

ASSESSING THE WILLINGNESS TO PAY FOR CONSERVATION AND MANAGEMENT OF WETLANDS AT JAGDISPUR RESERVOIR IN KAPILVASTU DISTRICT OF NEPAL

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ASSESSING THE WILLINGNESS TO PAY FOR CONSERVATION AND MANAGEMENT OF WETLANDS AT JAGDISPUR RESERVOIR IN KAPILVASTU DISTRICT OF NEPAL. Wetlands are one of the world's most productive ecosystems. They have significant ecological, economic, cultural, and recreational significance. However, wetlands are being misused and degraded; therefore, wise and sustainable use of wetlands, conservation and management of wetlands resources are critical at the local level. Community-based conservation is a method of managing wetlands near settlements sustainably. The objective of this study was to determine local people's willingness to pay (WTP) for community-based conservation and management activities, as well as the factors which influence it, at the Jagdispur Reservoir in Nepal's Kapilvastu district. A total of 62 households were surveyed. Household surveys and key informant interviews were conducted. Contingent valuation was used to elicit WTP, while regression analysis identified significant determinants. Thirteen provisioning, regulating, cultural and supporting services were identified, including irrigation, fisheries, tourism and biodiversity. Of 62 households, 67% expressed WTP averaging NRs 3,351 (US \$ 25.38) annually. WTP was higher for proximal households, reflecting greater dependence. Cash payments dominated, but labor contributions were also substantial. Age, income, participation in conservation, and distance from wetlands positively and significantly influenced WTP. Whereas education, gender, ethnicity and number of family members did not. The findings indicate a high value placed on sustaining wetland services, justifying investment in conservation and wise use. Follow-up research on governance, benefit sharing and sustainable financing is recommended to translate WTP into effective action. Overall, the results provide important baseline data to guide policies and collective action for wetland stewardship.

Keywords: Conservation and management, wetland, wetland goods and services, willingness to pay, contingent valuation method

PENILAIAN KESEDIAAN PEMBAYARAN KONSERVASI DAN PENGELOLAAN LAHAN BASAH DI WADUK JAGDISPUR, KAPILVASTU NEPAL. Lahan basah adalah salah satu ekosistem dunia yang paling produktif karena memiliki peran signifikan terhadap ekologi, ekonomi, budaya, dan rekreasi. Lahan basah sering disalahgunakan dan mengalami degradasi, sehingga studi terkait pemanfaatan lahan basah secara bijaksana dan berkelanjutan sangat perlu dilakukan mulai dari tingkat lokal. Konservasi berbasis masyarakat merupakan salah satu strategi pengelolaan lahan basah di dekat pemukiman secara berkelanjutan. Tujuan dari penelitian ini adalah untuk menentukan kesiediaan masyarakat untuk membayar (Willingness to Pay/WTP) kegiatan konservasi dan pengelolaan berbasis masyarakat, serta faktor-faktor yang mempengaruhinya. Penelitian dilakukan di Waduk Jagdispur, Distrik Kapilvastu, Nepal melalui survei. Survei dilakukan terhadap 62 rumah tangga. Pengumpulan informasi dilakukan melalui pemberian kuesioner dan wawancara dengan responden dan informan kunci. Penentuan WTP dilakukan dengan menggunakan Contingent Valuation Method (CVM), dan faktor-faktor yang mempengaruhi WTP diidentifikasi menggunakan analisis regresi. Dalam ukuran nilai rata-rata kesiediaan rumah tangga untuk membayar tunai dan barang untuk konservasi dan pengelolaan Waduk Jagdispur adalah sebesar NRs 3351 (US \$ 25.38). Umur, pendapatan bulanan, jarak dari lahan basah, dan partisipasi

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dalam kegiatan konservasi semuanya memiliki pengaruh yang nyata ($p < 0,05$) terhadap kesediaan rumah tangga untuk membayar perlindungan dan pengelolaan waduk. Berdasarkan data yang diperoleh dalam survey, perkiraan kesediaan untuk membayar jasa konservasi waduk dan kegiatan pengelolaan dapat dibenarkan secara ekonomi dan lingkungan. Penelitian lanjutan mengenai tata kelola, pembagian manfaat dan pembiayaan berkelanjutan direkomendasikan untuk menerjemahkan WTP menjadi tindakan yang efektif. Secara keseluruhan, hasil penelitian ini memberikan data dasar yang penting untuk memandu kebijakan dan tindakan kolektif dalam pengelolaan lahan basah.

Kata kunci: Konservasi dan manajemen, lahan basah, barang dan jasa lahan basah, kemauan membayar, willingness to pay, contingent valuation method

I. INTRODUCTION

Wetlands provide critical ecosystem services such as water filtration, flood control, biodiversity habitat, and opportunities for recreation that benefit local communities (Mitsch et al., 2015). However, wetlands around the world are being degraded and lost at an alarming rate due to land conversion for agriculture, pollution, and development pressures (Davidson, 2014).

Nepal's wetland has a total area of 743,563 ha, accounting for 5% of the country's total land area MFSC (2014). Wetlands provide local people with a variety of ecological goods and services, and habitat for riparian and aquatic animals (Lamsal et al., 2015b). In Nepal specifically, rapid population growth and land use changes have put pressure on critical wetland areas like the Jagdispur Reservoir in the Kapilvastu district (Thapa et al., 2016). This reservoir is the largest in the country and was recognized as a Wetland of International Importance under the Ramsar Convention in 2003, mainly for its rich biodiversity, including threatened mammals and migratory waterbirds (IUCN, 2004). Jagdispur Reservoir lies well north of tropical latitudes and lacks a coastal location or cold boreal climate with waterlogged soils; based on the cited definitions (Mitsch et al., 2015) it does not contain the habitat criteria needed to develop mangrove swamps or peatlands. It likely qualifies as an inland freshwater lake wetland instead.

Many wetlands have been classified as wastelands in the past, and have been drained or otherwise converted to agricultural, industrial,

and private land uses (Barbier, Acreman & Knowler, 1997). This implies that humans are unable to take advantage of the diverse benefits provided by wetlands (Roberts & Leitch, 1997). Consequently, by underestimating its real values, an opportunity to achieve benefits is put at risk. Sustainable wetlands management is critical for reducing the rate of wetlands loss and degradation worldwide. Nearby communities are becoming more aware of the importance of wetlands. If they benefit from wetlands preservation, conservation, and management, they will change their behaviour to support conservation and management efforts (Sibanda & Omwega, 1996). The research in developing nations has used contingent valuation methodologies to indicate a willingness to pay for wetland biodiversity conservation and other natural attractions (Pearce, 2001).

Assessing willingness to pay (WTP) provides quantitative information on how much the surrounding community values the wetland's services (Carson & Mitchell, 1993), which can inform policy decisions on whether investments in wetland conservation and restoration make economic sense and if community members would support such efforts (Hanley & Barbier, 2009). The concept of payment for ecosystem services (PES) schemes builds on this WTP to conserve natural areas like wetlands by having beneficiaries compensate landowners or managers for providing those services (Engel et al., 2008). As governments and NGOs in Nepal look to expand PES programs to fund protected area conservation (ICIMOD, 2016),

understanding local WTP is an important first step.

While some research has valued ecosystem services of wetlands in Nepal (Baral et al., 2016; Lamsal et al. 2015; Asadi et al. 2014), factors affecting willingness to pay have not been previously assessed for the significant Jagdispur Reservoir. Most of Jagdispur Reservoir's study is on water birds and biodiversity conservation. Factors like income, age, education level, distance from the wetland, and use of wetland resources have been found to influence WTP in previous CVM studies on wetlands (Lamsal et al. 2015; Asadi et al. 2014). This suggests WTP for wetland conservation may vary between communities depending on their characteristics. Therefore, this study aims to estimate WTP to conserve and sustainably manage wetlands for communities around Jagdispur Reservoir using CVM. It will also analyze factors affecting WTP, such as demographics, wetland use, and participation in conservation activities. Conducting this assessment empowers local

voices in determining the future of this important site and provides an economic model that could guide decision-making at other threatened wetlands in Nepal. The results can inform future payment for ecosystem service programs to fund wetland conservation in the area.

II. MATERIAL AND METHOD

A. Study area

The Jagdispur Reservoir is located in Nepal's western region. It is located between 27°37' N and 83°06' in the Kapilvastu Municipality ward number 10 of Kapilvastu District with an elevation of 197 meters above mean sea level. Because of its international importance for threatened species and habitat conservation, the Jagdispur Reservoir is recognized as an Important Bird Area (IBA). In 2003, the wetland area was designated as a Ramsar Site, mostly due to migrating waterbirds and threatened animals. With a core size of 157 hectares and

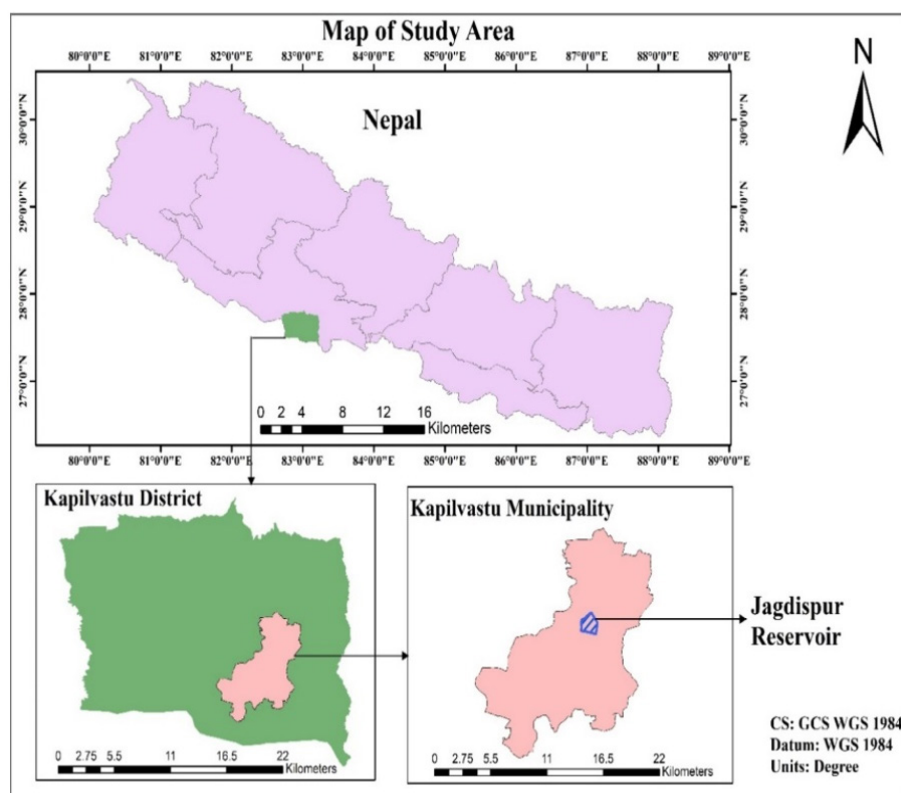


Figure 1. Map of the study area

surrounding wetlands totalling around 225 ha, this reservoir is currently the largest reservoir in Nepal and an important wetland site. It was built in early 1970 to provide irrigation for Jakhira Lake and the adjacent agricultural land. The neighbouring Banganga River feeds the Reservoir, a catchment in the Churia Hills. This study was conducted in 2020 (July to November).

B. Data collection

The purposive sampling method was carried out to select sample households for primary data collection. This sampling method was adopted because the researcher has field-level experience, and the studies are confined to a small number of household inquiries (Kothari, 2004). Different three villages, i.e. Jagdispur (located within 1 km of the wetlands), Birata (located within 2 km of the wetlands), and Jahadi (located within the vicinity of 3 km of wetlands), were selected because of the communities' dependency and direct access with the Jagdispur reservoir. The villages were sparsely populated. Therefore, a sampling intensity of 30% was utilized for each village. A survey was conducted on 20, 15, and 27 households of respective villages out of 66 houses from Jagdispur village, 50 households from Birata village, and 90 households from Jahadi village. The purpose of the household survey was to gather detailed information about wetlands and their users. Typically, the household head (eldest family member) was interviewed. The main questionnaires in the household survey included five-point Likert scale response options for collecting responses from respondents on reservoir conservation and management. Apart from the respondents interviewed from each village, in-depth interviews were also conducted with 6 key informants who represented the local communities regarding social status, ethnicity, economic well-being, knowledge, and ecological regions.

The study's data and information were gathered from secondary sources. To obtain

supporting data related with existing knowledge, technical aspects and policy developed in the research area, secondary data was gathered from research articles, case studies, papers, journals, and records from the District Forest Office in Kapilvastu and wetland operational plans.

C. Contingent Valuation Method (CVM)

The Contingent Valuation Method calculated Willingness to Pay for reservoir conservation and management. In Nepal and elsewhere, WTP is often used to estimate option and existence value. CVM is a survey method in which respondents are asked how much they would be ready to pay or donate in cash and labor to conserve natural goods, with their preferences presumed to be dependent on alternative goods available in a hypothetical market (Hoevenagel, 1994). Using a bidding game, the overviewed families were asked about the amount they were willing to contribute in cash and deliberate labor for the reservoir's conservation. The labor contribution was then converted to a monetary value using the study site's average wage rate (NPR. 500/day). The average monetary value was then calculated.

D. Regression analysis

Regression analysis was carried out to determine the factors affecting the household's WTP for the conservation and management of the reservoir. The multiple linear regression model used was in Eq. 1:

$$y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + e \dots\dots\dots(1)$$

Where:

y = Willingness to Pay for the community-based conservation activities

β_0 = Constant Term & $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}$ = Beta coefficients,

X1 = Age

X2 = Level of education

X3 = Gender

X4 = Participation in conservation

X5 = Monthly income

X6 = Distance from wetland

X7 = Number of household members

X8 = Ethnicity

e = Error Term

Here, y is a dependent variable that depends upon the independent variables (X1, X2, X3, X4, X5, X6, X7, X8, X9, and X10). As there are more than two independent comparison groups to compare the means of a continuous variable, hence we use analysis of variance (ANOVA) as an appropriate test of hypothesis (Eneji et al., 2009).

E. Data analysis

Data were collected in both qualitative and quantitative forms, which were evaluated using descriptive statistics including percentage, mean and frequency. Simple tables, charts, and graphs were used to convey certain data. Data were imported into Microsoft Excel 2016 and analyzed using Statistical Package for Social Sciences (SPSS ver.19). The study employed both descriptive and inferential statistics.

III. RESULT AND DISCUSSION

Results from direct observation, key informant interviews, and household surveys reveal that wetland provides both consumptive and non-consumptive goods and services.

Irrigation, fish, driftwood, medicinal plants, firewood, livestock bathing, water, tourism and recreation, biodiversity conservation, attractive terrain, fresh air, water regulation, and a clean environment are some of the major goods and services provided by Jagdispur Reservoir.

Socioeconomic status of the respondents

The total number of responses was 62 (N=62). The Socio-Demographic Profile of Sampled Households is shown in Table 1. Gender, ethnicity, educational status, conservation awareness, primary source of income, and age group are all socioeconomic factors that directly and indirectly affect community-based conservation efforts to conserve and manage the reservoir. These variables affect the willingness to pay (WTP) for the conservation of wetland biodiversity. The findings of this study were similar to those of Bhatt, Shah and Abdullah (2014), who found that analyzing respondents' socioeconomic status is important in assessing WTP for conserving wetland biodiversity. Income and education are two variables that directly affect the respondents' WTP in Shadegan International Wetland (Kaffashi et al., 2015).

Table 1: Socio-demographic status of respondents (N=62)

Variable	Percentage (%)	Frequency(n)
Gender		
Male	55	34
Female	45	28
Ethnicity		
Brahmin/Chhetri	18	11
Tharu	44	27
Made	27	17
Others	11	7
Age group		
Below 20	8	5
20-30	13	8
40-59	45	28
Above 60	34	21
Educational Status		
No formal education	38	24
Below Secondary Education Examination (SEE)	26	16
SEE	13	8

Table 1. Continued

Variable	Percentage (%)	Frequency(n)
Above SEE	23	14
Primary income sources		
Agriculture	56	35
Business	10	6
Foreign remit	16	10
Services	10	6
Others	8	5
Awareness of conservation		
Yes	55	34
No	45	28
Family size(number)		
Below 5	24	15
5	13	8
Above 5	63	39
Participation in conservation activities		
Yes	56	35
No	44	30

The reaction of the respondents to willingness to pay

The reaction of respondents regarding willingness to pay is given in Figure 2. Out of the 62 respondents, 69% respondents were ready to pay for the conservation and management of wetlands at 81%, 66% and 59% respectively for Jagdispur Village, Birata Village, Jahadi Village. Meanwhile, 31% of respondents stated that they were not ready to pay, respectively 19%, 34% and 41% from Jagdispur Village, Birata Village and Jahadi Village.

A 2010 study by Chand on the Ghodaghodi wetland in Nepal found a higher rate of willingness to pay, with 79% of respondents willing to pay. In contrast, a study by Lamsal et al. (2015a) on the Ghodaghodi Lake complex found only 48% were willing to pay cash for conservation activities. A 2014 study by Asadi et al. on an Iranian wetland had a comparable 67% willingness to pay rate. The key reasons for unwillingness to pay in this Nepal study were lack of conservation policies and awareness. This matches the findings of Lamsal et al. (2015a) who found many people may not fully understand the importance of wetlands and

their role in ecosystem health. In summary, the share of households willing to pay varies considerably across studies from 48% to 79%, likely reflecting differences in site-specific factors.

Reaction of respondents regarding the reason for willingness and unwillingness to pay

The goods and services provided by the Jagdispur Reservoir benefited all responders. Figure 2 shows that 69 % of respondents were ready to pay in cash or labour for reservoir conservation and management. The willingness to pay was mostly motivated by the goods and services obtained from Jagdispur Reservoir and for the good and benefit of the future generation. Local people have placed a high value on wetlands conservation and management, primarily for the ecosystem services and goods provided by the reservoir and to maintain the reservoir for the next generations. 31% of respondents claimed they couldn't afford to pay for reservoir conservation and management. Figure 3 shows the main reason for unwillingness to pay in three different villages due to policy

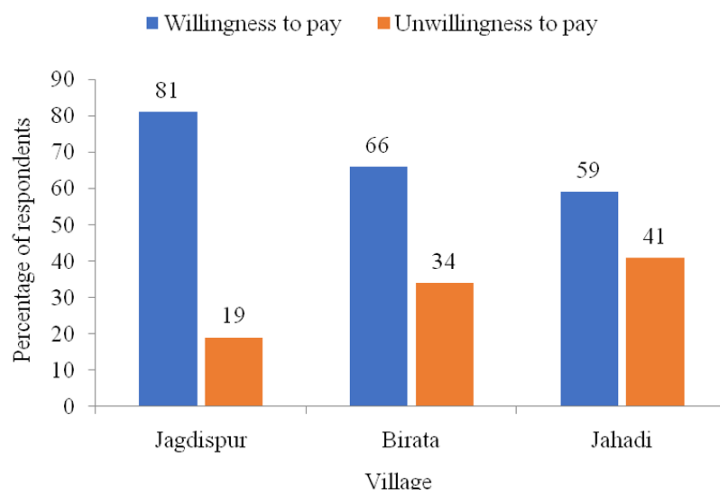


Figure 2. Reaction of the respondents for willingness to pay

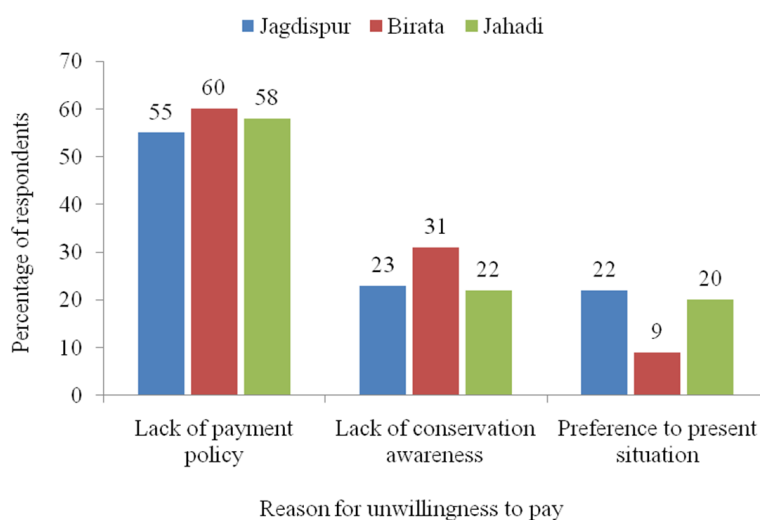


Figure 3. Reaction regarding the reason for unwillingness to pay

gaps and lack of awareness. Similarly, Lamsal et al. (2015a) identified a lack of policy and knowledge and a lack of awareness as the main reason for unwillingness to pay. Asadi et al. (2014) found distrust in authorities managing payments also reduced willingness to pay in their Iran wetland study. In summary, the reasons given for unwillingness to pay and preferred payment forms can vary considerably across sites based on policies, awareness, trust, and economics.

Reaction of respondents regarding the form of payment

Figure 4 shows the form of payment in three different villages. Out of 69% of respondents who were ready to pay, 44% of respondents were ready to pay by cash, 21% of respondents were ready to contribute as voluntary labor, and 35% of respondents were ready to pay in both forms on average of three villages. Here, most respondents preferred payment in cash. This aligns with Lamsal et al.'s (2015) Nepal study, where the most preferred cash payment.

However, Asadi et al. (2014) found higher willingness for labor than cash payment in Iran, perhaps reflecting affordability. Do and Bennett (2007) in Vietnam actually found a preference for payment in kind rather than cash.

Value of willingness to pay

Our results found that the community in the research sites are willing to pay in cash and labor for the conservation and management of the reservoir. On average, each household is willing to pay NRs 518 per year in cash and provide voluntary labor of 5.7 days per year, which is equivalent to NRs 2833 per year, calculated by local wage rates. Willingness to pay by cash or voluntary labor was higher in Jagdishpur village than in Birata and Jhahadi villages. This reveals that people around the Jagdishpur Reservoir give high importance to the conservation and management of the reservoir for future use and wetland goods and services.

This study found the average total willingness to pay (WTP) for conservation and management of the Jagdishpur Reservoir wetland to be NRs 3,351 (US \$ 29) per household annually. This WTP was comprised of cash payments (average of NRs 518 (US \$4.48) per household) as well voluntary labor contributions valued at NRs 2,833 (US \$ 24.52) per household.

Compared to findings from other wetland valuation studies in Nepal, WTP by cash in the research area is higher than the NRs 378 (US\$5.4) found for the community-based conservation of Ghodaghodi Lake (Lamsal et al., 2015a). Total WTP is slightly lower than the NRs 3,135 value local communities placed on conservation of the same Jagdishpur Reservoir in previous research (Baral et al., 2016). The reasons for the high WTP found in this study and other Jagdishpur studies are likely linked to the high dependence and utilization of

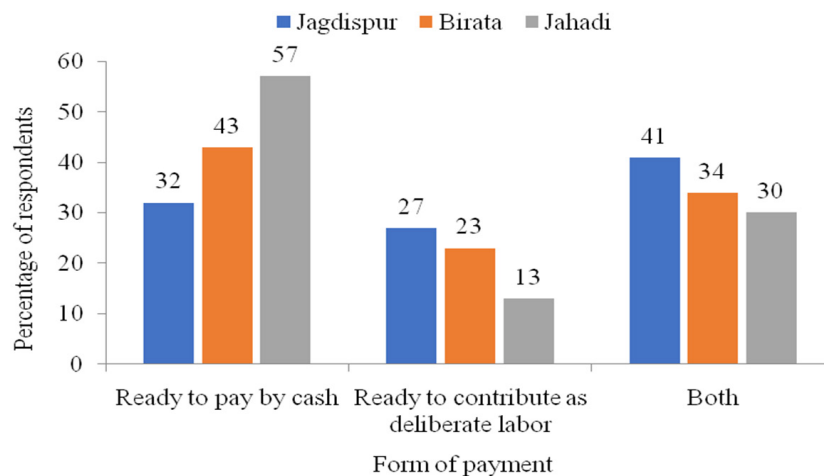


Figure 4. Reaction of respondents regarding the form of payment

Table 2: Total willingness to pay for conservation and management

Village	Willingness to pay by cash (NRs/HH)	Contribute as labor		Total
		Day per year	Monetary form (NRs/HH)	
Jagdishpur	737	7	3500	4237
Birata	512	6	3000	3512
Jhahadi	306	4	2000	2306
Total	518	5.7	2833	3351

Note: US\$ 1 ≈ 115.52 NRs

this wetland by local communities for fishing, driftwood collection, livestock grazing and other activities (Chaudhary, 2021).

Factors affecting a household's willingness to pay

A regression analysis was carried out to establish whether these factors influence households' willingness to pay for wetlands conservation. Several factors might influence are age, gender, participation in conservation, source of income, number of household members, monthly income, ethnicity, and the result is presented in Table 3. To determine the factors affecting households' WTP for the conservation and management of Jagdispur Reservoir, a null hypothesis was formulated thus: there are no factors affecting households' WTP for the conservation and management of Jagdispur Reservoir (H_0).

Analysis of variance (ANOVA) of the multiple regressions in Table 4 shows that the P-value is 0.000, less than the 0.005 significance level, meaning that we can reject the null hypothesis, and the F calculated value is 4.48, while the critical F value is 2.29. The calculated F value of 4.48 is greater than the critical F value of 2.29 at a 5% significant level; hence, the result is significant at a 5% significant level. A significant F test indicated that we would reject the null hypothesis, which states that there are no factors affecting households' WTP for the

conservation and management of Jagdispur Reservoir.

Subsequently, Table 5 shows that age ($P < 0.00$), participation in conservation activities ($P < 0.00$), monthly income ($P < 0.00$), and distance from wetland ($P < 0.00$) factors have p-values less than 0.05. These factors were significant, which means that these factors contribute to the variability of the dependent variable i.e., the household's willingness to pay for conservation and management of the reservoir. Similarly, the level of education, gender, household size, and ethnicity factors were insignificant ($p > 0.05$), which means these factors do not contribute to the variability of the dependent variable, i.e., the household's willingness to pay for conservation and management of the reservoir. The WTP was positively and significantly associated with age, conservation participation, and monthly income parameters. It shows that older people with more money are more eager to contribute to the conservation and management of the environment than younger people with less money. People who participate in more activities are more likely to contribute to the reservoir's conservation and management. WTP is inversely proportional to the distance from a wetland. People who live close to the wetland are ready to pay more for the reservoir's conservation and management than people who live further away.

Table 3: Strength of model

Model	R	R Square	Adjusted RSquare	Std. The error of the Estimate
1	0.606 ^a	0.367	0.285	0.6232

^a = Willingness to pay for conservation and management of Jagdispur Reservoir

Table 4: Analysis of variance of the multiple regressions

Model	Sum of squares	df	Mean Square	F	Significance
Regression	2354643	7	336377	4.48	0.000
Residual	4052653	54	75049		
Total	6407297	61			

Table 5: Multiple linear models of the total amount of WTP for conservation and management of the reservoir

Socioeconomic variable	Coefficient estimate	Standard error	t-value	p-value
(Constant)	147.44	51.3	2.87	0.02
Age (years)	6.32	14.7	0.42	0.00*
Level of education	-5.8	8.1	-0.71	0.46
Gender	-16.63	47.13	-0.35	0.66
Participation in conservation Activities	9.73	22.1	0.44	0.02*
Monthly income (NRs)	105.6	12.9	8.18	0.00*
Distance from wetland (in km)	-12.57	19.41	0.64	0.00*
Number of household members	2.52	5.21	0.48	0.35
Ethnicity	14.59	47.13	0.30	0.43

*Significant at 5% level of significance.

The established multiple linear regression equation becomes:

$$y = 147.44 + 6.32X_1 + 9.73X_4 + 106.6X_5 - 12.57X_6$$

There is a significant correlation between the amount of WTP for ecosystem services and monthly income, but no correlation between the amount of WTP for ecosystem services and education level (Bhandari et al., 2016). The positive influence of age on WTP aligns with a study by Asadi et al. (2014) on an Iranian wetland, which also found that higher age led to greater WTP. As the authors suggested, older people likely have more experience benefiting from wetlands; therefore, they are more willing to pay. Many studies have found income is positively associated with WTP for wetlands, like Bhandari et al. (2009) in Nepal, Lankia et al. (2014) in Finland, and Bennett and Thang (2005) in Vietnam. Higher-income logically provides a greater ability to pay. The negative effect of distance on WTP makes sense since proximity increases wetland use and awareness. This finding is in accordance with the study from

Lankia et al. (2014) who found that distance reduced WTP for managing recreational forests in Finland. Past participation in conservation increased WTP is consistent with findings of Do and Bennett (2007) in Vietnam and Blomquist and Whitehead (1998) in the USA.

IV. CONCLUSION

The study found that the Jagdispur Reservoir provides several important ecosystem goods and services to local communities, including irrigation, fish, driftwood, medicinal plants, livestock bathing, tourism, recreation, biodiversity conservation, flood control, and aesthetic beauty. A total of 13 key goods and services were identified through household surveys and key informant interviews. Out of 62 respondents surveyed, 67% were willing to pay for wetland conservation and management activities. The average willingness to pay was NRs 3,351 (US \$ 29) per household annually, comprising an average of NRs 518 (US \$4.48) in cash and NRs 2,833 (US \$ 24.52) worth of labor. Willingness to pay was higher among those who live closer to the wetland, reflecting greater dependence and benefits obtained from the wetland. Multiple regression analysis found that age, monthly income, distance from the wetland, and participation in conservation activities significantly influenced willingness to pay positively. In contrast, education level, gender, number of household members and ethnicity did not show a significant effect. This indicates that those who are older, wealthier, actively participate in conservation and live

close to the wetland are willing to pay more. This is not only driven by greater awareness of the importance of Jagdispur Reservoir but also an understanding of the greater benefits that can be obtained from the ecosystem services.

Overall, the high willingness to pay values reveals significant local dependence on wetland resources and appreciation of the ecosystem services provided. The findings provide evidence that investment in conserving and managing the Jagdispur Reservoir would be economically justified, given people's reliance on wetland resources. This information can help justify and direct government policies and programs aimed at protecting the Jagdispur Reservoir and similar wetlands. More research on governance, benefit sharing, and sustainable finance is needed to put WTP into action. Overall, the findings of this study provide critical baseline data for guiding policy and community action in wetland management.

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