Valuing the environment in developing countries: Problems and potentials

Khorshed Alam
Centre for Environmental Management, Central Queensland University, North Rockhampton, Queensland 4702, Australia.
Email: k.alam@cqu.edu.au, Tel: (07) 4930 6309

Abstract

Non-market valuation techniques have often been transferred to developing countries without taking into account their social, economic, political and cultural settings. For instance, the same kind of elicitation method is applied in developing countries, although many of the respondents are extremely poor and many of their economic activities are outside the purview of the monetary mechanism. This paper reports research in a developing country context where the conventional contingent valuation method is extended to include respondents' preference in terms of time for the restoration of a vulnerable river, irrespective of their decision to contribute money.

Key words: Buriganga River, contingent valuation and framing issue

Paper presented at the 49th Australian Agricultural and Resource Economics Society (AARES) Annual Conference, February 9-11, 2005, Coffs Harbour, NSW, Australia.

1. Introduction

Economic valuation of environmental goods or services is important for developing countries despite the kind of argument that "the type of information provided is designed to answer the questions not relevant to developing countries, especially in rural areas where environmental goods and services are important inputs into family production functions. Given poverty levels in developing countries, and limitations on government expenditures, the estimation of non-use values may not be appropriate" (Hearne 1996, p: 256). To some extent, valuing the environment is more important in developing countries in that there needs to be a balance between the goals of economic development and environmental protection or conservation. It is evident that economic development in many of these countries is achieved at the cost of massive destruction of natural resources and degradation of environment (Barbier and Cox 2003; Kwak and Russell 1996). Many countries are still engaged in achieving economic objectives (e.g. growth and employment generation) by destroying their natural environment. For instance, over the past two decades, carbon emissions grew fastest in developing countries such as China, Brazil, South Korea, and India, primarily because of high growth rates in electricity production (Hill 2004). Acceleration of economic growth often relies heavily on the inefficient use of energy, water and other resources, destruction of renewable resources and degradation of natural environment.

Destruction of the natural environment may be very costly when the loss for future generations is considered. Seen in that line, economic valuation of non-market benefits is more important in developing countries than the other parts of the world. Ignoring such benefits may provide support for flawed policy choices and under-estimate the significance of environmental improvements, particularly in the context of perverse corruption and lack of good governance. Therefore, use of economic valuation techniques can make an important contribution to policy making and can result in better resource allocation and outcomes in the protection and development of natural resources.

In this context, the issues that arise with the application of economic valuation techniques, particularly the contingent valuation method (CVM), in developing countries is reviewed. It is argued that contingent valuation (CV) can be a useful tool in valuing environmental changes in developing countries, however, special care needs to be given on designing and framing issues taking into account local cultural, institutional and economic factors. To examine these issues in the use of a CV, a case study on the cleanup of a dying river in Bangladesh is used in this paper.

2. Problems of Valuing the Environment in Developing Countries

The CVM has become a particularly popular tool to assess the value changes in the supply of non-market goods and services after the landmark endorsement by the National Oceanic and Atmospheric Administration (NOAA) panel following the Exxon Valdez oil spill in the Gulf of Alaska in 1989 that "…CV [contingent valuation] studies can provide estimates reliable enough to be the starting point of a judicial process of damage assessment including lost passive use [non-use] values" (Arrow *et al.* 1993, p: 4610). Although it originated in the western world (particularly in the USA), this technique is

now equally used in developing and transition economies (Georgiou *et al.* 1997; Mourato 1998; Whittington 1998 and Pearce *et al.* 2001). CVM studies are also growing rapidly in developing countries, especially as part of the assessment of externally funded environmental projects (Ardila *et al.* 1998; Whittington 1998 and Russell *et al.* 2001). However, some criticism of the technique still exists. Apart from the ethical question such as whether putting a price tag on mother nature is justifiable (Beder 1996), the main criticism is centred on the fact that the market on which the value estimates are performed is not a real one, it is hypothetical (Diamond and Hausman 1994). Furthermore, problems as well as biases associated with the design of survey procedure and its implementation are criticised by its opponents (Hausman 1993). The NOAA panel addressed the sources of potential biases inherent in CVM studies and made recommendations to overcome these pitfalls. Despite all the criticism and biases associated with it, the use of CVM is growing both in developed and developing countries. However, a review of the application of CVM in developing countries reveal that home-grown expertise and institutional capability are still a limiting factor for its application in many countries, while often it is instigated partly from donors' inspiration and local students' higher studies in developed countries. Problems in designing and conducting valuation studies in developing countries are often observed from onlookers' views/perspective, as many of these studies are designed by experts or consultants coming from western world.

Whittington (2002) claims that many of the CVM studies in developing countries are inaccurate and unreliable, due to (i) poorly administered and executed studies, (ii) poorly crafted scenarios, and (iii) failure to conduct split-sample experiments to assess the robustness of the results. Choe *et al.* (1996), using both contingent valuation and travel cost methods, estimate the economic value of water quality improvement of the rivers and sea in Davao, Philippines, and conclude that these techniques can be used widely in developing countries, although they found residents' willingness to pay (WTP) for environmental amenities was too low to make any investment in surface water pollution control. Lu *et al.* (1996) criticized the application of CVM in developing countries as it "focused on the derivation of benefit estimates rather than on the basic issues of the implementability and validity of applying CVM … in a non-American and non-European cultural context" (p: 182). Lu *et al.* considered the selection of an appropriate elicitation technique very significant in order to obtain reliable estimates of resource values considering cultural differences between western developed and developing economies. Kwak and Russell (1996) emphasizes the adjustment to standard CVM in applying to other cultural settings than the US and northern Europe. In estimating value of drinking water protection in Seoul, they made some adjustments in designing the survey procedure in the Korean cultural context such as choosing payment card as elicitation format, selecting housewife as household respondents and setting own sampling frame for the study as both telephone and street address directories are unreliable.

The application of CVM in developing countries represents a number of unique challenges. These include high cost and difficulties in conducting surveys, lack of technical capabilities, and poor confidence by policy decision makers on such studies. However, so far, problems in applying valuation technique have been examined from its survey design and implementation perspectives. Little research has been focused on the framing of valuation question. This needs an attention due to the fact that developing

countries are different from developed ones in many ways. These include lower incomes, higher rates of unemployment, the existence of informal markets, differences in social values, less recreation time and a relatively greater role for resource extraction in the socio-economic development. These differences imply that there may be corresponding differences in the relative importance of specific sources of benefits and the way residents perceive the economic valuation of non-market resources (Russell 2001). For instance, many of the economic activities in developing countries are only partially monetized, causing difficulties in translating respondents' preferences into monetary terms. Thus, to capture this issue, some other unit of value needs to be considered which can be appreciated by the target population and also be familiar to them. This is explored below.

2.1 Problems of Framing the Valuation Question

Choe *et al.'s* (1996) study found willingness to pay for surface water quality improvement of less than one percent of stated income in Davao, Philippines. Lauria *et al.*, (1999) also found similar share of household income for respondents' WTP for a connection to sewer system in Calamba, Philippines. The lower amount of respondents' WTP disappointed some CV practitioners. Due to the low WTP for environmental amenities in developing countries, Barton (1998) suggests that "expensive full blown CV studies may not be necessary until environmental quality becomes a community priority" (p: 3). Furthermore, residents' low willingness to contribute directed many CV practitioners to make misguided policy prescriptions, such as lower willingness to pay "lends support to the old conventional wisdom that households' willingness to pay for environmental amenities such as improved water quality is low and that investments in surface water pollution control should wait until incomes … have increased" (Choe *et al.* 1996, p: 520). However, such judgement ignores the reality of respondents' budget constraint and demand for other immediate competing needs such as food, shelter and medicine on the one hand and high desire for environmental improvements on the other.

The theoretical assumption underlying the CVM is that people have well-defined and stable preferences for environmental goods which can be elicited through carefully designed and administered surveys (USACE 1996). In the CV survey, money is used as a unit of account for eliciting peoples' preference. The question is whether one can always use a money yardstick to value environmental/non-market goods. How can the economic valuation capture the situation where considerable portions of the economic activities are not monetized?

Regardless of the question format in a survey questionnaire, the CVM involves asking respondents hypothetical questions about their monetary valuation of a situation. The unit of account of value is "money metric" and in most cases this is converted into dollar terms. However, the conventional approach of asking valuation questions does not take into account the local context in developing countries where many of the activities are non-monetized, and also many of the transactions are conducted in non-monetary ways. For instance, despite the massive commercialization of the economy in recent years, many activities are still non-monetized in Bangladesh. In many parts of the country, labour as a resource is only partially measured in monetary units (money metrics). In many cases, only part of the labour wage is paid in money metric, while either food or

rice/grain is provided as payment for the remainder. In many instances, donations/contributions for philanthropic activities (e.g. establishment of school, religious institution/congregation and social club) are collected in the form of grain/rice or materials (e.g. cows, goats, chickens or bamboo).

The questions asked in a CV survey are based on the assumption that all respondents have equal ability to pay. However, as Regens (1991) points out that residents who are more affluent have more discretionary real income to potentially allocate to environmental improvements as well as other things that they value. Income inequality among residents is more acute in developing countries than in developed.

Regens (1991) raises the issue that although the questions posed to respondents imply equal sharing of contribution among all respondents, it is reasonable to assume that residents would give some weight to what they perceive to be their actual contribution as well as their income when providing an answer to valuation questions. Studies show that people with comparatively high level of disposable income are more willing to contribute financially to environmental improvements than poorer people. A statistically significant relationship between respondents' willingness to pay and their income is found in many studies (see, for instance, Carson and Mitchell 1993; Arimah 1996 and Lauria *et al.* 1999). As Beder (1996) raises a pertinent question fairly: should this be interpreted as evidence that the affluent people care more for their local environment than less affluent people? Methods that rely on the conventional willingness to pay approach possibly overlook the potential contributions and concerns of people with low incomes. Furthermore, in low-income economies, individual incomes for many respondents are inadequate to meet basic needs. For instance, more than 22 percent of the adult population was found not doing any work and about 26 percent are involved with unpaid household works in Dhaka (BBS 1993). For those respondents, it does not make sense to express willingness-to-pay from their "disposable" income. These important aspects/ dimensions are ignored in framing conventional CV questions, in the context of developing country.

In order to capture this aspect of the respondents' preference in the context of developing countries in particular, the conventional contingent valuation technique is extended by adding a new measurement unit, i.e. time, along with the conventional money unit of measurement when asking the valuation questions. In this format, respondents are asked, irrespectively of their willingness to contribute money (WTC_M), whether or not they would be willing to contribute in terms of time. This non-monetary contribution, that is, willingness to contribute time (WTC_T), is very important in the context of developing market economies. This kind of non-monetary contribution has social acceptance in the context of value judgment in a country like Bangladesh. It has particular significance in the context of low disposable family income, high rate of unemployment and respondents' unfamiliarity with the preference elicitation process in a hypothetical market.

Therefore, in an extended contingent valuation (ECV) survey, in addition to a conventional willingness to pay (WTP) questions, new questions in the form of respondents' willingness to contribute time (WTC_T) are asked. These two types of questions – WTC_M and WTC_T – together represent the respondents' total willingness to contribute (TWTC) to a proposed environmental program. Thus,

total willingness to contribute (TWTC) = willingness to contribute money (WTC_M) +
+ willingness to contribute time (WTC_T)

Conventionally, the concept of "willingness to pay"' is used to refer to the respondents' preference of direct payment for an improvement. In this study, this concept is referred to as "willingness to contribute money or WTC_M". Measuring the willingness to contribute time (i.e. WTC_T) and hence, the total willingness to contribute (i.e. TWTC) is another approach to valuing the environmental changes. In terms of the standard economic theory, the elicitation question determines how people will sacrifice one bundle of utility for another. It is conventional to measure the utility of an environmental change against a change in income, where a WTP is assumed to be a proxy for a change in income. In this study, respondents' preference for an environmental change are derived by both asking monetary and time contributions which is still consistent with the utility theory. An application of this approach is examined in the case of a cleanup program described below. The distinctive features of this approach of the CV study are traceable in the ways the scenario is set up, the survey executed, the data analyzed, and policy implications derived for the selected case.

3. Case Study and Results

3.1 Description of the Case Study

The Buriganga River, which passes through Dhaka City, the capital of Bangladesh, was selected as the case study for this research. Although considered to be the lifeline of the capital, the city part of the Buriganga River has become biologically and hydrologically dead because of the indiscriminate dumping of domestic and industrial wastes, encroachment of riverbanks[1] by unscrupulous people, and negligence on the part of the authority to enforce rules and regulations pertaining to the ecological health of the river. A hypothetical cleanup programme was designed for the Buriganga River to frame the application of the economic valuation technique where respondents were asked for their preferences for the improvement of its water quality and development of new facilities in and around the river.

The CV scenario framed for the study captured non-market benefits of the Buriganga River Cleanup Program (BRCP) which was hypothetically proposed over a 10-year period. The survey design used a payment card elicitation format, and an increase in water bill as a payment vehicle. The study area was restricted to Dhaka City[2]. Using a stratified random sampling technique[3], 400 households (from a total of 643,016) in

[1] The encroachments have been extended up to the riverbed in some places by constructing shanties and other infrastructures.

[2] Although considerable differences exist among different departments in Bangladesh about the boundary of the city, the demarcation of the Dhaka City Corporation (DCC) is used in this study. The DCC area is 360 sq km.

[3] The study area was stratified into two constituents: 'Buriganga River area' (BRA), i.e. adjacent to the river, and 'outside Buriganga area' (OBA). Distance of locality from the river was used as the basis of this demarcation.

Dhaka City were interviewed in 2001. The survey questionnaire was refined using inputs from focus group discussions, and pre-tested before fielded for implementation.

After describing the valuation scenario, respondents were asked to determine how much they would value the environmental improvements of the Buriganga River if confronted with the opportunity to obtain the potential range of goods and services under some specified terms and conditions. Irrespective of a respondent's decision whether to agree to pay or not for the Buriganga River cleanup programme (BRCP), a question was asked whether the respondent would agree to contribute time to the cleanup programme. If they agreed, they were asked the duration of time per month and the manner in which they wanted to contribute. Responses to direct questions about WTC, both in the form of money and time, can be interpreted as estimates of each individual's preference for the good in question.

3.2 Results

The primary goal of the ECV survey is to estimate residents' WTC and this is covered in the following section. The WTC value is estimated in a two-stage framework designed to elicit respondents' preferences on the basis of the conceptual construct developed above – the two stages being willingness to contribute money (WTC_M) and willingness to contribute time (WTC_T). The estimates are presented below.

3.2.1 Estimates of the Willingness to Contribute Money

From the sample of 400 respondents, 25.5 percent are willing to contribute money for the BRCP to save the river (see Table 1). The sample proportion of respondents willing to contribute for the BRCP is 0.255, or 25.50 percent of the households, which is quite a significant outcome. The standard error of the sample proportion is 0.0218, and the 95% confidence interval for the population proportion of yes-saying to WTC_M is 0.2123 to 0.2977. This means that between 21.23 and 29.77 percent of the households in Dhaka City are willing to contribute money for the BRCP. For any further analysis, it is assumed that 25.50 percent of the residents of Dhaka City are willing to contribute money for the BRCP.

Table 1 Willingness to contribute money

	Observed counts	Expected counts
Yes	102	200
No	298	200
Total	400	
$\chi^2 = 96.04$; df = 1; P < 0.001		

Respondents' contribution can vary between very small and large amounts. Table 2 below shows the distribution of actual monetary amounts that the respondents are willing to contribute. Out of 400, 99 respondents have chosen an amount, although 102 respondents initially agreed to pay for the BRCP. When the question to select an amount from the payment card was introduced in the survey, three respondents could not make

any decision which amount to choose. The mean monthly amount of the WTC_M is Tk 145.19[4] and the median monthly amount of the WTC_M is Tk 51.91.

Table 2 Distribution of willingness to contribute money

Monthly amount (X)	Midpoints (x)	Frequency (f)	Cumulative frequency (cf)
> Tk 2000	3000	3	3
Tk 1001 – 2000	1500.5	0	3
Tk 501 – 1000	750.5	2	5
Tk 201 – 500	250.5	10	15
Tk101 – 200	150.5	8	23
Tk 51 – 100	75.5	27	50
Tk 1 – 50	26	49	99
		n=99	

The CV literature has long recognized the problem created by the extreme values, i.e. outliers. A visual inspection of Figure 1 shows that there are three observations which might be classified as extreme values.

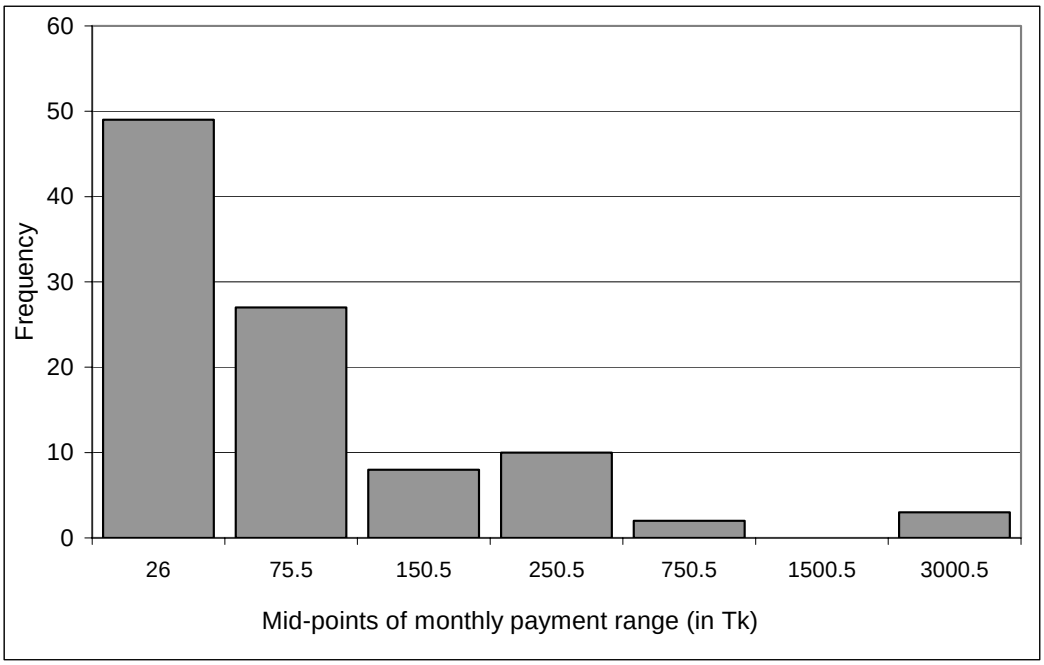

Figure 1 Distribution of willingness to contribute money responses

There has been considerable debate concerning the issue of whether the mean or median WTC_M should be chosen as the appropriate welfare measure. Imber *et al.* (1993) argue that "while the mean may be logically correct for use in benefit estimation for benefit-cost analysis, the median is the preferred measure in practice. This is a

[4] Taka (Tk) is the Bangladesh currency, US$ 1.00 = Tk 57.00 as in June, 2001.

conservative approach in terms of willingness to pay estimation because the mean will generally be larger than the median…" (p: 83). If the median is used, it is not affected by extreme values.

For measuring the WTC_M amount in this study, the median is chosen rather than the mean because it is closer in value to more of the observations and is resistant to both outliers and skewness (in such a situation the mean and median can be quite different). Another reason behind choosing the median rather than the mean is that one of the class intervals in the data is open-ended – that means its upper limit can be defined only arbitrarily.

The median of Tk 51.91 is a relatively small sum and is just above the lowest bracket of the payment card. Interestingly, 49 percent of the respondents indicated the lowest category (between Tk 1 and 50) in the survey as the amount they are willing to contribute for the BRCP. The median value reflects the bulk of the observations. As such, it is a better estimator than the mean for averaging WTC_M. This median value will be used as average WTC_M value for the residents of Dhaka City. This median value represents a conservative WTC_M value for the households in Dhaka City assuming that all no-saying respondents place no value on the BRCP.

3.2.2 Willingness to Contribute Time

Although the survey participants overwhelmingly supported the BRCP (94.5 percent), only 25.5 percent of them expressed their willingness to contribute money for the proposed BRCP. The estimated average (median) value appears to be very low. In the field survey, it was observed that many respondents were found to be very supportive of the BRCP, but when the question of WTC_M arose, a substantial portion of respondents (about 73 percent of those who supported the BRCP) were found to be unwilling to commit a monetary contribution. More than a quarter of the unwillingness was due to financial inability. This was not completely unexpected in an extremely poor economy, because respondents might have other more pressing priorities (e.g. basic food and shelter) to spend their money on.

To complement such a situation, a question was included in the interview schedule – irrespective of respondents' decision for WTC_M, whether they were willing to contribute their own time for the BRCP and whether there was any other contribution they were willing to make, other than monetary involvement. This provided an opportunity for those who could not pay cash but had the willingness to actually do service for the BRCP. Tasks for such voluntary works involved (i) providing physical labour; (ii) participating in campaign and public awareness building; (iii) organizing meeting and rally; (iv) contributing towards non-technical office work; (v) contributing towards technical office work; and (vi) providing consultancy service. Table 3 below shows that a total of 131 respondents agreed to provide their time for various activities and services for the BRCP.

Table 3 Willingness to contribute time for the cleanup programme

	Observed counts	Percent	Expected counts
Yes to WTC_T	131	32.75	200
No to WTC_T	269	67.25	200
Total	400	100.0	
$\chi^2 = 47.61$, df=1, P<0.001			

Table 3 shows that the proportion of respondents willing to contribute in terms of time is 0.3275. The 95% confidence interval for the proportion of respondents willing to contribute in terms of time is between 28.15 and 37.35 percent. The small p-value (<0.001) for the chi-square test indicates that there is sufficient reason not to accept the null hypothesis of no difference between the two proportions in the population and thus, the observed differences are significant. Hence, the data indicate that 32.75 percent of the residents of Dhaka City are willing to contribute their time for the BRCP.

Respondents were also asked how many hours per month they were prepared to dedicate to the BRCP. Table 4 shows that 82 participants are willing to contribute their time for less than one hour, 39 participants for one to four hours and ten for five to twelve hours. Four were unwilling to answer or unsure about the decision. Two hundred and sixty five expressed their inability to contribute in this form.

Table 4 Respondents' willingness to contribute time in a month

	Frequency	Percent
Unable to give time	265	66.25
Willing to contribute time	131	32.75
- Less than one hour	82	62.60
- One to four hours	39	29.77
- Five to twelve hours	10	7.63
Don't know/ unwilling to answer	4	1
Interviewed sample (n)	400	100.00

An attempt is made in Table 5 to monetize the contribution of time for the residents of Dhaka City. The mid-points for the class intervals of (i) less than one hour; (ii) one hour to four hours; and (iii) five to twelve hours are estimated as 30, 150 and 510 minutes respectively. As per the expressed willingness of 131 respondents, a total of 223.50 hours time per month is committed by the participants for the six categories of work. This information together with data on current market rates of wage and salary is used to estimate the WTC_T in monetary terms in Table 5.

The required works for the BRCP are divided into six categories ranging from physical labour to consultancy services. Physical labour is required for many activities such as removal of illegal structures, various types of construction work and expansion of sewer lines. Campaign and public awareness building and organizing meetings and rallies appeared as one of the very significant components of the BRCP in the focus group discussions and while interviewing relevant government departments. These are important for reducing pollution at its sources, adopting treatment measures at the source, building social resistance against encroachers (many of whom are very influential both politically and socially) and creating awareness among citizens for activities such as

proper waste management and avoiding the dumping of wastes into the river. Services for both non-technical and technical office work are required for activities such as coordination among different agencies/departments, preparation of tenders, supervision, procurement of materials and execution of the programme. Consultancy services are required for the detailed design of construction, engineering and treatment plants and specification of materials and equipment.

Table 5 Monetization of contribution in terms of time in a month (in Tk)

Type of work	Total hours*	Money value of WTC_T (in Tk)
Physical labor	29.42	294.17
Campaign and public awareness building	90.67	1813.33
Organizing meeting and rally	48.50	970.00
Non-technical office work	42.50	1700.00
Technical office work	8.17	1225.00
Consultancy	4.25	2125.00
Total	223.50	8127.50

Notes: Multiple answers were allowed.

* Total hours of work are equally divided among categories of work when respondents show their intention to volunteer time for more than one category.

The values of per hour physical labour, work for campaign and public awareness building, organizing meeting and rally, non-technical office work, technical office work and consultancy are estimated at Tk 10, Tk 20, Tk 20, Tk 40, Tk 150 and Tk 500 respectively. These rates, fixed at focus group discussions, are considered to be the market rate for these types of work in Dhaka City in 2001.

The respondents' average value of willingness to contribute in terms of time is estimated as (Tk 8127.50/131=) Tk 62.04 per month (Table 5). It is interesting to note that this amount is higher than the direct monetary contribution (WTC_M). The section to follow estimates residents' WTC_M and WTC_T values together in order to derive the non-market benefits of the BRCP.

5.2.4 Economic Value of Non-market Benefits

The amounts of direct monetary and non-monetary contributions (i.e. in the form of time) the residents of Dhaka City are willing to make for the proposed BRCP are estimated. The non-monetary contribution as expressed in time is also converted into monetary values. In order to provide the total non-market benefit estimation, these WTC values are extrapolated for the whole population, which is presented in this section. The total annual value of non-market benefits is shown in Table 6.

According to BBS (2001), the number of total households in Dhaka City was 1,107,474 in 2001. In Table 6, a simple aggregate estimate of the total annual WTC across the whole of Dhaka City is derived by multiplying the survey's median annual WTC_M (Tk 51.91) by the number of households in Dhaka City. The result of this product is

approximately Tk 176 million per year. The WTC_T value derived in the previous section is also extrapolated for the total population of Dhaka City, which is about Tk 270 million per annum. The total WTC value for the residents of Dhaka City can be estimated by adding these two values which is estimated at about Tk 446 million (Table 6). One interesting point here is that WTC_T represents 60 percent of the total value of the non-market benefits. Therefore, the conventional CVM asking only about monetary contribution would have estimated only 40 percent of this total amount. The total value of non-market benefits expected to be generated by the BRCP is estimated as Tk 446 million. Alternatively, this figure can be interpreted as estimates of the gross benefits arising from the BRCP for which market values do not exist.

Table 6 Estimate of yearly non-market benefits

Category	Amount in Tk
Households' average WTC_M per month	51.91
(Proportion of household WTC_M: 25.50%)	
Total number of households in Dhaka City	1,107,474
Annual value of monetary contribution (WTC_M)	175.91 million
Households average WTC_T per month	62.04
(Proportion of household WTC_T: 32.75%)	
Annual value of time contribution (WTC_T)	270.02 million
Total estimated annual non-market benefits	445.93 million

Source: Field survey and BBS (2001) for number of households in Dhaka City.

This is a considerable amount of money particularly when the 2001 annual per capita income in Bangladesh of only US$ 387 is taken into consideration. This value is also significant if it is considered that about 55 percent of the residents in Dhaka City live below the poverty line[5]. Such information about residents' willingness to contribute could be extremely valuable for the decision-making body. The application of CVM allows the residents of Dhaka City to voice the importance of saving the river and to accommodate its non-market value into a monetary economic framework. Also, contrary to conventional belief, it shows that the community does place a value on environmental quality improvement and is willing to contribute for it. Ignoring such non-market benefits would, therefore, clearly lead to an under-estimation of the value of a resource, such as cleaning up dying rivers.

4.0 Conclusion

The question that is asked in this paper is to what extent is this new valuation approach different from existing practices. It is revealed that the standard valuation techniques developed in the industrialized economic setting have some limitations when applied in developing countries. Many of these techniques assume conditions which may not be met in developing countries. To overcome these limitations of the CVM, particularly the issue

[5] The poverty line is defined as the monthly per capita expenditure that purchases a minimum diet which provides an average daily per capita calorie intake of 2122 kilocalorie (PC 1998).

of framing valuation question, an extension of the conventional CVM is developed in this paper. The distinctive feature of this extended CVM is that it asks respondents about their willingness to contribute time in addition to asking their willingness to contribute money in order to elicit preferences for the good in question. The purpose was to evaluate respondents' reactions to the valuation question and thereby provide a methodology applicable in the developing country context. It reveals that not only are a significant proportion of the respondents willing to contribute direct cash for the environmental improvement of the river, they are also willing to contribute their time. When the contribution in terms of time is monetized, it is estimated to represent about 60 percent of the total contribution (the remaining 40 percent being cash payment).

The application of CVM reveals that in case of benefit estimation in developing countries, local cultures and socio-economic conditions matter. It is not enough, or may even be misleading, to import methods from developed countries without taking into consideration specific settings of local culture and economic conditions. It also suggests that economic valuation is important because policy making about maintaining environmental resources and on resource allocation is particularly a daunting task, while fiscal resources are finite and often making choices involves trade-offs among competing preferences. Therefore, there is substantial potential for economic valuation techniques like CVM in developing countries in shaping policy decisions and providing inputs in resolving conflict among resource uses and its allocation for their sustainable economic development. This is more prominent than the other parts of the world in the context of poor accountability of bureaucracy and political regimes and often strong influence of coterie and personal interests in policy making.

Acknowledgements

The author wishes to thank Dora Marinova for her invaluable help with the research and survey design of the study on which this paper is drawn and John Rolfe for his thoughtful comments on a draft of this paper.

References

Ardila, S., Quiroga, R. and Vaughan, W. J. (1998). *A Review of the Use of Contingent Valuation Methods in Project Analysis at the IDB,* Inter-American Development Bank, Washington DC.

Arimah, B. C. (1996). 'Willingness to pay for improved environmental sanitation in a Nigerian City', *Journal of Environmental Management,* vol. 48, pp. 127-38.

Arrow, K., Solow, R., Portney, P., Leamer, E., Radner, R. and Schuman, H. (1993). 'Report of the NOAA panel on contingent valuation', *Federal Register,* vol. 58, pp. 4602-14.

Bangladesh Bureau of Statistics (BBS) (1993). *Bangladesh Population Census 1991, Zila: Dhaka*, Government of Bangladesh, Dhaka.

Bangladesh Bureau of Statistics (BBS) (2001). *Population Census 2001: Preliminary Report,* Government of Bangladesh, Dhaka.

Barbier, E. B. and Cox, M. (2003). 'Does economic development lead to mangrove loss? A cross country analysis', *Contemporary Economic Policy*, vol. 21, pp. 418-32.

Barton, D. N. (1998). 'Applying NOAA panel recommendations to contingent valuation studies in developing countries: A case study of coastal water quality in Costa Rica', Discussion Paper No. D-24/1998, Department of Economics and Social Sciences, Agriculture University of Norway.

Bateman, I. J. and Willis, K. G. (eds) (1999). *Valuing Environmental Preferences: Theory and Practice of the Contingent Valuation Method in the USA, EC, and Developing Countries*, Oxford University Press, New York.

Beder, S. (1996). 'Valuing the environment', *Engineering World*, December, pp. 12-14.

Carson, R. T. and Mitchell, R. C. (1993). 'The value of clean water: The public's willingness-to-pay for boatable, fishable and swimmable quality water, *Water Resource Research*, vol. 29, pp. 2445-54.

Choe, K. A., Whittington, D. and Lauria, D. T. (1996). 'The economic benefits of surface water quality improvements in developing countries: A case study of Davao, Philippines, *Land Economics*, vol. 72, pp. 519-27.

Diamond, P. A. and Hausman, J. A. (1993). 'On contingent valuation measurement of nonuse value', in Hausman, J. A. (ed), *Contingent Valuation: A Critical Assessment*, North-Holland, Amsterdam, pp: 3-38.

Diamond, P. A. and Hausman, J. A. (1994). 'Contingent valuation: Is some number better than no number?', *Journal of Economic Perspectives*, vol. 8, pp. 45-64.

Georgiou, S., Whittington, D., Pearce, D. and Moran, D. (1997). *Economic Values and the Environment in the Developing World*, Edward Elgar, Cheltenham.

Hausman, J. A. (ed) (1993). *Contingent Valuation: A Critical Assessment*, North-Holland, Amsterdam.

Hearne, R. R. (1996). 'Economic valuation of use and non-use values of environmental goods and services in developing countries', *Project Appraisal*, vol. 11, pp. 255-60.

Hill, L. (2004). 'Power to the people: Integrated resource planning in developing countries', Working Paper, Energy Division, Oak Ridge National Laboratory, USA. (http://www.ornl.gov/info/ornlreview/rev28_2/text/irp.htm#hill; accessed 18 August 2004)

Imber, D., Stevenson, G. and Wilks, L. (1993). *A Contingent Valuation Survey of the Kakadu Conservation Zone*, Vol 1, Reprint, RAC Research Paper No. 3, Resource Assessment Commission, Canberra.

Kwak, S. and Russell, C. S. (1996). 'Exploring the value of drinking water protection in Seoul, Korea', in Mendelsohn, R. and Shaw, D. (eds.), *The Economics of Pollution Control in the Asia Pacific*, Edward Elgar, Cheltenham, pp. 199-225.

Lauria, D. T., Whittington, D., Choe, K., Turingan, C. and Abiad, V. (1999). 'Household demand for improved sanitation services: A case study for Calamba, the Phillipines', in. Bateman, I. J and Willis, K. G. (eds), *Valuing Environmental Preferences: Theory and Practice of the Contingent Valuation Method in the US, EU, and Developing Countries*, Oxford University Press, New York.

Lu, A. Y., Bishop, R. C. and Welsh, M. P. (1996). 'Measuring the benefits of air quality improvement in Taipei: A comparison of contingent valuation elicitation

techniques', in Mendelsohn, R. and Shaw, D. (eds), *The Economics of Pollution Control in the Asia Pacific*, Edward Elgar, Cheltenham, pp: 182-198.

Mendelsohn, R. and Shaw, D. (eds) (1996). *The Economics of Pollution Control in the Asia Pacific*, Edward Elgar, Cheltenham.

Mourato, S. (1998). 'Economic valuation in transition economies: An application of contingent valuation to Lake Balaton in Hungary', in Acutt, M. and Mason, P. (eds.), *Environmental Valuation, Economic Policy and Sustainability*, Edward Elgar, Cheltenham, pp: 15-34.

Pearce, D., Pearce, C. and Palmer, C. (2001). *Valuing the Environment in Developing Countries*, Edward Elgar, Cheltenham.

Planning Commission (PC) (1998). *The Fifth Fiver Year Plan 1997-2002*, Government of Bangladesh, Dhaka.

Regens, J. L. (1991). 'Measuring environmental benefits with contingent markets', *Public Administration Review*, vol. 51, pp. 345-52.

Russell, C. S. (2001). *Applying Economics to the Environment*, Oxford University Press, New York.

United States Army Corps of Engineers (USACE) (1996). 'Monetary measurement of environmental goods and services: Framework and summary of techniques for corps planning', IWR Report 96-R-24, Vicksburg.

Whittington, D., (1998). 'Administering contingent valuation surveys in developing countries', *World Development*, vol. 26, pp. 21-30.

Whittington, D. (2002). 'Improving the performance of contingent valuation surveys in developing countries', *Environmental and Resource Economics*, vol. 22, pp. 323-67.