Wetland Improvement / Annual Income (in Rs)	More Interested	Moderately Interested	Not Interested	Total
Below 50,000	7(63.64) [10.00]	4(36.36) [13.79]	0(0.00) [0.00]	11(100.00) [11.00]
50,000-100,000	9(47.37) [12.86]	9(47.37) [31.03]	1(5.26) [100.00]	19(100.00) [19.00]
100,000-150,000	16(69.57) [22.86]	7(30.43) [24.14]	0(0.00) [0.00]	23(100.00) [23.00]
150,000-200,000	9(81.82) [12.86]	2(18.18) [6.90]	0(0.00) [0.00]	11(100.00) [11.00]
200,000-250,000	11(68.75) [15.71]	5(31.25) [17.24]	0(0.00) [0.00]	16(100.00) [16.00]
250,000-300,000	6(100.00) [8.57]	0(0.00) [0.00]	0(0.00) [0.00]	6(100.00) [6.00]
Above 300,000	12(85.71) [17.14]	2(14.29) [6.90]	0(0.00) [0.00]	14(100.00) [14.00]
Total	70(70.00) [100.00]	29(29.00) [100.00]	1(1.00) [100.00]	100(100.00) [100.00]

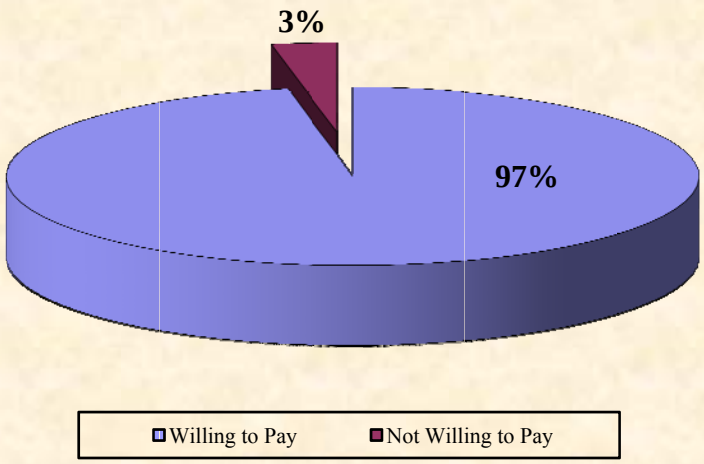
Figures in brackets are Percentage of the horizontal total; figures in square brackets are Percentage of the vertical total

5 The Willingness to Pay: Composition and Distribution

The Willingness To Pay is the amount of money that a consumer is willing to make in order to consume a particular unit of a commodity. It is associated with the utility of that particular commodity and is used in economics in order to measure the consumer surplus. In the present study, it is used to identify the amount of money that the urban stakeholders are willing to pay to conserve Kol wetland and thereby to estimate the

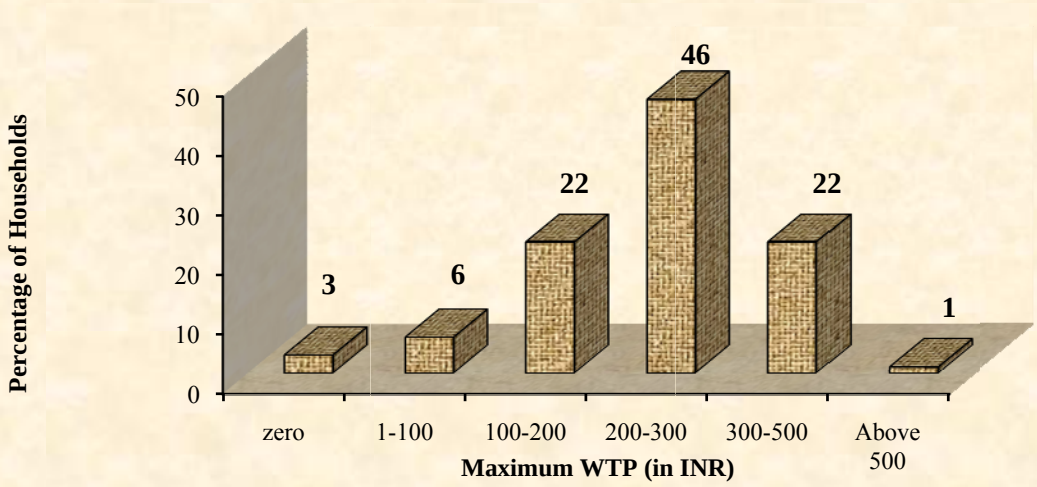
economic value of the wetland. It is observed that almost all of the households are interested in the improved conservation of the wetland (97 per cent of the sample house households express their Willingness To Pay for the improved conservation of Kol wetland) (Fig. 8).

Figure 8: The proportion of the stakeholders' on the basis of their willingness to pay



WTP, in terms of INR varies between 0 and 1000 with a mean of 239.5 and a standard deviation of 170.3 (Fig. 9). A large proportionof the households, i.e., 46 per cent fall

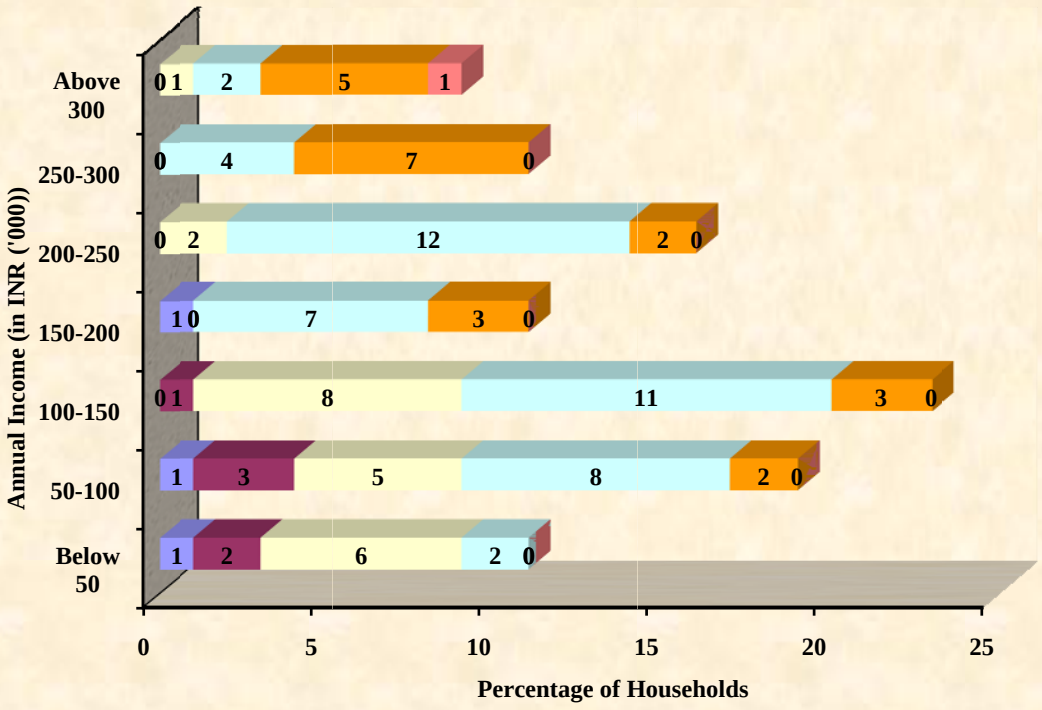
Figure 9: Classification of the Household Based on the maximum WTP



under the category where the maximum WTP varies between INR 200 and 300. It can be seen that only 3 per cent households are not willing to pay according to the sample data.

In order to have a more detailed understanding about how different income groups respond to the WTP questions the association between the WTP and the income of the household is examined further. In this context, It is observed that there exists a positive association between income level of a household and its WTP. (For example, in the class of respondents, who are willing to relatively more, the higher income group dominates) (Figure 10). The expected degree of association between income and WTP is evident. This aspect, however, examined subsequently.

Figure 10: Income-wise classification of the Maximum WTP



6. Determinants of Willingness to pay

We have seen a positive association between the income of the households and its Willingness To Pay. In this section, the causal aspect of the relationship between the socio-economic features of the household, on one hand, and the WTP, on the other, is examined within a regression framework.

6.1 The model

Birol et.al, (2007) estimated farmers' Willingness To Pay for varying quantities and qualities of recycled wastewater using Contingent Valuation Method. She has attempted to find out the determinants of the WTP of the farmers with an Ordinary Least Square (OLS) regression analysis of WTP with the socio-economic variables. Further, a few of the important studies conducted in Indian context are by Verma (2001) and Sumana (2004). The said studies, in general, have reported causal relationship between socio-economic characteristics of the stakeholders and WTP.

In line with the above literature, the causal relationship between(i) the socio-economic variables and attitudes and perceptions towards conservation and (ii) WTP is examined with an OLS regression model. The following model has been formulated for the regression analysis. The WTP is expressed as the function of the socioeconomic attributes of the households and distance from kol wetland and expressed as

$$WTP = f(AGE, EDU, FAM, INC, LND, ENV, DIS)$$

The linear additive form of the same is

$$WTP = \alpha + \beta_1 AGE + \beta_2 EDU + \beta_3 FAM + \beta_4 INC + \beta_5 DIS + \beta_6 LND + \beta_7 ENV \quad (2)$$

The explanatory variables along with their notations and expected signs of causal relationships are reported in Table 3.

Table 3: The Explanatory Variables in the model

Sl No	Variable	Definition	Exp. Sign
1.	AGE	The age of the decision maker of the household	+ve
2.	EDU	Education Level of the decision maker	+ve
3.	FAM	Family size of the household	+ve
4.	INC	Logarithm of Annual income of the household	+ve
5.	DIS	Distance of the households from Kol Wetland	-ve
6.	ENV	Whether the respondent is a part of any Environmental organization (1-Yes, 0-No)	+ve
7.	LND	Total landholding size of the household	-ve

The descriptive statistics of the variables used in the regression is given in table 4. The standard deviation of WTP and LND is very high indicating variation in the distribution of variables across households.

Table 4: Descriptive Statistics

Sl No	Variable	Mean	Standard Deviation
1.	WTP	239.50	170.308
2.	AGE	53.44	9.841
3.	FAM	4.61	1.171
4.	LND	33.91	82.607
5.	DIS	7.96	5.566
6.	ENV	1.92	.273
7.	EDU	12.09	3.232
8.	INC	11.83	0.707

The estimated results (Table 5) shows that the variables AGE, INC, DIS, LND and ENV are relatively more important determinants, with expected signs, of the WTP of the households, according to the significance level and the value of standardized coefficients. It is noteworthy that, although the coefficient values of EDU and FAM have the expected signs, they are not significant. It can be further seen that income is the most important variable which determines the WTP of the household (This aspect has been substantiated by evidence by other studies as well). As expected, there exists negative influence of distance (DIS) upon WTP. Size of landholding (LND) also demonstrates negative influence according to the result. This finding may be attributed to the fear of potential restrictions over the farming activities following the improved conservation programme of the wetland.

Table 5: Linear Regression Results

Variable	Coefficient	Standard Error	Standardized Coefficients
CONSTANT	-1328.794*	280.044	
AGE	3.156**	1.522	.183
EDU	6.847	5.530	.130
FAM	11.782	12.136	.081
LND	-.406**	.169	-.197
INC	111.187*	24.476	.462
DIS	-6.053**	2.497	-.198
ENV	112.628**	53.641	.181
R^2	.422		
Adj R^2	.378		
F	9.588*		
Sample Size	100		

*-significant at 1% level, **-Significant at 5% level

7. The total WTP

The WTP of the stakeholders, as a whole, is estimated after calculating the average WTP of the sample stakeholders. It is found that the mean WTP of the household is INR 239.5 per annum with a standard deviation of INR 170.3. As the variation is very high the median WTP will be a better measure to estimate total WTP. The median WTP is estimated as INR 200. The total number of urban households in Thrissur is 180,345. Based on the above, the total WTP of the urban households in Thrissur District for improved conservation of Kol wetland has been found to be INR 36,069,000.

8. Conclusion

In this paper, an attempt has been made (i) to analyse the perception of the stakeholders on the improved conservation of Kol wetland and (ii) to estimate the economic value that the stakeholders perceive on the improved conservation and management of the said wetland. It has been found that, a large proportion of the urban stakeholders beholds high interest for the improved conservation and management of Kol wetland and also is willing to contribute a visible part of their income for the said cause. This aspect explains their interest to preserve the wetland, which deliver diverse goods and services. The regression analysis showed that income to be the most important element which determines the WTP with the usually expected positive relationship. The distance from the wetland is also found to be an important factor as the determinant of WTP and is negatively related. The insignificance of education level variable of the respondents opens up a new frontier in the theory. This aspect need to be debated and examined in depth. The estimated WTP of the stakeholders indicates the urban households' concern for the improved conservation and management of the wetland. The findings can motivate policy makers to adopt a better and holistic approach for improved conservation and management of the wetland.

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