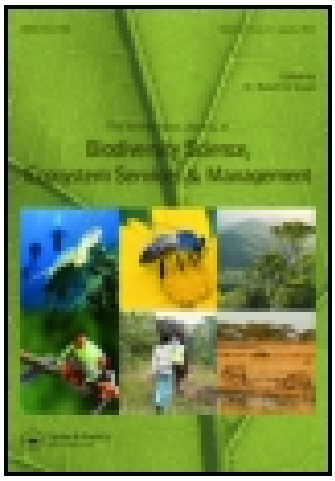


International Journal of Biodiversity Science, Ecosystem Services & Management
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/tbsm21

An analysis of willingness to pay for community-based conservation activities at the Ghodaghodi Lake Complex, Nepal

Pramod Lamsal[a], Kishor Atreya[b], Krishna P. Pant[c] & Lalit Kumar[d]
[a] Himalayan Geo-En. Pvt. Ltd., 133 Mokshya Marga, Dhumbarahi, Kathmandu 4, Nepal
[b] Aquatic Ecology Center, Kathmandu University, Dhulikhel, Nepal
[c] School of Arts, Kathmandu University, Lalitpur, Nepal
[d] University of New England, Armidale NSW 2351, Australia
Published online: 22 Jun 2015.

International Journal of Biodiversity Science, Ecosystem Services & Management, 2015
http://dx.doi.org/10.1080/21513732.2015.1055338

An analysis of willingness to pay for community-based conservation activities at the Ghodaghodi Lake Complex, Nepal

Pramod Lamsal[a]*, Kishor Atreya[b], Krishna P. Pant[c] and Lalit Kumar[d]

[a]*Himalayan Geo-En. Pvt. Ltd., 133 Mokshya Marga, Dhumbarahi, Kathmandu 4, Nepal;* [b]*Aquatic Ecology Center, Kathmandu University, Dhulikhel, Nepal;* [c]*School of Arts, Kathmandu University, Lalitpur, Nepal;* [d]*University of New England, Armidale NSW 2351, Australia*

(*Submitted 3 September 2014; accepted 20 May 2015; edited by Clem Tisdell*)

Wetlands comprise an important ecosystem but are under threat in developing countries due to increasing human encroachment. Community-based conservation is an approach for sustainable management of the wetlands near settlements. This study investigated willingness to pay of local people for community-based conservation activities and the variables affecting it in the Ghodaghodi Lake Complex, Nepal. A sample of 217 households residing near the lake complex was surveyed. The result showed that households were willing to pay for community-based conservation activities, at an average of NPR 378 (US$5.4) per annum. The age of the household head, wetland income, agricultural income and prior experiences on participation in conservation activities positively affected household's willingness to pay. Government expenditure of at least the amount of willingness to pay estimated by this study for the community-based conservation activities would be economically and environmentally justified.

Keywords: wetland; willingness to pay; participation; community-based conservation; Ghodaghodi Lake Complex

1. Introduction

Wetlands are important ecosystems providing habitat to plants and animals while supporting livelihood of the people dependent on its biological resources. Wetlands support people's livelihood by supplying various products and functions (Brouwer et al. 1999) and are considered the source of goods (e.g. food, fuelwood, freshwater and construction materials), as well as services (e.g. pollution control, water treatment, nutrient deposition) (Turner et al. 2004). Therefore, its conservation is both for sustainability of biological resources and support of livelihood. Many wetlands, however, have historically been treated as wastelands and drained or otherwise degraded for human consumption (Barbier et al. 1997) through conversion into different land uses: agricultural, industrial and residential. This suggests we are unable to capitalize on many natural services provided by wetlands (Roberts 1997), thus risking an opportunity to realize benefits by underestimating its real values. Sustainable management of wetlands to reduce its rate of loss and degradation is of utmost global importance. Community-based conservation (CBC) approaches initiated locally could be a good alternative. Local communities are knowledgeable about the importance of the wetlands, and if they benefit from wetlands conservation, they would change their behaviour to support conservation initiatives (McNeely 1989; Sibanda & Omwega 1996).

Wetlands are always regarded as an important resource in Nepal in terms of its ecosystem services to the local people and habitats for riparian and aquatic species. More than 240 wetlands exist in Nepal (Siwakoti & Karki 2009), harbouring 11 globally threatened and 26 endemic flowering plant species as well as 42 globally threatened faunal species (IUCN 2004). Over 190 species of birds (22% of total available species in Nepal) are wetland dependent (IUCN 1998). So far nine wetland sites are listed in the Ramsar Site of International Importance and Ghodaghodi Lake Complex (GLC) is one of them, listed in 2003.

Several studies have been undertaken in developing countries using contingent valuation methods (CVM) to reveal willingness to pay (WTP) for the conservation of wetland biodiversity and other natural attractions. The amount of WTP, however, differs from county to country based on socio-economic status and levels of environmental awareness of the community using the wetland resources (Table 1). Though wetlands are regarded as vital resources for livelihood and biodiversity conservation, there are limited studies conducted on valuation of wetland services in Nepal.

The management of wetland resources has been a daunting task for most of the developing countries, including Nepal, since it is often taken for granted. We selected GLC and administered iterative bidding elicitation techniques (Bateman et al. 1995; Gunatilake 2003) of CVM to capture WTP of local people for resource conservation. First, GLC is one of the most important freshwater ecosystems located in the tropical climatic region of the country, inhabiting rich biological diversity. Second, the

*Corresponding author. Email: pramod_lamsal@yahoo.com

Table 1. Annual WTP on wetland conservation in developing countries.

Study area	Country	Annual WTP (US$ per household per year)	References
Drought mitigation from watershed protection in Ruteng Park	Indonesia	2.00	Suyanto et al. (2005)
Wetland conservation of Shadegan Wetland	Iran	2.26	Kafasshi et al. (2013)
Wetland Biodiversity Conservation in Mekong River Delta	Vietnam	2.50	Do and Bennett (2007)
Wetland Biodiversity Conservation in Woopo Wetland	Korea	2.60	Kwak et al. (2007)
Management and conservation biodiversity of Baghmara Buffer Zone Community Forest	Nepal	4.84	KC et al. (2013)
Improved recreational services and facilities in Bhoj Wetland	India	5.43	Verma and Negandhi (2011)
Contribution for the conservation program to be implemented in Uluabat Lake	Turkey	33.50	Gurluk and Rehber (2006)
Restoration of environmental services via in-stream flows in the water-scarce Yaqui River Delta	Mexico	79.20	Ojeda et al. (2008)

lake resources help in securing the livelihood of local people residing near the complex (Lamsal et al. 2015), who have been harvesting resources. Third, the resources are at a declining state (Lamsal et al. 2015). Fourth, a lack of relevant data on people's WTP tends to inhibit planners and government officials from designing programmes and approaching stakeholders in conservation efforts. Pearce (2001) stated that environmental valuation techniques help to place a value on changes in the status of natural resources including wetlands, so that necessary conservation policy can be taken into account, which would otherwise be dominated by financial benefits of land use conversion. Literature also shows that there is a lack of information on the economic values of almost all of the wetlands and this is true for GLC as well. Therefore, the objective of this study was to estimate household's WTP for CBC activities and factors affecting their WTP. We believe that the findings of the present study will be useful for raising societal awareness about the economic value of wetlands to the local people. Policymakers and wetland managers of the country can also benefit in formulating relevant policies that help to design and allocate additional resources to community-based wetland conservation activities.

2. Materials and methods

2.1. Study area

Ghodaghodi Lake is situated at an altitude of 205 m above mean sea level (28°42′06.6′N and 80°56′44′E latitude and longitude, respectively) in the tropical lowland of western Nepal. It is a freshwater lake system covering an area of 2563 ha. It has been listed as a Ramsar Site of International Importance due to its rich wetland biological diversity (Table 2).

The lake is surrounded by three Village Development Committees (VDCs) of the Kailali district, namely Darakh, Sandepani and Ramsikharjhala (Figure 1). The population of these localities is increasing rapidly (Lamsal et al. 2015). The land cover of the study area (three VDCs) includes agricultural land (60%), forest land, lakes, common pastures and scrub lands (37%) and the remaining includes settlements, roads, rivers and streams (Bam 2002). The GLC is under the jurisdiction of Department of Forest and is managed by a Lake Management Steering Committee, a type of multi-stakeholders forum that oversees yearly programmes, developed mainly through a top-down approach (Lamsal et al. 2015). No specific literature is available on the valuation of ecosystem services from the GLC. As most of the resources from the wetland are harvested informally by indigenous local communities for self-consumption, market data are very limited for a valuation study. A stated preference study, particularly contingent valuation, is the only possible method for valuation of ecosystem services in such a situation.

2.2. Contingent valuation

Hoevenagel (1994) defines CVM as a survey method in which respondents are asked how much they are willing to pay for the use or conservation of natural goods, where their preferences are assumed to be contingent upon alternative goods that are offered in a hypothetical market. This methodology is appropriate for valuing environmental goods that have no market data or their proxies but affect the welfare of the respondents. A major strength of CVM is that it can be applied to different valuation situations since it does not rely on actual market or observed behaviour (Pearce & Moran

Table 2. Biodiversity status of GLC.

Survey season	Aquatic plants	Terrestrial plants	Fish	Avifauna	Mammals	Reptiles	References
November–May 1997/98	107	137	27	140	34	N/A	IUCN (1998)
January–February and September–October 2005	22	35	N/A	60	N/A	N/A	Kafle (2005)
March–April 2007	45	54	19	41	17	5	Lamsal et al. (2014)

Note: N/A = Not Available.

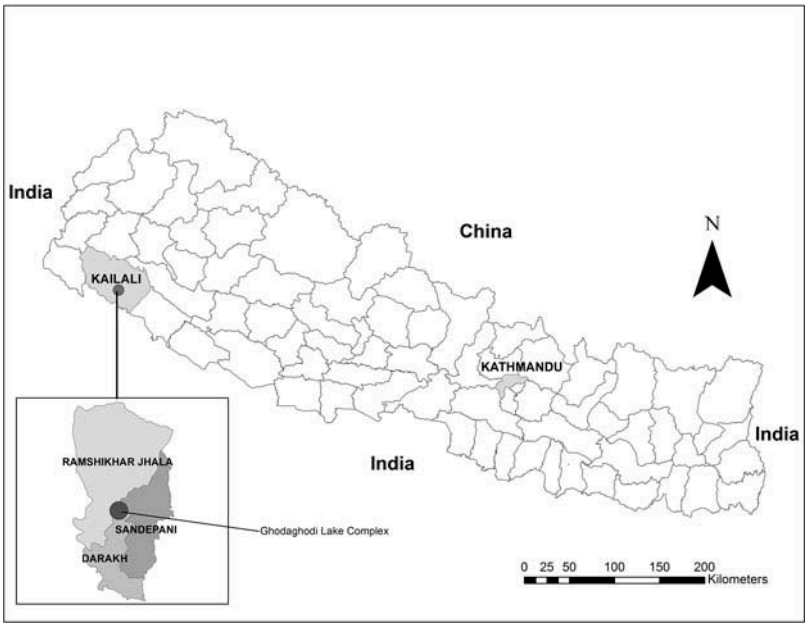


Figure 1. Study area showing three VDCs.

1994; Emerton & Bos 2004). This study used WTP under CVM that has been commonly used as one of the standard approaches for measuring the economic value of non-market goods, for example, resources, wildlife and environmental quality (Whittington et al. 1990; Hanemann 1994; Philips 1998). Although having some strength, the CVM is subject to a number of biases that affect the validity and reliability of its results (Whittington et al. 1990; Arrow et al. 1993; Venkatachalam 2004). In this context, Venkatachalam (2004) opined that the proper design of the WTP scenario in the questionnaire was very important and should be meaningful and clearly understandable by the respondents. Loomis et al. (2000) added that obtaining accurate estimates of benefits through CVM needed in-depth information of the resource being valued and thus efforts should be geared to carefully define and clearly display the current and proposed levels of ecosystem services to the respondents. Therefore, it is very important to reduce underlying biases and make the respondents well informed before capturing the WTP of environmental goods and services. The present study has taken care of such challenges while designing the WTP scenario and its execution at the field level. We adopted the iterative bidding method for estimating WTP. This method was first used by Davis (1963) which minimizes starting point bias. According to Hoehn and Randall (1983), the iterative technique significantly extends the time the respondents spend in valuing the goods and therefore improves the quality of the response.

2.3. WTP scenario

The detail and specific wording of the villager's WTP scenario read to the respondent is provided in the Appendix. Each respondent was made aware of the contribution of wetland resources to their livelihood and the need for its conservation for continuation of the flow of such services. To minimize bias that may arise due to existing relation of the people with the Lake Management Steering Committee, a community-based organization (CBO) was hypothesized as a payment vehicle with a mandate to look after GLC conservation activities. Both short-term and long-term objectives of the conservation plan of the CBO were made clear and the respondents were asked to contribute to it through monetary means. The starting bidding price for the WTP was fixed at NPR 500 (US$7.14). If a respondent said 'yes' for NPR 500 initially, then there was hope that he/she would have willingness higher than this value, so we asked the same question again but by increasing the amount by NPR 100 at each step, up to a maximum of NPR 1000. If at any point a respondent did not show willingness, that particular amount was decreased by NPR 50 to precisely capture their preference. Also once a respondent reached NPR 1000, an open-ended question was asked to state a maximum WTP. Similarly, if a respondent said 'no' on NPR 500, then this amount was decreased by NPR 100 at a time down to the zero. If a respondent was not willing to pay even a penny, he was asked to give the reason behind his or her decision to determine whether it was a form of protest. The respondents were also given an opportunity to change the initial value of WTP if they wished after going through the entire bidding process.

2.4. Data collection and analysis

The study was based on primary data collected from household survey. Before the survey, we organized a local-level group discussion to identify the VDCs and wards around the wetland complex. Three VDCs identified were Darakh, Sandepani and Ramsikharjhala. Each

VDC has nine wards and a ward is the smallest administrative unit in Nepal. Three wards located near the lake were selected from each sampled VDC with the assumption that the majority of the households from these wards relied more on wetland resources for their livelihood than the households in far off places. Of the 2172 identified households in the nine wards of the three VDCs, 10% were selected using proportional random sampling. This gave us a total of 217 households for questionnaire survey.

Household survey questionnaire and WTP scenarios were developed and pre-tested. The questionnaire was translated to Nepali language to make it more readable for the local enumerators. Intensive field surveys were conducted during April and May 2007. Before conducting the formal field surveys, three local enumerators, with 12 years of schooling and residing in the respective VDCs, were selected and trained by the first author for 3 days on administering household survey questionnaire and WTP scenario. The enumerators were familiarized with all the questions of the survey to avoid any confusion. The senior most members of the households were interviewed. In cases where such members were not available, other members with the best knowledge on the use of lake resources were interviewed. The questionnaire included modules on household and demographic characteristics, proximity of the household to the lake, their environmental awareness and conservation participation, agricultural income, wetland resource uses and income, WTP and possible factors affecting it. One questionnaire was found incomplete, leaving 216 questionnaires for analysis.

Initial bid amount was determined based on the conservation budget required. Our hypothesized CBC of the lake would require an annual budget of NPR one million, and the number of households that inhabited in the sample wards was 2172. We divided this amount among the households in the sample wards, which eventually gave us the initial bid amount of WTP for the respondents (i.e. NPR 460–500).

The robust regression model through STATA/MP 13.0 version was used to identify factors affecting households WTP for the CBC activities at GLC. For the robust regression measure of fit, we estimated R^2 through 'rregfit' STATA program written by UCLA Statistical Consulting Group (2006). The explanatory variables used were age of the head of the household (*AGE*), gender (*GENDER*), household size (*HHS*), walking distance from the household to the bank of the lake (*WMIN*), awareness of conservation activities (*AWARE*), wetland income (*WETINC*), agricultural income (*AGRINC*), perception of environmental degradation (*ENVDGRD*) and prior participation in conservation activities (*PRTCONA*). The explanatory variables and the expected signs of the model are listed in Table 3.

$$\begin{aligned} WTPMAX = {} & \alpha + \beta_1 AGE + \beta_2 GENDER + \beta_3 HHS \\ & + \beta_4 WDMIN + \beta_5 AWARE + \beta_6 WETINC \\ & + \beta_7 ENVDGRD + \beta_8 AGRINC \\ & + \beta_9 PRTCONA + \varepsilon \end{aligned}$$

Table 3. List of explanatory variables and hypotheses used in the regression for household's WTP for community-based GLC conservation activities.

Independent variable	Explanation and unit	Hypothesis
AGE	Age of the head of the household (years)	−
GENDER	Dummy of gender (if male = 1, 0 otherwise)	+
HHS	Number of family members in the household	+
WDMIN	One-way walking distance to reach the lake from the respondent's house (minutes)	−
AWARE	Individual awareness of any conservation activities going on in the lake complex (if yes = 1, 0 otherwise)	+
WETINC	Annual household income solely from harvesting of wetland resources (e.g. fuelwood, fodder, fish, Singar and sal leaf) (NPR in thousands)	+
ENVDGRD	Individual knowledge on lake degradation based on the sustainability perception of fuelwood collection (if increase = 1, 0 otherwise)	+
AGRINC	Annual household income solely from agricultural products produced from their agricultural land (e.g. rice, wheat, mustard) (NPR in thousands)	+
PRTCONA	Prior in-person participation in any of a lake conservation activities (if yes = 1, 0 otherwise)	+

where α and β_i's are the estimated parameters and ε is the random error.

3. Results

3.1. *Household's WTP*

Out of the 216 households, 39% were willing to pay NPR 500 or higher, while 61% showed lower WTP than the initial bid amount. The final WTP determined using iterative bidding is summarized in Figure 2. The results are tri-modal with the first mode at NPR 100, the second at NPR 550 and the third at NPR 1000. The fitted linear trend line shows that on average the frequency of the respondent decreases with increase in the level of payment. This is consistent with the principle of demand.

The mean annual WTP was calculated at NPR 378 (US $5.4) with the range between NPR 10 and 1000 (SD± 245.61) per household. The median WTP was NPR 350 (US$5). If we extrapolate this over a larger spatial extent, then the mean annual WTP will be NPR 2,309,580 (US$32,994) from three VDCs that circumscribe the lake (with 6110 HHs as per CBS (2001) national census).

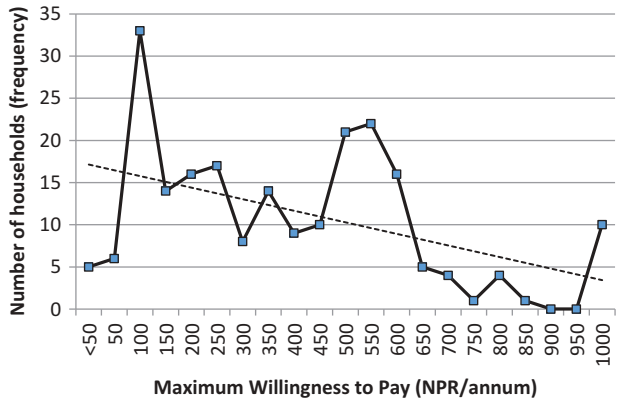


Figure 2. Frequency of households with different levels of WTP.

3.2. *Determinants of household's WTP amount*

This study identified factors affecting household's WTP for community-based GLC conservation activities. The descriptive statistics of the variables used are tabulated in Table 4.

The average age of the sampled population was 36 years. The sampled population comprised of 82% males. The average number of family members in a sampled household was 6. The average walking distance to the lake was 35 minutes. About 70% of sampled respondents were aware of the existing conservation activities going around the GLC. The majority of the households were agricultural dependent (65%), with average annual income of NPR 7031. Annual average income from wetland was NPR 4378 (for details, see Lamsal et al. 2015). Only around 18% of the respondents participated in the conservation activities undertaken in the GLC during the past years.

The robust regression showing factors affecting WTP for community-based GLC conservation activities is given in Table 5. Age (*AGE*) and wetland income (*WETINC*) were significant and positive at 5% level while agricultural income (*AGRINC*) and prior participation in conservation (*PRTCONA*) were significant and positive at the 1% level. Gender, household size, walking distance, awareness and environmental degradation were not significantly affecting WTP.

Table 4. Descriptive statistics of the variables used in the robust regression analysis.

Independent variables	Minimum	Maximum	Mean	Standard deviation
AGE	17	69	36.01	11.53
GENDER	0	1	0.82	0.38
HHS	1	35	6.17	3.03
WDMIN	5	110	34.74	21.38
AWARE	0	1	0.69	0.47
WETINC	0.69	19.20	4.69	2.68
ENVDGRD	0	1	0.34	0.47
AGRINC	0.00	222.00	7.03	20.51
PRTCONA	0	1	0.18	0.38

Table 5. Determinants of household's WTP for community-based GLC conservation activities.

Independent variables	Coefficient	Standard error	*t*-Ratio
AGE	3.42**	1.36	2.52
GENDER	−13.69	43.45	−0.32
HHS	3.42	6.25	0.55
WDMIN	−0.11	0.77	−0.14
AWARE	0.21	35.06	0.01
WETINC	12.85**	6.24	2.06
ENVDGRD	−45.97	33.26	−1.38
AGRINC	3.04***	0.89	3.40
PRTCONA	172.14***	42.91	4.01
CONSTANT	143**	72.72	1.97

Notes: R^2 = 0.21; $F(9, 206)$ = 6.33; Prob > F = 0.0000; ** and *** indicate significance at α = 0.5 and 0.01, respectively.

4. Discussion

This study elicits the WTP of local people for community-based GLC conservation activities. They are the ones who bear the major consequences of any decision, either conservation or conversion. Therefore, local people, as direct users of wetland resources, will face immediate threat by development activities or benefits from wetland conservation (Wattage & Mardle 2008). Literature reports effects of degradation of wetland ecosystem. When wetland ecosystems get degraded, their productivity falls, resulting in lower income to local users, producing greater poverty among them and eventually accelerating pressure on these ecosystems (Johnson et al. 2006). Knowledge of costs and benefits to the local people can provide an insight for decision makers that can eventually help to evaluate the existing resource management policies (Wistowsky 2009).

Very few studies have been conducted in Nepal with respect to the contingent valuation application in the CBC activities, while almost none exist in the case of wetlands. In our case, majority of the respondents (61%) did not accept the starting bid amount, resulting in the enumerators having to reduce the bids. Initial starting point bidding amount could influence the final bid, for example, the use of low or high starting point leads to a low or high mean WTP (Green et al. 1990; Green & Tunstall 1991), whereas it also reduce non-response and variance that are likely to happen in other format of CVM (Mitchell & Carson 1989; Loomis 1990). As mentioned in the methodology, we set the initial bid amount by dividing the proposed programme budget of a hypothetical CBO among the households in the study area. People were willing to pay for conservation activities at GLC. The finding (US$5.4 average maximum WTP) is comparable with KC et al. (2013) on biodiversity conservation in Nepal (US$4.84), and studies undertaken in other developing countries, such as Verma and Negandhi (2011) (US$5.43 for wetland conservation) in India. The estimate is higher than those reported by Suyanto et al. (2005) from Indonesia, Kafasshi et al. (2013) from Iran, Kwak et al. (2007) from Korea and Do and Bennett (2007) from Vietnam. However, the estimate is much lower than those

reported by Ojeda et al. (2008) from Mexico and Gurluk and Rehber (2006) from Turkey.

Lamsal et al. (2015) showed that GLC resources significantly contributed to the household economy of the local people. They extract wetland resources equivalent to 12% of their annual total gross income. Further, the same study found that 95% of the households extract fuelwood from the GLC, apart from other resources including fish, fodder, trapa (*Trapa natans, T. bicornis*) and sal (*Shorea roubusta*) leaf for their livelihood. The aggregate WTP applied to the population in sample VDC comes to be NPR 2.3 million, more than two times the budget estimated for CBC of the GLC. This is a very good indication of the desire of local people towards possible participation and contribution in the conservation of lake resources. However, precaution should be taken for the extrapolation of WTP amount beyond the three VDCs as we have little information of the households beyond the study area. The higher the age, the more was the WTP for conservation, and this was against our hypothesis; however, this was consistent with the findings of Asadi et al. (2014). As elder people have more experience of deriving greater ecosystem services than younger ones, they do not hesitate in payment for conservation. The individuals who had ever participated in person at least once in lake conservation activities tended to show more WTP, and this was consistent with the findings of Do and Bennett (2007) and Kaffashi et al. (2011). The amount of income received from wetland positively affected maximum WTP of the respondents, which is similar to that of Asadi et al. (2014). Those who earned more from selling lake-derived resources and sustained their livelihood from the lake knew its importance which motivated them to pay more for CBC. Income of the households from agriculture influenced the WTP amount and is supported by the findings of Blomquist and Whitehead (1998), Ojeda et al. (2008) and Gupta and Mythili (2009). In some cases, the less well-off people in developing countries are usually reluctant in paying for conservation (Turpie 2003). Similarly, the households where members had previously participated at least once in lake conservation activities were interested in more payment for the conservation activities. This finding is well supported by the work of Blomquist and Whitehead (1998), Turpie (2003) and Ojeda et al. (2008). A household well aware of the advantages and disadvantages of wetland ecosystem favour CBC. The results of this research will be helpful for policy-making. Gustavson and Kennedy (2010) reported that the demonstration of monetary value of wetland not only assists in analysis of the trade-offs between its conservation and development but also guide wetland management efforts and public investments to protect and enhance the benefits from the wetlands.

The study showed that local individuals support programmes that they believe will provide a sense of belongingness and contribute to their livelihood. The study also provides some insights into the application of contingent valuation techniques in a Nepalese context, especially on the valuation of wetland services, where the CVM studies are very limited. As Whittington et al. (1990) said, contingent valuation survey is a viable methodology to extract information on individual's WTP for development programmes, including resource conservation and management activities in the developing countries and is true for the case study of GLC we presented. We are of the view that this contingent valuation study conducted at GLC is among the very few that was able to capture willingness of local people to pay for community-based wetland conservation activities. The study could facilitate national-level policy design and field-level sustainable wetland management in the future.

Although the findings of the present study are consistent with the body of available literature, it has a few limitations, so results should be interpreted cautiously. The estimated WTP for this study was developed considering local people living near the GLC area and within a localized institutional context (a CBO), so extrapolation of WTP results at district, regional or national levels as well as other institutional arrangements could be different. Further research could take into account the inclusion of larger sampling size from wider areas to make its outcome reflective at the national level and incorporate wider values like biodiversity conservation, carbon sequestration and climatic change in order to capture its full value.

5. Conclusion and recommendation

Local communities support programmes that they believe will provide a sense of belongingness and contribute to their livelihood. This study estimated WTP of local people for wetland conservation programmes. It also identified factors that influence the level of WTP. The study showed that all the respondents were willing to support the CBC programme by agreeing to contribute towards such programmes. The average annual WTP of the local people was found to be NPR 378 (US$5.4) per household, equating to NPR 2,309,580 (US$32,994) for the three VDCs that circumscribe the lake. Age of the head of the household, income from wetland, agricultural income and prior participation in conservation activities motivated households to pay more for the conservation. Government annual expenditure of at least the amount identified by this study per household for the community-based GLC conservation activities would be economically and environmentally justified.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

Arrow K, Solow R, Portney EE, Radner R, Schuman H. 1993. A report of the NOAA Panel on contingent valuation. Washington (DC): Resource for the Future.

Asadi M, Ghaderzadeh H, Chapi K, Rezaie F. 2014. Estimation of willingness to pay for conservation of Zarivar Wetland, Iran: a contingent valuation approach. Int Bull Water Resour Dev. 1:1–9.

Bam YB. 2002. Conservation and sustainable use of Ghodaghodi Lake System, Action Plan, Submitted to IUCN Nepal; p. 90.

Barbier EB, Acreman M, Knowler D. 1997. Economic valuation of wetlands: a guide for policy makers and planners. Gland: Ramsar Convention Bureau Switzerland.

Bateman IJ, Langford IH, Turner RK, Willis KG, Garrod GD. 1995. Elicitation and truncation effects in contingent valuation studies. Ecol Econ. 12:161–179.

Blomquist GC, Whitehead JC. 1998. Resource quality information and validity of willingness to pay in contingent valuation. Resour Energy Econ. 20:179–196.

Brouwer R, Langford IH, Bateman IJ, Turner RK. 1999. A meta analysis of wetland contingent valuation studies. Reg Environ Change. 1:47–57.

CBS. 2001. National population and housing census 2001 report. Kathmandu: Central Bureau of Statistics, National Planning Commission Secretariat, Government of Nepal.

Davis RK. 1963. Recreation planning as an economic problem. Nat Resour J. 3:239–249.

Do TN, Bennett J. 2007. Willingness to pay for wetland improvement in Vietnam's Mekong River Delta. Paper presented at 51st annual conference of Australian Agricultural and Resource Economics Society, Feb 14–16; Queenstown; p. 31.

Emerton L, Bos E. 2004. Value: counting ecosystems as an economic part of water infrastructure. Gland: IUCN; p. 88.

Green CH, Tunstall SM. 1991. The evaluation of river water quality improvements by the contingent valuation method. Appl Econ. 23:1135–1146.

Green CH, Tunstall SM, N'Jai A, Rogers A. 1990. The economic evaluation of environmental goods. Project Appraisal. 5:70–82.

Gunatilake HM. 2003. Environmental valuation: theory and applications. Srilanka: Post Graduate Institute of Agriculture, University of Peradeniya; p. 373.

Gupta V, Mythili G. 2009. Willingness to pay for water quality improvement: a study of Powai Lake in India. Asian J Water, Environ Pollut. 8:15–21.

Gurluk S, Rehber E. 2006. Evaluation of an integrated wetland management plan: case of Uluabat (Apollonia) Lake, Turkey. Wetlands. 26:258–264.

Gustavson K, Kennedy E. 2010. Approaching wetland valuation in Canada. Wetlands. 30:1065–1076.

Hanemann WM. 1994. Valuing the environment through contingent valuation. J Econ Perspect. 8:19–43.

Hoehn JP, Randall A. 1983. Incentives and performance in contingent policy valuation. Paper presented at: the American Agricultural Economics Association summer meetings, Purdue University.

Hoevenagel R. 1994. The contingent valuation method: scope and validity. Amsterdam: Institute for Environmental Studies, Vrije Universiteit.

IUCN. 1998. In: Bhandari B, editor. An inventory of Nepal's Tarai Wetlands. Kathmandu: IUCN Nepal.

IUCN. 2004. A review of the status and threats to wetlands in Nepal. Kathamndu: IUCN Nepal.

Johnson PM, Mayrand K, Paquin M. 2006. Governing global desertification: linking environmental degradation, poverty and participation. Hampshire: Ashgate.

Kaffashi S, Shamsudin MN, Radam A, Rahim KA, Yacob MR. 2013. We are willing to pay to support wetland conservation: local users' perspective. Int J Sustainable Dev World Ecol. 12:325–335.

Kaffashi S, Shamsudin MN, Radam A, Rahim KA, Yacob MR, Muda A, Yazid M. 2011. Economic valuation of Shadegan International Wetland, Iran: notes for conservation. Reg Environ Change. 11:925–934.

Kafle G. 2005. Avifaunal survey and vegetation analysis focusing on threatened and near-threatened species on Ghodaghodi Lake of Nepal. A report submitted to Oriental Bird Club (OBC), Bedford; p. 32.

KC B, Kandel PN, Adhikari S. 2013. Economic valuation of ecosystem services in protected areas: a case study from Nepal. Banko Janakari. 23:42–50.

Kwak SJ, Yoo SH, Lee CK. 2007. Valuation of the Woopo Wetland in Korea: a contingent valuation study. Environ Dev Econ. 12:323–328.

Lamsal P, Pant KP, Kumar L, Atreya K. 2014. Diversity, uses, and threats in the Ghodaghodi Lake Complex, a Ramsar Site in Western Lowland Nepal. ISRN Biodiver. 2014:1–12.

Lamsal P, Pant KP, Kumar L, Atreya K. 2015. Sustainable livelihoods through conservation of wetland resources: a case of economic benefits from Ghodaghodi Lake, western Nepal. Ecol Soc. 20:10.

Loomis J, Kent P, Strange L, Fausch K, Covich A. 2000. Measuring the total economic value of restoring ecosystem services in an impaired river basin: results from a contingent valuation survey. Ecol Econ. 33:103–117.

Loomis JB. 1990. Comparative reliability of the dichotomous choice and open-ended contingent valuation techniques. J Environ Econ Manage. 18:78–85.

McNeely JA. 1989. Protected areas and human ecology: how national parks can contribute to sustaining societies of the twenty-first century. In: Western D, Pearl MC, editors. Conservation for the twenty-first century. New York: Oxford University Press; p. 150–157.

Mitchell R, Carson R. 1989. Using surveys to value public goods: the contingent valuation method. Washington (DC): Resources for the Future.

Ojeda MI, Mayer AS, Solomon BD. 2008. Economic valuation of environmental services sustained by water flows in the Yaqui River Delta. Ecol Econ. 65:155–165.

Pearce D. 2001. Valuing biological diversity: issues and overview. In: OECD, editor. Valuation of biodiversity benefits: selected studies. Paris: OECD.

Pearce DW, Moran D. 1994. The economic value of biodiversity. London: Earthscan Publications; p. 104.

Philips A. 1998. Economic values of protected areas: guidelines for protected area managers. Cambridge: IUCN – The World Conservation Union.

Roberts LA. 1997. Economic valuation of some wetland outputs of Mud Lake, Minnesota-South Dakota [Internet]. North Dakota State University (Master thesis). [cited 2014 Nov 15]. Available from: http://www.ccalt.org/.../TPL%20Report. pdf

Sibanda B, Omwega A. 1996. Some reflections on conservation, sustainable development and equitable sharing of benefits from wildlife in Africa: the case of Kenya and Zimbabwe. South Afr J Wildl Res. 26:175–181.

Siwakoti M, Karki JB. 2009. Conservation status of Ramsar Sites in Nepal Tarai: an overview. Botanica Orientalis. 6:76–84.

Suyanto S, Leimona B, Permana RP, Chandler FJC. 2005. Review of the development environmental services market in Indonesia. Indonesia: World Agroforestry Centre (ICRAF); p. 54.

Turner RK, Bateman IJ, Georgiou S, Jones A, Langford IH, Matias NGN, Subramanian L. 2004. An ecological economics approach to the management of a multi-purpose coastal wetland. Reg Environ Change. 4:86–99.

Turpie JK. 2003. The existence value of biodiversity in South Africa: how interest, experience, knowledge, income and perceived level of threat influence local willingness to pay. Ecol Econ. 46:199–216.

UCLA Statistical Consulting Group. 2006. How can I get R2 with robust regression (rreg)? [Internet]. [cited 2015 Mar 1]. Available from: http://www.ats.ucla.edu/stat/stata/faq/rregr2.htm

Venkatachalam L. 2004. The contingent valuation method: a review. Environ Impact Assess Rev. 24:89–124.

Verma M, Negandhi D. 2011. Valuing ecosystem services of wetlands—a tool for effective policy formulation and poverty alleviation. Hydrol Sci J. 56:1622–1639.
Wattage P, Mardle S. 2008. Total economic value of wetland conservation in Sri Lanka identifying use and non-use values. Wetlands Ecol Manag. 16:359–369.
Whittington D, Briscoe J, Mu X, Barron W. 1990. Estimating the willingness to pay for water services in developing countries: a case study of the use of contingent valuation surveys in Southern Haiti. Econ Dev Cult Change. 38:293–311.
Wistowsky W. 2009. Canada's National Parks: what are they worth to Canadians and why? [Internet]. CASIOPA Presentation March 30, Protected Areas Socio-economic Analyst; Peterborough (ON): Ontario Parks. [cited 2015 Jun 10]. Available from: http://casiopa.mediamouse.ca/wp-content/uploads/2010/04/CASIOPA-Wistowsky.pdf

Appendix. Detail and specific wording of the villager's WTP scenario read to the respondents

We all know that GLC has a long mutual relationship with the local people of this area. This lake provides many resources for maintaining the livelihood of us, both in tangible and intangible forms. The resources that we harvest from the lake include timber, fuelwood, fodder, fish, lotus, snail, turtle, NTFP, water for irrigation, tourism, etc., while non-tangible benefits include integrity of ecosystem, aesthetic beauty, etc. This clearly indicates that GLC plays an important role in the local livelihood. However, this contribution of the lake will be sustainable in the long run if it is conserved properly. So conservation of the lake is of prime importance if it is to be used for the welfare of all of us. The act of conservation is the responsibility of none other than us because we are the ones who have utilized the lake for a long time. Some recent studies have shown that the productivity of the lake is decreasing and the resources are in limited supply compared to those of the past. Therefore, we have come up with an idea of forming a new CBO. This CBO will be managed by local communities and will start the conservation programme instantly for 10 years. The money it receives from your generous effort will be deployed to implement the conservation programmes all the year round. Some external fund is anticipated; however, that might be temporary. To make this effort sustainable, the contribution from the local people is essential and we are expecting it. So, we want to know how much contribution you are willing to make to enable this noble effort to be successful.

Please be informed that this is your own CBO, formed through the participation of individuals among yourselves in the working committee. The entire conservation programme will be formulated and implemented after the consent of the representatives in the committee. This means the programme is based on the needs and wishes of the local people. The following services are expected from the proposed conservation programme and the outcomes are categorized as short-term and long-term benefits.

Short term

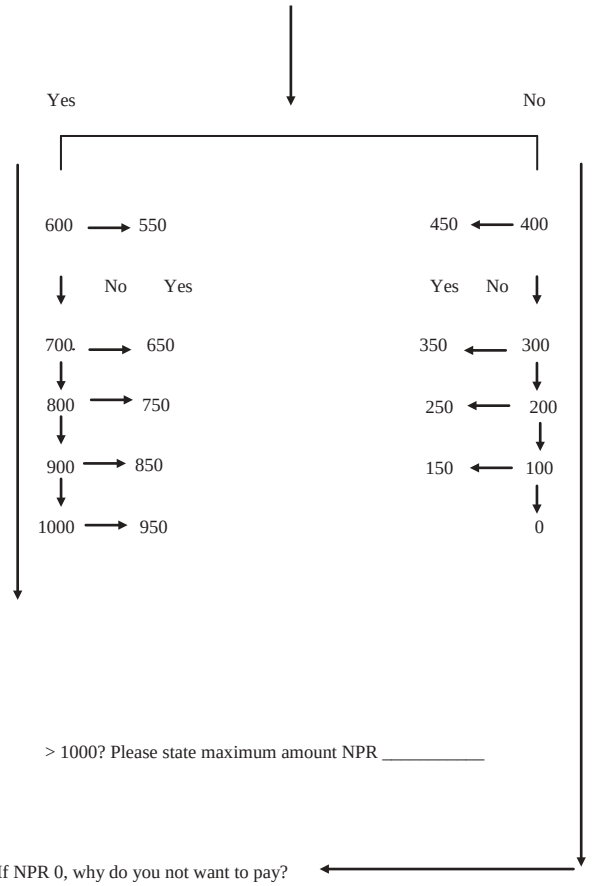
- Increase in production of lake resources like timber, fuelwood, fodder, fish, snail, turtle, lotus, NTFP, etc. For this, plantation of trees, fodder, NTFP, etc., will be undertaken on a priority basis.
- Renovation and upgrading of services in the temple that will attract more pilgrims to the area and increase business transactions of local people.
- Increase in water level that will create excess water available for irrigation to nearby agricultural land.

Long term

- Improved water quality: available for drinking purposes; improved fisheries production.
- Protection of marsh crocodile and wetland birds: increase visitor numbers and this will lead to employment and other opportunities for the villagers; tourism activity and increased boating by visitors.

The CBO estimates a total of NPR one million per year for the period of 10 years to mobilize the planned GLC conservation activities. As it is entirely a community-based programme, financial contribution should also come from the community itself. We have identified a total of 2172 beneficiary households from the three wards of Darakh, Ramsikharjhala and Sandepani VDC which are in close proximity to the lake and utilize the majority of lake resources. The intervention will be carried out on a priority basis so that the needy ones among the above-stated services can be delivered to the local people. The priority will be decided in the group meetings that you participate.

(1) In this context, if you are asked to contribute some money for the sake of conservation of Ghodaghodi Lake, would you be ready to participate in the CBO activities?
□ Yes □ No
(2) If no, please give a reason why you do not want to participate in the programme?
(3) If the CBO committee decides for each household to pay NPR 500/year, would your household be willing to pay this? (Please circle the amount your household wishes to pay)



Flow chart: The iterative bidding WTP question format used in the survey. The WTP bidding price was fixed at NPR 500 which the respondents were asked to pay in the dichotomous choice format supported by open-ended question.