Social Perceptions and Valuation of Urban Wetlands of Kolkata Region

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Abstract: *The development of environmental strategies for sustainable urban planning prioritises 'water' among other crucial factors. The management of water-based ecosystems includes marine, riverine and wetland ecosystems. Some of the most important cities of the world are located upon or adjacent to water-based ecosystems – New York, New Jersey, California, London, Dacca, Mumbai and Kolkata, to name a few. Urban wetlands need careful prioritisation as the process of urbanization generates the greatest volumes of wastes and pollutants as also the most largescale conversion of landuses – reclaiming wetlands for urbanization is the most common concern at the global level. This study attempts to explore people's perceptions and preferences regarding the wetlands of Kolkata, one of the largest metropolitan regions of the world. An intricate water-based ecosystem consisting of a network of distributaries, canals, natural waterbodies affected by tidal influences constitute a complex and unique attribute of its deltaic location. This paper attempts to explore the nature of preferences of people (who are either direct or indirect stakeholders in the system) and the attributes associated with these preferences. Thereafter, it also attempts to examine the differential characteristics of rural and urban households in order to identify the discriminants. It emerges that preferences are associated with socio-economic factors and environmental awareness. Household size, education, income and willingness to pay emerge as discriminants between the rural and urban population.*

Keywords: urban wetlands, perceptions, preferences, valuation, discriminants

Introduction

Planning for urban environments has been faced with innumerable challenges through time. One of the most dynamic of these challenges pertains to the issues of conservation of natural ecosystems within and adjacent to growing metropolitan regions. Sustainable urban planning is not only about providing adequate amenities and infrastructures and reducing pollution levels, but is also primarily concerned with protection of sensitive ecosystems. This paper proceeds to identify the conservation attitudes of rural and urban population towards the wetlands of Kolkata. In examining social perceptions and valuation of the use of wetlands, the contingent valuation method has been used in a broad and inclusive sense for the analysis of willingness to pay in favour of preservation of wetlands. Further, the discriminants analysis has been used to identify differential characteristics of rural and urban population.

Approach and Rationale

Wetlands and their multifarious functions have been extensively researched upon, from the point of view of hydrological, botanical, zoological, micribiological, limnological and biodiversity related parameters. These studies, almost unanimously lead to one question – about the importance of conserving these ecosystems. This necessitates weighing of losses and gains related to retention or conversion of those lands; which gives way to an interesting dimension of research – the benefit-cost approach. This approach is imminent in determining the future of the sensitive natural ecosystems of the world. It is also necessary to mention that the twin processes of industrialization and urbanization has created, by far, the greatest extent of negative impacts upon natural ecosystems. Urban wetlands therefore may be considered to be in far greater danger of degradation than remotely located ones.

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A large volume of literature has been compiled by environmental economists as a series of methodological variants with supporting empirical examples have evolved to study the social processes of environmental valuation. Institutional research like that of the VALSE project (1996-1998), the World Bank studies (1995) and the studies on resource valuation under the European Union Environmental Action Plan has incorporated natural resource evaluation into the mainstream of institutional policy framework. Individual studies conducted on the basis of several case studies across the world also lends support to the fact that valuation may be used a method of understanding the values on natural ecosystems, hitherto treated as a 'free good' for generations. Many studies have been conducted upon urban water-based ecosystems in India – the Bhoj wetlands of Bhopal by Verma (1999), of the tangible and intangible benefits and costs of cleaning up the Ganges by Markandya and Murty (2000), of the values of ecological functions of the Yamuna floodplains by Kumar (2001), the functions and values of the East Kolkata Waste Recycling Region by Dasgupta (2003) and that of water resource management of the Nainital lake and its watershed by Singh (2003), to name a few.

Methodology

Studies on wetlands from the point of view of the benefit-cost analysis approach have been conducted with the use of different methodologies. By and large, the studies may be classified according to methods of valuation of benefits and functions of wetlands, namely revealed preference and stated preference methods. Studies on tourism and recreation benefits largely use the travel cost approach, those on variation of real estate prices have taken up the hedonic pricing approach, while contingent valuation has been used for developing the people's preferences arguments. It has also been generally concluded that, such studies can adequately willingness to pay in a broad and inclusive sense. It is an anthropogenic approach and estimate the values of ecosystem services. Contingent Valuation represents the general techniques or procedures used to elicit focuses on stakeholders. It is a direct method for estimating values based on behavioural models for measuring environmental benefits, implying that the demand for an environmental change is measured by means of a constructed or hypothetical market. The Willingness to Pay (WTP) values indicate the "stated preference" for conservation of the wetland. Studies in developed countries have used simple benefit-cost ratios (Adger et al 2001), dichotomous choice models (Choong-Kee, 2002), repeated and nested logit modeling (Herriges, 2002 and Hanley, 2002) contingent valuation (Brouwer etal 2001, Hanley and Spash, 1998 Choe, 1996). Valuation as a methodology has been developed in the context of Indian studies by Murty et al, (1999), Chopra (1999) and Parikh (2003). These studies have estimated values of ecosystem benefits. The prevalent argument in all studies, both in the developed countries and in India, is strongly towards preservation as a long-term benefit. In this study, the Contingent Valuation technique has been used to elicit responses to analyse the nature of peoples preferences, by asking respondents to pay a value contingent to their being in a market for the environmental good (the wetland).

Discriminant Analysis is used to study differences between two groups of data. For the methodology, reference has been made to a study on differential performances of the Indian automobile sector during two periods, namely, pre-liberalisation and post-liberalisation, by Narayanan (2001). Kumar (1990) applied it to examine the differential characteristic of foreign and local firms in Indian industries. In this study, it is used to define the basis on which sample responses differ between urban and rural groups.

The significance of the difference between rural and urban groups is first evaluated by the univariate statistical criterion, which is a non-parametric test. The univariate analysis tests for the equality of group's means for each variable. Wilk's Lambda and F value represents the testing criterion. Wilk's Lambda is expressed here as:

W = within group sum of squares / total sum of squares

W = 1 if the observed group means are equal and moves closer to zero as within group variability is smaller than total variability.

Wilk's Lambda scores are used to choose variables and their significance is determined by F values.

After the univariate analysis, all variables are introduced in a multivariate analysis to identify discriminants.

The Univariate Wilk's Lambda score governs the choice of a variable to be included in the step-wise procedure. Here, the separation between the two samples (rural and urban) is given by:

$$RU = \alpha_1 X1 + \alpha_2 X2 + \alpha_3 X3 + \ldots\ldots\ldots\ldots \alpha_n X_n \qquad (1)$$

Where X indicates the values of independent variables and α represents the coefficients estimates from the data. RU is the discriminant score of sample groups (0 = rural and 1 = urban).

All the variables have been introduced in a multivariate statistical procedure to identify discriminants. The variables are as follows: family size, years of education, occupation, income levels, willingness to pay, willingness to conserve, awareness of pollution levels and willingness to use wetlands for recreation functions.

Willingness to Pay (WTP) was selected as the decision variable as this would indicate people's preference regarding the wetland as an environmental resource. A Rural-Urban dummy variable was introduced to the model in order to classify the sample.

The study area lies between 22 35' to 22 40' N and 88 25' to 88 30' E and is the north eastern part of Kolkata Municipal Development Authority. The study area spreads across two districts, namely Kolkata Metropolitan District and the North Twenty Four Paraganas District. It may be important to mention that it lies to the north-east of Salt Lake City which was the first example of wetland reclamation for urban expansion. The survey was conducted in the margins of the ongoing Rajarhat New Township Project and covers seven villages around the Nowai and Haroa Khal, east of the National Highway (NH 34) and the Airport. For the urban sample, newly developed housing societies were selected from Narayanpur, Kaikhali and VIP Road, located in the South Dum Dum and Rajarhat-Gopalpur municipalities. 184 rural households and 80 urban households were covered during the survey.

Willingness to Pay for Conservation

Willingness to pay (WTP) is the amount of payment that a respondent is willing to make for the protection of the resource or willing to contribute if the resource is conserved instead of being converted for other uses (such uses as may be considered ideal for generation of benefits while conserving the resource). This section analyses both willingness and unwillingness to pay and attempts to justify preservation preferences in terms of the income levels of the population. It then goes on to conclude which group among rural and urban has better user preferences.

Analysis of Willingness to Pay

For those willing to pay, the payment ranges from Rs.60 per year to Rs.1800 per year. The highest payment in rural sample is Rs.1200 per year, while that in the urban sample is Rs.1800. Considering the high-income levels in urban areas, the payment as a proportion of their income is very low. The overall mean for 264 households is Rs.300.72, with a standard deviation of Rs.400.60, which indicates that there is high overall variation in the amount people are willing to pay for conservation. If rural and urban willingness to pay are considered separately, it appears that while the rural mean is Rs.143.04 per annum, with a standard deviation of Rs.222.73, the urban mean is Rs.663.38 with a standard deviation of Rs.477.75. This clearly demarcates the difference in the nature of payment possibilities across rural and urban population. While urban payments are higher, there is lesser variation. On the other hand the situation is reverse in case of rural population, where the payment are lesser but shows high variation. This implies that rural population is more forthcoming in payment, whenever their conditions permit them to do so.

The WTP values were grouped into seven categories (Table 1), to analyse the nature of distribution of households. The distribution shows concentration of households in different payment groups. Figure 1 shows the same distribution.

Table 1: Willingness to Pay across all Households

Payment for conservation	No. of HH	% of HH
(WTP in Rs/yr)		
0	62	23.5
1-100	70	26.5
101-150	25	9.5
151-300	38	14.4
301-800	35	13.3
801-1000	15	5.7
> 1000	19	7.2
	264	**100.0**

It is evident from Table 1 and Figure 1 that the frequencies are highest for the lowest range of WTP Rs.1-100 per year, i.e., 70% of the population is willing to make the least payment. In the groups with higher payments, number of households decline considerably. The lowest number of households is in the second highest payment group – only 5.7% are willing to pay anything between Rs.801-1000. 7.2% are willing to pay more than Rs.1000. It was verified that the households belonging in this group are either direct stakeholders like owners of fisheries or feel strongly about conservation benefits.

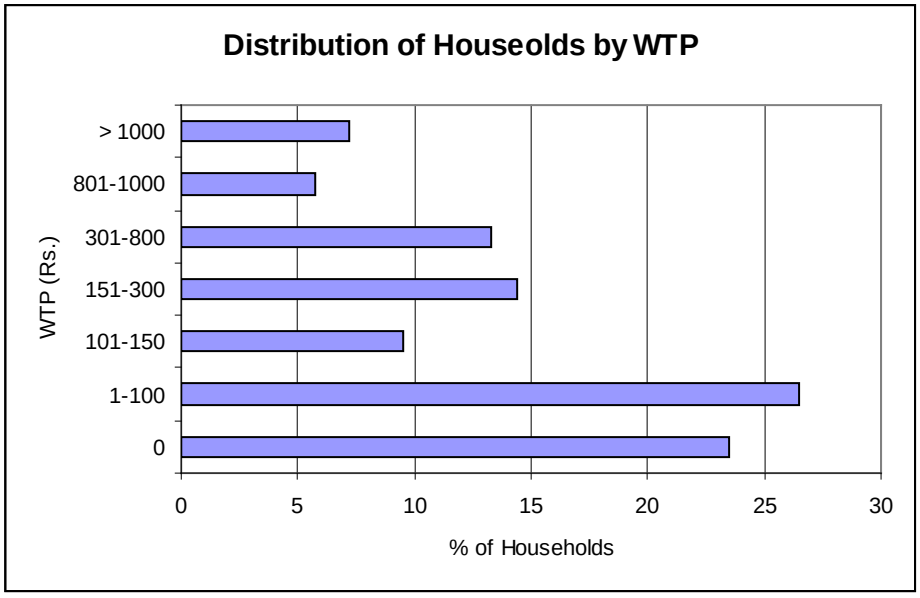

Fig.1

Rural Willingness to Pay

In the rural area, the WTP values range from Rs.60 to Rs.1200 per annum in the seven villages taken together. It may be mentioned here that high WTP of Rs.1000-1200 is strictly restricted to the "bheri" (fish farm) owners, who are comparatively financially better off than other rural respondents. The total amount of payment expected from 184 rural households amounts to Rs.26320.

Importantly, it is to be observed that the payment for conservation is proportionate to increases in income in case of rural households, which is evident from Figure 9.2. This reiterates our assumption that rural willingness to pay is likely to be influenced primarily by income.

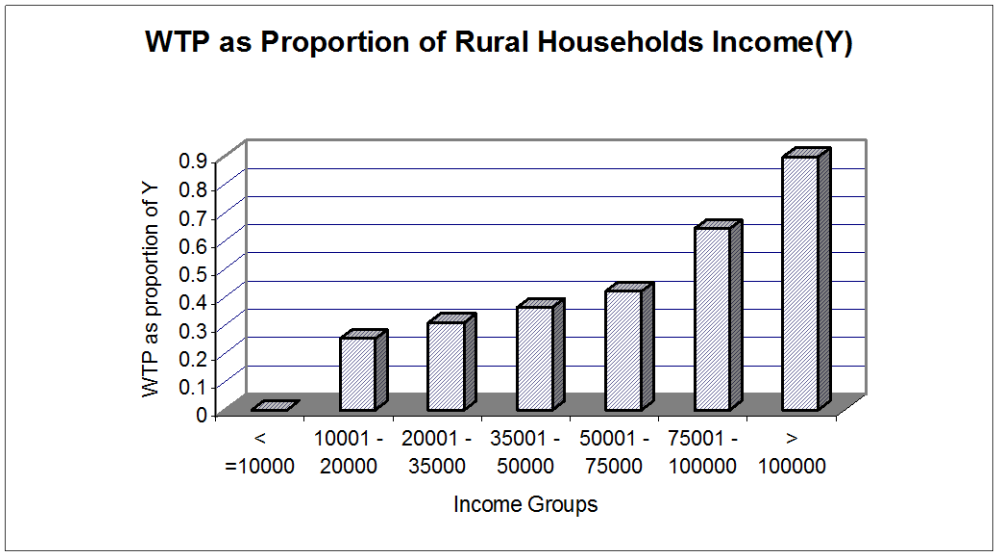

Fig.2

However, as a whole, the proportion of income that households are willing to sacrifice is very low, ranging from **0.08** to **0.87**. Understandably, while the higher income groups can afford to pay for protection of their sources of livelihood, the poor cannot secure their livelihoods even though they may want to. It may be mentioned here that higher income groups in the sample were all "bheri" (fish farm) owners and they are willing to contribute higher amounts, as the wetlands are their source of profit and livelihood.

Urban Willingness to Pay

As a whole, the urban willingness to pay is higher than the rural, because of higher levels of income and greater security in terms of employment and savings. Total willingness to pay of urban households amounts to Rs. 53070, more than double the payment expected from rural sample population.

However, its variation across income groups does not follow the same rationale as in the rural sample. As shown by Fig. 9.3, the maximum share of payment comes from the middle-income group Rs.150001 – 300000.

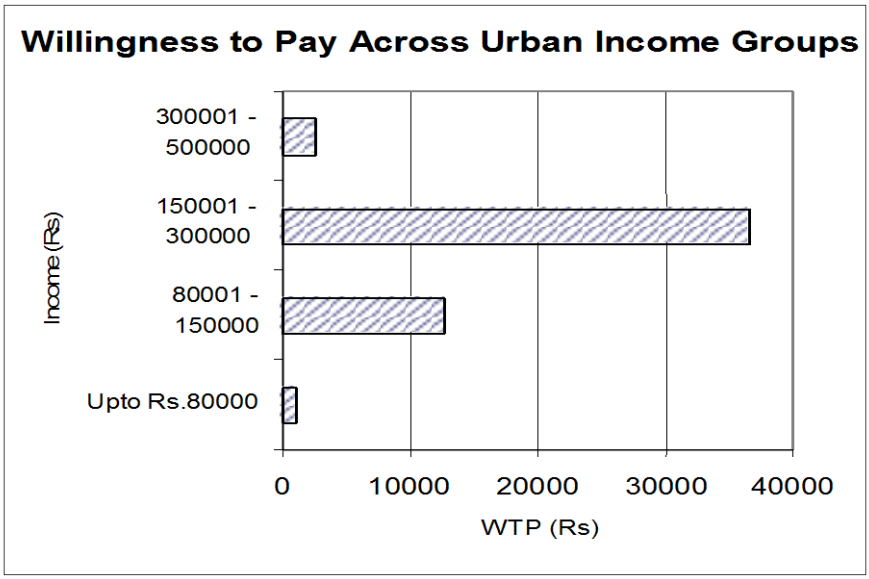

Fig.3

Comparative aspects of User Preferences

Higher level of incomes earned by the urban households is not reflected in their willingness to pay as a whole. Though the total value of WTP is higher, the proportion of income that they are willing to forgo is lower than rural households. Table 2 summarizes the relationship between income and willingness to pay.

Table 2: Willingness to Pay as Proportion of Income

Samples	Total Income (Rs/yr)	Total WTP (Rs/yr)	WTP as a % of Income
Rural	6313400	26320	0.42
Urban	15483000	53070	0.34

In spite of lower incomes and poverty, rural households were likely to contribute 0.42% of their income while urban households are likely to pay 0.34%, lower by 0.08 percentage points. Though a very marginal difference, *it shows better user group preference for rural population.* Presumably, the reason is that a greater proportion of the rural population is directly dependent upon the wetlands for agriculture and pisciculture for their livelihood and therefore comprises direct stakeholders. On the other hand, there are no direct stakeholders at present among urban households except for being consumers of fish and vegetables produced in the wetland areas. The urban population, however, comprises indirect beneficiaries of the positive functions of the wetland ecosystem but is not well aware or informed about these functions.

Discussion of conservation attitudes among rural and urban population revealed that positive conservation attitudes were shown by 95% of urban respondents and 80% of rural respondents. However, it is evident that the willingness to pay as a proportion of income, does not necessarily match with the perception of urban population towards conservation. While 95% respondents are willing to conserve, they are willing to forgo only a very small proportion of their income for the purpose. Rural perceptions are also strongly in favour of conservation and in spite of low levels of income, are willing to forgo 0.42% of their income, which amounts to Rs.26320.

Analysis of Unwillingness to Pay

There are respondents in both rural and urban samples that are not willing to make a payment, whatever the payment vehicle may be. Table 1 in the above section shows that 23.5% of the total population is unwilling to pay. Most of these households cannot pay because of their financial instability. But some also feel that they would not pay because they are unsure about how their hard-earned money would be utilized by the institution to which (or the person to whom) they will have to pay. There is another section who feel that they should not pay as it is the government's responsibility to pay for resource conservation. Tables 3 and 4 show the distribution of rural and urban households unwilling to pay across different income groups. 27% of rural households are unwilling to pay, whereas 15% of urban households are unwilling.

Rural Unwillingness to Pay

In case of rural population, it is noted that 27% of the households are unwilling to make any payment. Table 3 indicates that out of the 27%, none of the households belonging to the very low-income group are willing to make any payment. Two reasons are very clear regarding non-payment of the lower income group. Firstly, their hand-to-mouth existence does not permit them to spare anything for conservation payments, which is a luxury for them.

Table 3: Distribution of Rural Households Unwilling to Pay

Income Groups	No. of Household	Households Unwilling to Pay	Groupwise %	% of Total Household
< =10000	11	11	100.00	6
10001 - 20000	64	32	50.00	17.5
20001 - 35000	43	3	7.00	1.5
35001 - 50000	28	1	3.60	0.5
50001 - 75000	26	0	0.00	0
75001 - 100000	6	3	50.00	1.5
> 100000	6	0	0.00	0
Total	**184**	**50**		**27**

Secondly, some feel that conversion of wetlands to residential and commercial uses is likely to bring greater employment opportunities in the form of construction work, need for daily labourers, domestic help, shops for daily needs and a range of other opportunities. This possibility of employment is a far greater need of the poor and unemployed than wetland conservation. In higher income groups, payment possibilities are noted to be increasing. The reasons were determined to be their greater stake in the wetlands as most of these respondents are fish farm owners or shareholders.

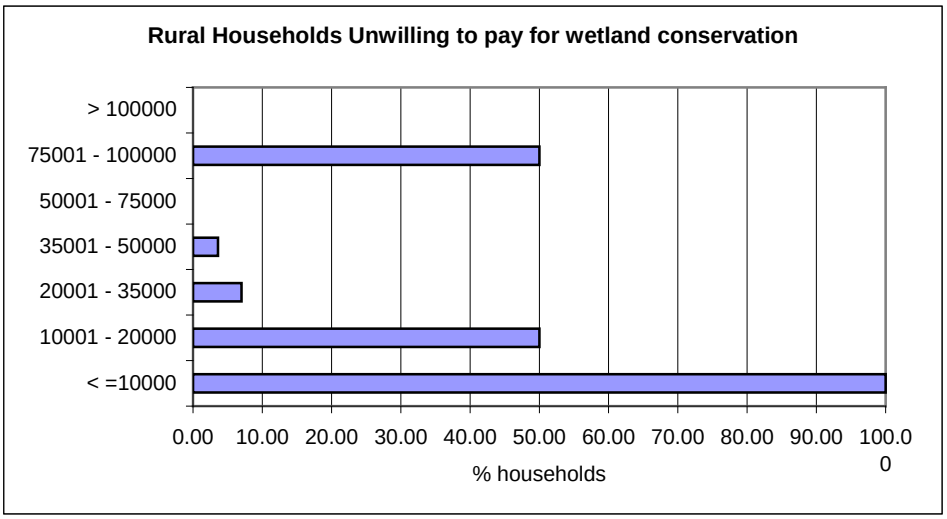

Fig.4

Urban Unwillingness to Pay

On the other hand urban households unwilling to pay arranged by income groups has been shown in Table.4. The scenario is reversed in this case. The highest income group of Rs.3,00,001- 4,50,000 is largely unwilling to pay. 30% of the lowest income group in urban population is not willing to pay.

Table 4: Distribution of Urban Households Unwilling to Pay

Income Groups (Rs)	No. of Household	Household Unwilling to Pay	Groupwise % of Household	% of Total Household
<= 80000	3	1	30	1.25
80001 – 150000	27	2	8	2.5
150001 – 300000	42	3	7	3.75
300001 – 450000	8	6	75	7.5
Total	80	12		15

The unwillingness to pay by members of high-income groups may be explained by the fact that their expenditure for improvement of standard of living does not spare much for conservation. Another assumption may be made, that the members of high income groups are alienated from the ideas of ecosystem benefits and conservation needs for the wetlands. It is an important assumption that implies that higher income does not have any association with higher level of awareness of the environmental resources.

Association Between WTP, Socio-Economic Factors and Environmental Awareness

Correlation matrices were prepared to analyse the nature of correlation between the variables. Some socio-economic characteristics were selected as variables other than WTP in order to identify correlation between these variables and the preferences to examine the factors, which influence payment possibilities.

Table 5 shows the correlation coefficients of the variables as derived from the correlation matrix. The correlations for rural and urban population have been given separately in column 1 and 2, followed by coefficients of correlations for the combined sample of 264 households.

Table 5: Correlation Coefficients for the Selected Variables

Sl. No.	**Variables Correlated**	Rural Coefficients	Urban Coefficients	Rural and Urban combined
1	Family Size and WTP	0.404**	-0.030	0.254**
2	Family Size and Willingness to Conserve	0.169*	0.164	0.138*
3	Family Size and Use for Recreation	-0.050	0.023	0.104
4	Family Size and Awareness of Pollution	-0.078	0.074	0.076
5	Income and WTP	0.895**	0.114	0.601**
6	Income and Willingness to Conserve	0.173*	0.201*	0.234**
7	Income and Use for Recreation	0.189*	0.090	0.322**
8	Income and Awareness of Pollution	-0.091	-0.031	-0.141
9	Education and WTP	0.183*	0.225*	0.550**
10	Education and Willingness to Conserve	0.086	0.134	0.217**
11	Education and Use of Recreation	0.088	0.066	0.324**
12	Education and Awareness of Pollution	-0.080	0.106	0.132
13	WTP and Willingness to Conserve	0.163*	0.079	0.203**
14	WTP and Use for Recreation	0.171*	0.242*	0.252**
15	WTP and Awareness of Pollution	-0.079	0.106	-0.172*
16	Willingness to Conserve and Recreation	0.197*	0.161*	0.218**
17	Willingness to Conserve and Awareness of Pollution	-0.052	-0.162*	-0.171*
18	Recreation and Awareness of Pollution	0.048	0.068	0.135

** Significant at 0.01 level, * Significant at 0.05 level

Correlation of the same set of variables for rural and urban samples taken together provides several important indications. The coefficients indicate that there is high correlation between income and willingness to pay. The correlation between income and WTP is apparently guided by rural behaviour as in case of urban sample, there doesn't seem to be a correlation between the two variables. Thus these two sets of variables are exclusive. The second important association is the significant correlation between education and WTP, which is indicative of the influence of urban samples. Significant correlation exists between income and use for recreation. A cursory glance at Table 9.5, column 3 will show that is a moderately correlated variable in case of urban population. There is a weak correlation between income and willingness to conserve, though the reasons for the relationship may differ across rural and urban samples. While rural incomes are considerably wetland dependent, the urban respondents may simply be revealing a positive attitude towards observation, as most of them do not seem to assess themselves as stakeholders. However, their responses get reflected in the significance that emerges in the coefficient for both samples taken together.

In case of the rural sample, income is highly correlated with willingness to pay. This was assumed as rural population is characterized by poverty and any payment possibility is likely to be highly dependent on income. Income and family size, as also family size and willingness to pay are moderately correlated. Weak correlation exists between the remaining variables. The implications are that willingness to pay is likely to be influenced by income level and family size. The weak correlation between WTP and willingness to conserve indicates that the willingness to pay is guided more strongly by livelihood benefits than conservation attitudes.

In case of the urban sample, moderate to weak correlations are indicated between income and family size as well as between income and willingness to conserve. A positive relationship also exists between WTP and use for recreation, though the coefficient is not significant. It was evident from urban responses that the urban inclination to use the wetlands for recreation is high, while the rural population neither has the leisure nor affordability. The high correlation in the combined analysis largely reflects the urban response. The descriptive statistics based on the field observations show the difference in variables between the urban and rural samples and it is likely to have differential impact on the perceptions of the ecosystem between the two groups.

Differential Characteristics of Rural and Urban Households – the Discriminant Analysis

This section attempts to examine which variables discriminate between rural and urban samples, from the point of view of comparing the importance of the degree of willingness to pay as a possible important discriminant. It is noted that group means and variances of rural samples differ largely from urban samples in terms of family size, years spent on education, income and willingness to pay. Table shows that variances are high.

Table 6: Group Means and Variances of Rural and Urban variables

Variables	Mean (Rural)	Variance (Rural)	Mean (Urban)	Variance (Urban)
Household Size	5.99	4.279	3.21	1.005
Years in Education	2.83	8.185	14.96	6.315
Income	34311.96	6.70000	193537.50	6.30000
Willingness to Pay	143.04	49607.1	663.38	228245
Awareness of pollution levels	2.51	.557	2.29	.435

Size of the Family (household size): While mean rural family size is 5.99, that of urban is 3.21. Variances are more divergent, that of rural is 4.279 and urban is 1.005. This implies that number of family members in rural areas is varying to a much greater extent than in the urban area. This is essentially because of the fact that average family sizes in rural areas are much larger firstly because of lack of awareness and education, and secondly because of prevalence of the joint family system. At the same time small families also exist – both due to single unit family types as well as because of migration-related causes where the parents may be residing in the village while the younger male working population may have migrated for work and the younger females have migrated after marriage. In case of urban areas, family sizes are more consistently smaller because of predominance of single units families and preference for smaller families.

Years spent on Education (Education Level): As far as years spent on education are concerned, it was assumed that urban education levels would be higher than rural. In this case, the rural mean is 2.8, which is very low, while the urban mean is 14.96. This indicates that rural respondents are characterized predominantly by primary level education. Urban respondents however show more than 14 years spent in education, on an average, which implies the graduate level. From different aspects like ability to pay for education, access to infrastructure related to education as well as level of information and awareness, the urban population is definitely better off than their rural counterparts.

Household Income: Income is another variable that shows differences in group means and variances. It is also likely to be the most important indicator for willingness to pay especially because, in general, most decisions are

income-dependent in rural areas (more likely to be so in the case of a developing country). In this case, mean rural income is Rs.34312 while mean urban income is Rs.193537, at least 5.6 times more. This is largely due to the steady income from organized and service sector where the urban respondents are largely employed. Urban respondents in business sector are also more successful than their rural counterparts due to the availability of a wider and more diverse market and a population with higher paying capacities. Higher educational qualifications automatically result in better rate of employment and higher payments for the urban respondents. Also, the dependency ratios are lower in urban areas than in rural. Variances, however, are steady for both rural and urban incomes, both near-about 6.5. Income levels are uniformly high in urban areas and uniformly low for rural areas.

Thus, because of the differenced in group means and variances, it is expected that some of these variables may be important discriminants between rural and urban samples. It was hypothesized that income (INCOME), willingness to pay (WTP), education years (EDULEV) and family/household size (HHSIZE) may be important discriminants. In order to test this hypothesis, the Discriminant Analysis method is used, which essentially introduces all variables in a univariate, followed by a multivariate testing criterion in order to find the discriminants between two sets of samples.

Results and Analysis The results show EDULEV (level of education), INCOME, FAMSIZE (household size), and WTP (willingness to pay) to be the most important discriminants.

Table 7: Results by Multivariate Discriminant Analysis

Variables	Tolerance	F to Remove	Wilk's Lambda
EDULEV	0.896	140.155	0.212
INCOME	0.816	36.398	0.157
HHSIZE	0.915	50.117	0.164
WTP	0.917	15.678	0.146

Table 8: Summary of Canonical Discriminant Functions

(a)

Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	6.290[a]	100.0	100.0	.929

a. First 1 canonical discriminant functions were used in the analysis.

(b)

Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.137	514.503	4	.000

The resultant discriminant function coefficients may be represented by the following equation:

UR = f [{(-.454) HHSIZE } + {(.675) EDYRS } + {(.419) INCOME } + {(.269) WTP}]

……*(2)*

The discriminant analysis expresses the magnitude to which rural samples differ from urban samples. In this case, the values of F to remove indicate the average between groups variance. Although the earlier discussions indicate that most variables differ substantially between rural and urban, the most important discriminants were unknown. The F to Remove values as shown in Table 7 indicates that, as expected, level of education, family size, income and WTP emerge important discriminants. Level of education has the highest value, it is definitely widely different as the level of literacy is poor among the rural population (25% of the population are illiterate). Male literacy is 70.6% and female literacy is 69%. The urban literacy profile is overwhelmingly high – urban male literacy is 100%, while female literacy is 98.06%. The next important discriminant is family size. Table 6 earlier shows that mean family size is 5.99 in case of rural population and 3.21 in case of the urban, thus number of members in rural families is nearly 50% more than urban, this explains it as an important discrimnant. Income is third in importance, although it was expected to be a higher order discriminant. Mean urban income is almost 5.6 times more than that of the rural. The relative importance of WTP shows that although it is not as high as education or family size, it happens to be an important discriminant.

Table 8 (a) gives the eigen value and indicates that the correlation is significantly high at 0.929. Table 8 (b), on the other hand shows that the model, as a whole, is significant.

The rural population has much lower level of education, lower levels of income, but higher family size. However, they are willing to pay more for conservation and preservation of the wetlands. The above results highlight that rural sample differ significantly from their urban counterpart in terms of education, income, family size, and willingness to pay, and thus, all these factors emerge significant discriminants. The implications of the factors of differentiation are that they indicate the nature of relationship between urban and rural population and the wetland ecosystem. However, willingness to pay emerges as one of the important discriminants – this corroborates the findings in the earlier section.

Conclusions

This study was an attempt in establishing the preliminary relationship between the socio-economic parameters of a given population with its nature of preferences with regard to urban wetlands. Analysis of willingness to pay has emerged as an important survey-based valuation technique across the world and has been widely accepted as also critically assessed for the methodological flaws. In the study of assessing peoples preferences for the Kolkata wetlands, it was essential to consider both rural and urban population as a large proportion of the wetlands lie in rural locations, which may undergo a transition towards urban landuses as they lie on the brink of the mega-city project of eastern Kolkata. What emerges from the preliminary survey is that people are clear about the fact that wetlands are important to sustain, though all respondents are not aware of the total set of functions that these wetlands play in the life of the region and its people. Analysis of payment patterns show that, firstly, peoples preferences are clearly guided by their economic conditions or ability to pay. Also, specifically in case of rural population, where the linkages to the wetlands are stronger than urban areas, people are willing to part with a greater proportion of their income than urban respondents. This clearly shows the nature of user preferences. The second section analyses the discriminants between urban and rural samples and concludes that education, family size, income and willingness to pay are the important discriminants. This paper therefore establishes that because of essential differences in the socio-economic characteristics as well as differences in their ecological understanding, a differential approach should be adopted in educating and informing the peoples about the importance of wetlands. The dissemination of information alone can improve understanding of this very important ecological entity. The holistic understanding will in turn initiate the process of their participation in wetland conservation and management

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