__Original Research Article__

The pollution plague of Bharalu: a discrete choice experiment

Abstract

In recent years, there has been growing concern about degradation and pollution of environment and climate change as they impact future development of both the developing and developed countries. Economists have increasingly become interested in environmental economics which is concerned with how economic activities of producers and consumers affect the environment in which we live and explain the policies to improve the quality of life of the present and future generation. It is no secret that environmental issues are more important for developing countries where poverty prevails on a large scale and acceleration of economic growth is urgently needed. Besides, declining water quality can impact the economy in various ways. Impacts can be found in the health sector, where labor productivity can be affected, in agriculture, where the quality and quantity of food produced can be reduced, and in tourism, real estate, aquaculture/fisheries and other sectors which rely on environmental quality and ecosystem services. The river Bharalu at Guwahati (Assam) is one such essential water resource that has gradually degraded over the years, taking the form of an urban municipal drain. Once flowing with pristine water and full of biodiversity, the river has seen heavy industrialisation and urbanisation around its source and the length which has resulted in its serious pollution levels. This study tries to analyse the impact of Bharalu's pollution via an economic perspective and makes an analysis through the consumer's viewpoint. The study involves a discrete choice experiment that identifies people's willingness towards the river's ecological restoration and discusses the issues associated with it.

Keywords: Bharalu, pollution, economics, environment, ecology

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1. Introduction

Rivers are known to be the most integral part of Earth's natural landscape. Functioning as conduits for water, sediments and other matter, river systems have been vital in driving a wide array of fundamental and inter-related natural processes **(Harman et al., 2012).** They have also eternally played an integral part in the existence of humanity. From being an endless supply of freshwater for drinking and irrigation to the riparian zones where agriculture can flourish, rivers are an excellent source of nutrition and a major means of transport. Today, riverbanks are being transformed into recreational spaces and tourist attractions, mostly seen in European and East Asian nations **(Miaux & DemersRenaud, 2021)**.

However, the world has also witnessed a long-drawn history of lost rivers. One of India's major metropolitan cities, Guwahati situated in the heart of the Indian state of Assam has its own story centering the Bharalu River. Once a natural lifeline of Guwahati, the Bharalu today exists in a heavily impaired condition in the metropolitan's heart. Today, it carries a hefty portion of the city's household, municipal and industrial waste. Guwahati is situated on the bank of the Brahmaputra River which is Asia's second largest and world's ninth largest river by discharge. It is also the main source of drinking water for the city dwellers. Bharalu's polluted water is referred to as a huge concern as it directly discharges into the mighty river within city limits. This concern was officially validated when in 2011, the Central Pollution Control Board (CPCB) of India published a report naming Bharalu to be "one of the most polluted rivers in the country" **(CPCB, 2011).** A decade since, Bharalu's health has heavily worsened with minuscule restoration efforts in sight. This study makes an effort to investigate the impact of Bharalu's pollution via an economic perspective, performing the analysis through the consumer's viewpoint. It involves a discrete choice experiment that identifies people's willingness towards the river's ecological restoration and deliberates on the varied issues associated with it.

2. Materials and method

2.1 The Bharalu River in Guwahati

The Bharalu is a tributary of the Brahmaputra River situated on its southern bank and lies between 25°59´ to 26°11´ N and 91°43´ to 91°5´ E. It flows through the heart of Guwahati city cutting through densely populated residential, industrial and commercial zones to meet the mighty Brahmaputra at Bharalumukh point **(Figure 1)**. Topographically, the city is bounded by hills and comprises of plains with some bloated hillocks. A non-perennial river, Bharalu originates in the hilly catchment of Meghalaya, and remains in a relatively natural state till it enters the densely inhabited areas of the city. With a stretch of approximately 6.2 km., the total catchment area of the Bharalu is about 120 sq. km which is almost equally divided between the hill region and the plains **(Suresh & Pekkat, 2022)**. Draining an area of 10.94 sq. km., the river's flow velocity is estimated to be 1.07-1.37 m/sec.

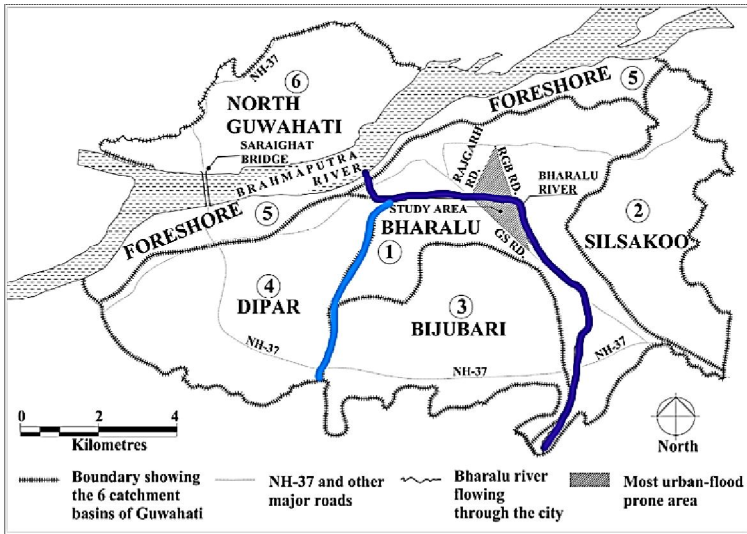

Figure 1: The Bharalu basin (Source: Guwahati Municipal Corporation)

2.2 Methodology for WQI

Before designing the choice experiment, we performed an analysis of Bharalu's water quality (drinking standards) via a water quality index. The results obtained were meant to help identify the degree of pollution as well as estimate the extent of restoration efforts required to bring back the river to a state of good ecological quality. The WQI calculation involves a 3-stage method. The first stage comprises of assigning weights (0-5) to each parameter (physico-chemical) according to their relative importance in overall water quality by drinking standards. Following this, the relative weight (W_i) was calculated using the expression (1) was calculated using the expression (1).

$$W_i = \frac{w_i}{\sum w_i} \qquad (1)$$

where, w_i is the weight assigned to each parameter, and i = 1…. n; n is the total number of parameters.

The second stage comprises of computing a quality rating scale (Q_i) for each parameter as denoted by expression (2).

$$Q_i = C_i / S_i \times 100 \qquad (2)$$

where, C_i is the concentration of a particular parameter in each water sample, S_i is the permissible limit/standard according to an internationally accredited organisation. We have considered the Bureau of Indian Standards (BIS) guidelines for this study. Finally, expression (3) is the third state which denotes the computation of WQI. The resultant WQI values are distinguished into five types, from "excellent" to "unsuitable for drinking".

$$WQI = \sum(W_i Q_i) \qquad (3)$$

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2.3 Experiment design

Determining the importance of restoring Bharalu's water quality and the perception of individuals towards its pollution in the context of their willingness to pay (WTP) requires an extensive field survey. An elaborate survey consisting of 958 households was conducted. These were chosen on the basis that these urban households use the river not only for drinking and sanitation purposes, but also as a drainage outlet. Purposive sampling technique was applied for obtaining samples. Residential households were sampled depending upon the length of the period of their residence beside the river. Men and women were interviewed separately to capture the individual perception of people towards clean water. The interviews were taken via discrete choice experiment (DCE) technique and the responses gathered were used to examine our objective. The information obtained was then also studied subjectively and later analysed using a partially censored model to obtain the overall willingness to pay for restoring the Bharalu river.

3. Results and discussion

3.1 Economics of restoration

Ecological restoration has gained immense ground in modern academic disciplines as a field of research linked to several concepts and models that explain how the environment responds to different interventions aimed at ecosystem restoration. The early development of the concept can be traced to writings of Lewis (1989) wherein he described it as the process of returning an environmental resource from a disturbed or completely altered condition to an earlier natural status through human interventions. However, solely focussing on ecological indicators leaving out other factors, is risky, considering the policy implications of a restoration project affects, not just the environment, but also humanity. Hull and Gobster (2000) stressed that restoration should be subject to inclusion of social and economic circumstances as a key pillar.

Later, Sachs et al. (2009) in their report 'Biodiversity conservation and the Millennium Development Goals' identified the need to include economic value of ecosystem services while measuring overall benefits from ecosystems. Generally termed as economics of restoration, this overlapping area between two disciplines- restoration ecology and economics has now garnered worldwide interest. Literature pertaining to the area recognises that diminishing stocks of natural capital today is the biggest limiting factor to economic growth, and not manmade capital, as was earlier thought (Recuero and Couvet, 2018). This has brought ecologists and economists in an agreement that it is through bridging natural and economic disciplines.

Literature concerned with the Bharalu river are majorly related to evaluating its environmental condition. Earliest known studies include Lal and Bhattacharya (1989) and Sarma et al. (1994). These studies reflected on slow degradation of the river. Intensification of degradation was soon observed by Kar (2001) and Girija et al. (2007). Recent studies conclude the river's extreme

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degradation and insist on its urgent restoration (Borah and Bhagabati, 2015; Devi and Sharma, 2019).

Most of these studies pertain to purely scientific disciplines, with very limited purveyance on larger social and economic aspects. Borpujari and Gogoi (2015) studies the social impacts while Devi and Sharma (2019) reflected on the myriad impacts of urbanisation. Notably, an insight into the economics of Bharalu's restoration has been put forward by Hazarika and Kalita (2019). Besides, several reports of government and independent agencies exist in public domain that address the matter.

3.2 Ecological status of Bharalu

Bharalu's catchment area has seen very rapid urbanisation in recent years and the river has detoured to a large extent due to unabated encroachment and wide scale dumping of garbage. Once a major source of potable water, the Bharalu today carries a large portion of the city's municipal as well as other wastes and serves as the natural drainage for stormwater runoff **(PCBA, 2013**). The wastewater from households, commercial/business establishments, and small to medium industries within the city flows directly into the Bharalu River through the system of mutually interconnected drains. The degradation caused by domestic and commercial wastes poses a serious threat especially for the inhabitants of Guwahati and finally the downstream receptor, the Brahmaputra. As the Brahmaputra is the main source of drinking water for Guwahati and also for the whole valley, the excessive pollution load of Bharalu is a matter of grave concern for the region. Known to be extremely squalid and polluted, Bharalu is regarded as one of the foremost sources of contamination affecting the overall quality of the Brahmaputra water.

Once an ecologically pristine water resource with thriving aquatic diversity, the Bharalu river is an urban drain today. Sector experts point out the present generation of sewage in the city is about 70 million litres daily (mld), which will eventually increase with installation of the new water supply systems in the Guwahati Metropolitan Area. The sewage generation is expected to increase to around 280 mld by 2025. With an estimated population of about 1.7 million, Guwahati, one of the Smart Cities under the Indian government's Smart Cities Mission, neither has sewerage (network of pipelines to carry sewage), nor any municipal sewage treatment plant (STP) to treat the wastewater. Practically, the entire city depends on underground septic tanks to manage its sewage, which is a threat to the groundwater quality. Groundwater contamination is a concern because at present, only 30 per cent of the city population is covered by piped water supply system at a consumption level of around 70 litres per capita per day. Rest of the city population depends on groundwater by means of individual bore well or supply by private operators through tankers.

The deterioration of the Bharalu River starts from the Basistha hill south of National Highway 37. Meanwhile, an important stretch of Bharalu river, the Basistha River, branches out towards

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the Borsola Beel from where it flows further down and meets Deepor Beel located at the outskirts of the Guwahati. Bharalu worsens as it flows through the densely populated residential and commercial areas of Guwahati. It undergoes intense deterioration till it merges with Brahmaputra. Besides, the wastewater discharging from the Indian Oil Corporation Refinery at Noonmati drains directly into the river. Therefore, considering the central role that Bharalu exercises as the riverine lifeline of Guwahati, it is highly necessary that the river is restored to such a natural a state from which ecosystem services can be effectively reaped and distributed.

The Central Pollution Control Board (CPCB), which monitors and identifies polluted river stretches in the country, has identified Bharalu river of Guwahati as one of the most polluted rivers in the country. Based on the water quality testing, the central monitoring agency rates polluted rivers on a scale of one to five with 'Priority 1' category including rivers with biological oxygen demand (BOD) concentration of 30 milligram per litre (mg/l) or above. It must be noted that a BOD of 3 mg/l is desirable. The CPCB has included Bharalu river in 'Priority 1' category of polluted river stretches, as it recorded BOD level of 52 mg/l in the river and the main source of pollution was identified as Guwahati's sewage **(CPCB, 2011).** In total, there are 330 drains in Guwahati city that carry stormwater, often mixed with untreated sewage which empty into the Bharalu river and the Bahini rivulet which flows into it.

Taking cognisance of the 45 critically polluted stretches across the country (as compiled by the CPCB), including Bharalu river of Guwahati, in September 2018, the National Green Tribunal (NGT), ordered preparation of action plans to restore the polluted river stretches to the prescribed standards. The action plan promised a pollution-free Bharalu within a year by March 31, 2021. Surprisingly, no such work has begun till date.

3.3 Design of DCE experiment

The core part of the DCE application is the experimental design, including attribute selection and specification of the attributes' levels, as well as the development of choice sets by combining the attributes' levels into alternatives **(Rose and Bliemer, 2009)**. In this study, defining the attributes in the choice experiment was based on an extensive literature review and early in-depth discussions with environmental officers and experts regarding the management of the Brahmaputra River. Five categories of feasible changes were identified, including water quality, ecological status (represented by species diversity in the river and at the riparian areas), hydro-morphological features, livelihood, and recreational opportunities (the provision of recreational facilities and infrastructure for jogging, picnicking, boating, etc.). The attribute levels were chosen based on policy interest and possible constraints in a densely populated urban area. In addition, the cost attribute was defined as a local water tariff increase per household per annum aimed at funding a municipal program in charge of restoring the Brahmaputra River, the levels of which were based on empirical evidence of Belgian residents' willingness-to-pay for nature restoration (Schaafsma et al. 2014). The inclusion of the cost attribute allows understanding residents' preferences for various attributes and their levels and estimating the maximum amount

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of money that individuals are willing to pay for different alternatives. The attributes and levels are given in Table 1.

The alternative restoration scenarios in the choice tasks were generated according to the D-efficient design criteria applying NGene software package version 1.1.2. which enables the exploration of main effects and possible interactions and ensures that the uncertainty around parameter estimates will be minimized (by minimizing the determinant of the covariance matrix), and more reliable WTP estimates can be produced (Lourenço-Gomes et al. 2013). This process resulted in 36 choice sets, blocked into six sets of choice pairs shown on choice cards. As a result, six versions of the questionnaire, each containing six choice sets, were constructed. Every choice set contained two hypothetical options at different cost levels, and a status-quo option (no restoration scenario) for which no cost would occur. The inclusion of this status-quo alternative holds the promise to present respondents with a trade-off between optimality and plausibility, which implies better congruency with consumer theory and real choices (Dias and Belcher 2015). Although manipulated photographs, which could serve as a surrogate for real landscape experience, have recently been used in choice cards to respondents' judgement error (Bateman et al. 2009), it was difficult to clearly reflect different levels of water quality and biodiversity via photographs. Hence, the standard tabular format with narrative text-pictures visualizing the attributes was utilized to minimize the cognitive burden or task complexity for respondents and facilitate their understanding of choice tasks (de Ayala et al. 2015).

Table 2 an example of a choice set used in the questionnaire. The order of the choice questions presented for each participant was randomly generated. The content of a preliminary questionnaire and the format of the pictorial choice cards were piloted using a focus group composed of environmental managers, academic experts, and ordinary residents to assess its logic, consistency, and comprehensibility. The final version of the questionnaire consisted of four parts. Part I included questions pertaining to respondents' general knowledge of, and attitudes towards, river ecosystem and river pollution, as well as their experience of river-based recreation. This part could assist respondents to gain a better understanding of the benefits brought by restoring the Brahmaputra River, and thus facilitate their interest and establishment of a linkage between urban river, restoration, and WTP, cognitively and behaviorally, even though the inclusion of such questions might increase the possibility of choosing those environmentally oriented alternatives (Pouta 2004). Nevertheless, a similar technique has been successfully applied in previous DCE studies (Andreopoulos et al. 2015), which provide respondents with a 'warm-up'. Part II contained the choice experiment. Prior to the choice tasks, respondents were given instructions to remind them of the budget constraints and tradeoffs amongst alternatives. The exact wording was as follows: "The choices are hypothetical, but your truthful answers would be crucial for making relevant decisions. There are altogether six choice sets for you to make. Please consider your household income and expenditures carefully, each choice alternative independently (irrelevant to previous choice sets), and then specify your preferred alternatives." Following the choice tasks, the individuals who refused to participate in the choice

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exercise were asked to explain their reasons for refusal. This avoided the assumption that these respondents preferred the status quo, when they were actually protestors. In Part III, respondents' socioeconomic information was solicited, including gender, age, place of residence, education level, occupation, household size, and household income, which can provide significant supplementary variables to the econometric analysis of choice data (Andreopoulos et al. 2015). A set of post-survey questions were presented in Part IV to check the internal consistency of respondents' answers to validate the present study. Respondents were also reminded about the opportunity to revise their answers. The final questionnaire is available from the authors upon request.

Protest respondents were defined as those who have chosen the status quo on each of the six choice cards presented in Part II and who gave a reason for this choice to be other than "I cannot afford to pay" and "I do not value river restoration". Following the common practice in the DCE literature, the protestors were excluded from further analysis (Martin-Ortega and Berbel 2010). Additionally, respondents who provided incomplete socioeconomic information were also not included in the econometric analysis.

3.4 Observing WTP for restoration

Of the households surveyed, respondents comprised of 46% males and 54% females (Table 3). To extract the WTP from respondents, the chief question asked was "are you willing to pay x_j for restoring the water quality of Bharalu?" The choice range of prices we offered them was between INR 5 and 100 which also had to be a multiple of 5, i.e. 10, 25, 50, 75, etc. They had to answer with a 'yes' or 'no'. If the chosen price was equal to or higher than the given prices, a 'yes' was recorded. Otherwise, the answer was considered 'no'. We fed the probability of obtaining responses in a Probit model. Specifically, a 'yes' was included as $P(WTP_i \geq x_j)$ and a 'no' was included 1- $P(WTP_i \geq x_j)$. Considering the standard CVM model, the two sets or probability were censored over the interval.

The model was formulated based on Cameron (1991). Considering the disturbance term to be independently and identically distributed, the model used is as follows:

$$WTP_i = Y_i \beta + u_i \quad (1)$$

Besides, we constructed a second model to record responses of people answering 'no' at first. Later they were asked whether they had another price in mind. The log-Lagrange model constructed as is as follows:

$$\log L = \sum\{R_1 \log \emptyset \left(\frac{Y_i\beta - x_j}{\sigma}\right) + R_2 \log \emptyset \left(\frac{x_j - Y_i\beta}{\sigma}\right) + R_3 \log \theta \left(\frac{x_j - Y_i\beta}{\sigma}\right)\} \quad (2)$$

In this model, R_1 denotes affirmative responses to the primary question, R_2 represents the negative responses which were followed with positive, and R_3 represents the negative responses to the primary question. $\emptyset$ and θ denotes the probability density function and cumulative distribution function respectively. Y_i is the row vector of exogenous variables affecting a respondent’s chosen price.

Our findings suggest that people are willing to restore the river which invariably conditions their willingness to pay. If we attach a personal value to WTP besides its existing monetary value, we realised that there exist positive correlations between attitude of dwellers towards restoring the river and their willingness to pay for it. This is because they realise that the river is an important natural resource, and preserving it would mean great benefits for the society as well as the environment. They are concerned about the negative health impacts that may arise from its deterioration. This also means a decline in their personal enjoyment through recreational use of the natural resource.

In addition to the significant factors mentioned earlier, other variables also played a role in determining the willingness to pay (WTP) for water quality restoration. For instance, the education level of respondents was found to be statistically significant, suggesting that individuals with higher education levels tend to value water quality more and are willing to pay a higher amount for its restoration. Furthermore, the findings revealed that the proximity to the Bharalu River (LOC) significantly influenced respondents' WTP. Those living in closer proximity to the river were more likely to recognize the importance of clean water and were willing to pay a higher amount to improve its quality. Another noteworthy factor was the size of the household (CHI). Larger households tended to have a higher WTP, possibly due to increased water consumption and a greater awareness of the impact of water quality on the health and well-being of multiple family members.

The proportion of income spent on water-related expenses (PROP) was also found to be statistically significant. This indicates that households with a higher proportion of income allocated towards water-related costs were more likely to recognize the value of improved water quality and express a higher WTP. Moreover, the belief in the relationship between sewage contamination and river pollution (BSC) strongly influenced respondents' WTP. Those who strongly believed that sewage contamination was a significant contributor to river pollution expressed a higher willingness to pay for water quality restoration. This finding suggests that public awareness and perception of the causes of water pollution can impact individuals' motivation to take action and support initiatives for environmental improvement.

Overall, the mean WTP of INR 24.20, with confidence intervals of 21.1 and 19.40, indicates that the average individual or household is willing to contribute financially to restore the water quality of the Bharalu River. The stated willingness to pay reflects the value placed on achieving a certain level of good ecological quality that meets the respondents' requirements. This information can be useful for policymakers, environmental organizations, and other stakeholders in designing and implementing strategies to restore and preserve the water quality of the Bharalu River.

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4. Conclusion

In conclusion, this study sheds light on the economic implications of water pollution in the Bharalu River and the willingness of consumers to pay for its ecological restoration. The findings reveal that deterioration of water quality significantly impacts individuals, influencing their willingness to pay (WTP) for restoring the river's ecological health. Factors such as the perception index of water quality, the adverse health effects of poor water quality, household demographics, and the belief in sewage contamination as a major contributor to river pollution all play significant roles in determining WTP. Moreover, variables like education level, proximity to the river, household size, and the proportion of income spent on water-related expenses are also found to influence individuals' WTP. These factors reflect the awareness, concerns, and priorities of respondents regarding water quality and its impact on their lives. The mean WTP of INR 24.20 indicates that the average individual or household is willing to financially contribute to restore the water quality of the Bharalu River to meet their ecological requirements. This willingness demonstrates the recognition of the importance of clean water and the need to preserve it for the present and future generations.

The study highlights the significance of policies that address environmental degradation and promote sustainable development. Particularly in developing countries, where poverty is prevalent, environmental issues have far-reaching implications on various sectors, including health, agriculture, tourism, and more. The Bharalu River serves as a prime example of the consequences of industrialization and urbanization on water resources. The findings from this study can be valuable for policymakers, environmental organizations, and other stakeholders involved in restoring and preserving the Bharalu River's water quality. The insights gained regarding consumer perspectives, the factors influencing WTP, and the economic impacts of water pollution can inform the design and implementation of effective strategies to mitigate pollution, protect the environment, and improve the quality of life for communities relying on this essential water resource. Ultimately, addressing the degradation of the Bharalu River can contribute to sustainable development and enhance the well-being of both current and future generations.

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Table 1: Attributes and levels used in the DCE

Attributes	Description in the questionnaire	Levels		
Hydromorphological feature	Re-opening of river channel and convert current artificial banks into more naturalized ones	Fully covered, highly engineered straight channel	Open, still artificial channel	Open, more naturalised channel
Water quality	To improve the water quality by enhancing wastewater treatment	Bad, highly polluted	Average, slightly polluted	Good, meeting the level defined in environmental law (swimmable and suitable for diverse species)
Ecological status	To increase the biodiversity of fish, invertebrates and other aquatic species	Very limited species diversity	Average, 50% increase in species diversity	Good, 75% increase in species diversity
Livelihood opportunities	To receive livelihood benefits from the river via fishing, transportation and allied activities.	No livelihood facilities available	Moderate livelihood activities with marginal income	Decent livelihood opportunities with good income stream
Recreational opportunity	To enhance the biodiversity at riverbanks To establish facilities and encourage both instream water recreational activities such as swimming, boating, land-based activities like picnics and jogging along the river promenade	No recreational facilities available	Recreational areas would be established, necessary facilities and infrastructure provided for jogging, picnicking, boating, etc.	

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Table 2: Example of a choice card in the survey

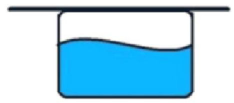
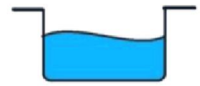
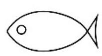
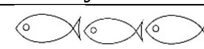
Description	Status quo	Alternative A	Alternative B
Hydromorphological feature	Fully covered, highly-engineered straight channel	Open, still artificial channel	Open, more naturalised channel
			
Water quality	Bad, highly polluted	Average, slightly polluted	Good, meeting the level defined in environmental law (swimmable and suitable for diverse species)
			
Ecological status	Very limited species diversity	Average, 50% increase in species diversity	Good, 75% increase in species diversity
			
Livelihood opportunities	No livelihood facilities available	Moderate livelihood activities with marginal income	Decent livelihood opportunities with good income stream
			 
Recreational opportunity	No recreational facilities available	Recreational areas would be established, necessary facilities and infrastructure provided for jogging, picnicking, boating, etc.	
			

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Table 3: Description and statistics of variables used

Variables	Description	Mean	Standard Deviation
AIV	Initial value	30.10	20.1
AFH	Do you think the water quality has a negative impact on your health?	0.72	0.12
BQ1	Is the river water quality excellent?	0.001	0.14
BQ2	Is the river water quality good?	0.004	0.14
BQ3	Is the river water quality poor?	0.36	0.48
BQ4	Is the river water quality unacceptable?	0.41	0.26
PIN	Perception index of water quality	105.9	32.21
BSC	Do you consider sewage contamination to be a reason for poor water quality?	0.61	0.24
CHA	Do you use river water for drinking?	0.46	0.33
CENV	Does the river water quality affect your environment?	0.31	0.33
GEN	Sex of the respondent	0.61	0.65
CHI	Do you have minor children at home?	0.17	0.36
SEN	Do you have senior members (above 60) at home?	0.22	0.23
LOC	Are you a local resident?	0.21	0.29
PROP	Is this house your own?	0.59	0.21
INC1	Do you earn less than 8 lakhs per annum?	0.64	0.19
INC2	Is the value of your house more than 10 lakhs?	0.41	0.26

Table 4: Results of Econometric analysis

Variables	Partial censor model
AIV	1.25
AFH	5.24**
BSC	4.24**
BQ1	5.09
BQ2	-0.69
BQ3	-1.12
BQ4	1.36
PIN	4.31*
CHA	0.21
CENV	-9.32
GEN	7.84
CHI	6.82*
SEN	8.37
LOC	-0.36*
PROP	-12.31**

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INC1	12.49
INC2	7.48
Constant	41.65*
Insigma	3.21**
Likelihood	-1231.15

Mean Willingness to Pay = 22.6, SD = 0.21, Confidence intervals (95% CI) = 21.7 & 22.4

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