

Study of Conservation and Wise Use of Two Important Indian Wetlands Using Contingent Valuation Technique

Malabika Biswas Roy^{1,2*}, Sujit Pal³, Mihir Pal⁴, Pankaj Kumar Roy², and Abhishek Kumar⁵

¹Department of Geography, Women's College, Calcutta, West Bengal, India

²School of Water Resources Engineering, Jadavpur University, Kolkata, India

³Higher Education Department, Government of West Bengal, India

⁴Ramthakur College, Agartala, Tripura, India

⁵Department of Geography, Banaras Hindu University, Varanasi, India

*Corresponding Author: malabikabiswasroy@gmail.com

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Abstract

Wetland administration, as the connected side of wetland science, requires a comprehension of the logical parts of wetlands adjusted with legitimate, institutional, social and monetary substances. This paper endeavours to evaluate how the group instruction can oversee and save the wetlands and furthermore to gauge the estimation of two wetlands situated at various states utilizing Contingent Valuation Technique (CVT). A model is being developed to describe the relationship between the wage of family and its Willingness to Pay (WTP) with the help of some indicators related to conservation and wise use of two wetlands. A total of 600 samples families have been considered for two wetlands. Seven attributes are being considered as dependent parameters for WTP. The results shows that WTP of rural households were found to be INR 10,000 and INR 18,000 for Gajna and Rudrasagar, whereas almost 47% lesser value was found for Gajna wetland with respect to Rudrasagar of urban households for better conservation and wise use of two important wetlands using CVT. The outcomes delineate WTP is more noteworthy and great relationship got with the assistance of factual system with training other than condition and separation for both the wetlands. At last, this paper finishes up the relapse investigation utilizing measurable programming demonstrates the salary to be the most essential capacity which decides WTP of the partners may enhance the financial upliftment through protection and shrewd utilization of wetlands.

Keywords: Ramsar Wetland; Conservation; Management; Rural Wetland; WTP

1. Introduction

Wetland is imperative wellspring of common assets, whereupon the country economy depends. Normally, from the

perspective of the economy and additionally environment, the essentialness of wetland and partners' interest for protecting the wetland is colossal (Biswas Roy et al., 2012). Wetlands work like goliath wipes, putting

away, at that point gradually discharging groundwater, softened snow, and floodwater. The degree of groundwater revive relies upon the kind of soil and its penetrability, vegetation, dregs collection in the lakebed, surface range to volume proportion and water table inclination (Ramchandra et al., 2002). Partners' cooperation is basic to the assurance and safeguarding of wetlands since it assumes a vital part financially and in addition biologically in the wetland framework (Roy et al., 2010). Government funded training and consciousness of the advantages of biodiversity protection, appropriation of wetland easy to understand options and pay creating undertakings offer a special chance to reasonably manage and ration wetland in the midst of expanding populaces, destitution and restricted assets (Macharia et al., 2010). The unexpected CVT has been the most generally utilized approach in esteeming non-advertise merchandise (Bateman and Willis, 1999). Likewise, Binikumar and Ramanathan (2008) assessed ranchers' WTP for changing amounts and characteristics of reused wastewater utilizing CVT. They have endeavoured to discover the determinants of the WTP of the agriculturists with an Ordinary Least Square (OLS) relapse investigation of WTP with the financial factors. Further, a couple of the vital investigations have been directed in Indian setting prescribed by Verma (2001). The general goal of the paper is to set up instruction as a device for the preservation

and savvy utilization of wetlands through people groups investment of test populace of the examination range and to develop the methodology for the most ideal and feasible utilization of these two wetlands underlining the monetary upliftment of the local through some conceivable administration think about while keeping its biological community less viable.

2. Materials and Methods

2.1 Study area

In this present investigation, the two wetlands are considered to be specific Gajna wetland situated in West Bengal region and Rudrasagar wetland in Tripura region as reflected in Fig.1. Gajna wetland is arranged in a provincial range and it is critical for country individuals for their work. Rudrasagar wetland is canvassed in peri-urban wetland perceived as Ramsar site and it is vital for eco-tourism. Since these two wetlands rely upon various markers.

2.1.1 Gajna Wetland in West Bengal

Gajna wetland is arranged under the mouza, Gajna (eighteenth Mouza), Pipulbaria (nineteenth Mouza), Hanskhali Block of Nadia District, West Bengal. It is an oxbow lake covering 53 ha, which gets its cause from the stream Churni. The length of the lake is 1 km, profundity of the beel is 2.5-3.5 m, and the expansiveness of the wetland is 100 m.

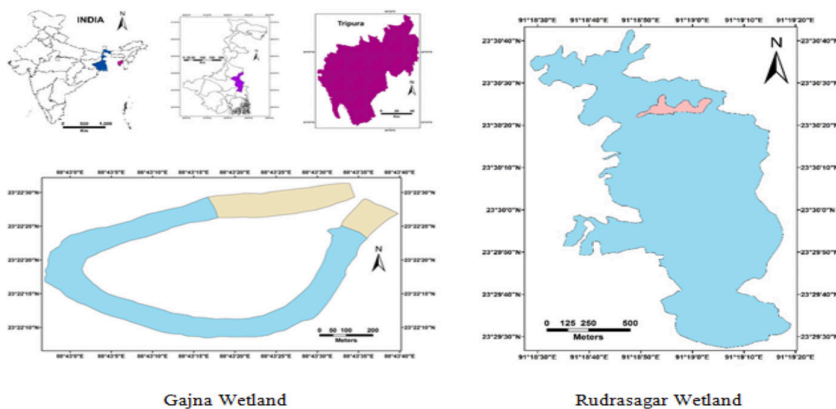


Figure 1. Location Map

2.1.2 Rudrasagar Wetland in Tripura

The Rudrasagar wetland is situated in the Melaghar Block of Sonamura Sub-Division of West Tripura District. Rudrasagar wetland is situated in the upper catchment range of the stream Gomati. Geologically the Rudrasagar wetland (23°29' N and 90°01' E) is situated in the Melaghar hinder under Sonamura Sub-Division and is around 50 km from the state capital of Tripura. Normal water bowl range of the lake has been distinguished 1.5 sq km while perceptions were performed (Pal *et al.*, 2014).

2.2 Methodology

Two wetlands are chosen for its ecological and prudent significance in the economy of two states. A sum of 600 families of which 100 for Gajna and 500 families for Rudrasagar have been met in light of poll design for the financial review for both the wetland in three seasons in the time of 2015-2016. Amid post-storm season close around 600 families have been considered for study by talk with strategy took after by 500 family units in pre-rainstorm and 400 families amid storm season. At last, a model is set up for WTP in light of logical factors utilizing Number Cruncher Statistical System (NCSS) measurable programming to evaluate how the pointers, for example, sexual orientation, training, natural danger, arrive utilize and so forth may impact the neighbourhood group. NCSS is an advanced, easy-to-use statistical analysis software package. NCSS is a powerful tool used for data accuracy measurement with the help of T-Tests, Analysis of Variance and also it could be used for developing the mixed models in two different geographical conditions. Here, NCSS was used as because the two considered wetlands are located in two different regions and both wetlands have high amount of natural resources. So, a linear relationship was established using NCSS with different indicators to conserve and wise-use of wetlands in the long run.

3 Results and discussions

3.1 Socio-economic profiles of two wetlands

As respects the family estimate, the normal family measure was observed to be 5

and it changes in the vicinity of 2 and 10 with a standard deviation of 1.2-1.5. It is noticeable that greater parts of families are having a family estimate in the vicinity of 3 and 6 for both the wetlands. On account of education, its levels among leaders of the family unit are observed to be 95-98% for both the wetlands. The investigation has considered the education level of the leader of the family just as the choice with respect to WTP for the enhanced preservation is generally taken by him/her. The comparing information uncovers that 43% and 28% of the families are going by a man who has an optional training for Gajna and also Rudrasagar wetland separately. 23% of them are graduates and 6% are post graduates though 8% of them are graduates and 2% are post-graduates for Gajna and Rudrasagar wetland individually.

To the extent the word related example is concerned, a fascinating point is watched. To expand, the single larger part portion among occupation is agriculturists gone from 16-26%. It is a current marvel not in West Bengal but rather additionally in Tripura especially in a rustic territory that the quantity of matured is expanding and the principle wage wellspring of numerous family units is the rancher. 16% of family units are having private representative though 8% of families are fallen in a similar class for Rudrasagar wetland and 10-14% are having their very own business. Being the provincial populace there was less retired person. 14% of the families are relying upon difficult work while in Rudrasagar wetland just 5% of the families are relying upon a similar expert. The level of yearly wage among the specimen family units differs between INR 12,000 and INR 3, 50,000 for both the cases. The normal pay of the family unit is run between INR 61,800 and INR 72,400 with standard deviations of 4195 and 6245 separately. The yearly wage of 19-24% of the families goes between INR 40,000 and 60,000. The normal 10-12% of the family units is having a wage of beneath INR 20,000. Just 6% of the families are having yearly salary of INR 1,00,000 and 1,20,000 though in Rudrasagar wetland around 25% of the family units are acquiring more than the yearly pay of INR 2,00,000 and INR 3,00,000.

3.2 Stakeholders Perception of Gajna and Rudrasagar Wetland

The interests of the families test family units on the preservation of the wetlands are introduced. The example family units' mindfulness about the wetland is surveyed by soliciting them to recognize the element from the wetland that they consider being generally essential. The reactions demonstrated that 32% family units considered for farming took after by pisciculture for Gajna wetland though 24% families considered for agribusiness took after by pisciculture for Rudrasagar wetland. 2% of the specimen trusts that the grand excellence is more vital element while around 10-12% offered significance to water protection highlight of the wetlands for both the cases. Once the significance of wetland is seen, at that point it is basic to see whether the partners utilize the enthusiasm to demonstrate the enhanced protection of the wetland. 72-76% of the family units indicate high enthusiasm for the enhanced preservation of the wetlands in the two cases.

A less measure of 2-4% holds no enthusiasm for the enhanced protection of the wetlands. Out of aggregate 36 graduates, 86.67% and 85.71% indicated high enthusiasm for the enhanced protection for both Gajna and also Rudrasagar wetlands. Half of the Post graduate individuals additionally communicated high intrigue though 100% found the same in the protection of the wetland for Gajna and Rudrasagar wetland separately. When all is said in done, it is watched that the partners having training over the essential level have indicated enthusiasm for preservation of wetlands. In the meantime, WTP is required to have an immediate and positive association with the level of pay of the partners. Consequently, it is essential to analyze the relationship between the partners' advantage and their yearly salary. Among the family units whose yearly pay is inside INR 1,00,000-1,20,000 or more INR 1,20,000, right around 100% shows high intrigue while if there should be an occurrence of Rudrasagar wetland similar outcomes are watched yet the wage level is by one means or another higher contrasted with Gajna wetland.

3.3 The Willingness to Pay: Composition and Distribution

The WTP is the measure of cash that a purchaser will make with a specific end goal to devour a specific unit of a product. It is watched that the majority of the families are occupied with the enhanced protection of the wetland (88% of the specimen families express their WTP for the enhanced preservation of Gajna wetland). Be that as it may, on account of Rudrasagar wetland, 95% of the example family units express their WTP. WTP regarding INR fluctuates in the vicinity of 0 and 100 with a mean estimation of 23.34 and 37.89 and a standard deviation of 12.79 and 27.56. An extensive extent of family units i.e. 36% fall under the classification where the greatest WTP changes between INR 20 and 30 however on account of Rudrasagar wetland 45% fall under the class of INR 200-300. It can be seen that exclusive 5-6% family units are not willing to pay as per the specimen information.

3.4 Model Development for WTP

A model is created with help of factual programming utilizing some logical factors to evaluate the positive relationship between the wage of the family units and its WTP. The seven financial parameters have been picked as factors to think about the social impact on eagerness to pay by the people of the nearby group. These factors incorporate the time of people, training level, family size and landholding size of families, wage of people and separation from the two wetlands for the 100 families of Gajna wetland, introduce in the country region and 500 families of Rudrasagar Wetland in Tripura which is a well known visitor spot. The insight about every parameter is given in Table 1 beneath. The connection between the financial factors and dispositions and discernments towards protection and WTP is inspected with an OLS relapse display. The accompanying model is defined for the relapse The WTP is communicated as the capacity of the financial qualities of the examination family units and separation from wetland and communicated as $WTP = f (AGE, EDU, FAM, INC, LND, ENV, DIS)$

The linear additive form of the same is

$$WTP = a + b_1AGE + b_2EDU + b_3FAM + b_4INC + b_5DIS + b_6LND + b_7ENV$$

Where a and $b_1, b_2, b_3, b_4, b_5, b_6$ and b_7 are constants

The descriptive statistics of the variables used in the regression is given in Table 2. The standard deviation of LND and WTP is very high indicating variation in the distribution of variables across households.

The estimated results (Table 3) shows that the variables EDU, DIS, LND, and ENV are relatively more important determinants, with expected signs, of the WTP of the households, according to the significance level and the value of standardized coefficients. It is noteworthy that, although the coefficient values of AGE, INC, and FAM have the expected signs, they are not significant. DIS and LND are not significant variables with respect to WTP in case of Rudrasagar wetland. It can be further seen that EDU value is comparable in the case of both Gajna and Rudrasagar wetlands as well as the most important variable which determines the WTP of the household. The EDU value 5.0

for Gajna and 5.54 for Rudrasagar signifies that the educated people are more in Rudrasagar compared to Gajna which is a rural area. The size of Family Member (FAM) also demonstrates negative influence according to the result for Gajna wetland. The high mean value for ENV variable in both the wetlands indicates that dependent variables are not closely related with the ENV. Table 3 depicts that the correlation coefficients were found as 0.995 and 0.686 for Rudrasagar & Gajna wetland respectively. It is observed that the value of R^2 of Gajna is found to be lower which may due to several reasons such as

I. In case of Gajna wetland, the sample size was considered 100 whereas 500 number of sample size was considered for Rudrasagar even though the areas are found to be third less than that of Rudrasagar wetland

II. A good correlation can always be found based on a good number of sample population.

This finding may be attributed to the fear of potential restrictions on the farming activities following the improved conservation program of the wetlands.

Table 1. Explanatory variables in the model for two wetlands

Sl. No.	Variable	Definition	Exp. Sign
1	AGE	The age of the decision maker of the household	+ve
2	EDU	Education level of the decision maker	+ve
3	FAM	Family size of the household	+ve
4	INC	Logarithm of annual income of the household	+ve
5	DIS	Distance of the households from Gajna /Rudrasagar Wetland	-ve
6	ENV	Whether the respondent is a part of any Environmental organization (1-Yes, 0-No)	+ve
7	LND	Total landholding size of the household	+ve

4. Conclusion

In the International context as well as in the context of scientific information generated on conservation and wise-use of wetland through environmental awareness in India particularly in rural West Bengal and in peri-urban Tripura, CVM is the most appropriate technique for optimization. A good relationship is obtained between educations with WTP for both the

wetland using linear regression analysis with the help of statistical software.

It may also be concluded that the regression analysis showed that income to be the most important element which determines the WTP with the usually expected positive relationship. The education and distance from the each wetland are also found to be an important factor as the determinant of WTP and is negatively

related to Rudrasagar wetland. The educated people are more interested to pay in rural areas whereas the Rudrasagar being a popular tourist spot education does not play an important factor in determining WTP. The estimated WTP of the stakeholders indicates the urban households' concern for the improved conservation and management of the wetlands. The findings can motivate policy makers to adopt a better and holistic approach for improved conservation and management of the wetlands.

Participatory Appraisal Technique (PAT), however needs to provide the enabling environment for conservation with optimum uses to be achieved holistically in rural West Bengal. If these two wetlands are managed properly, not only will their status change, rural

West Bengal as well as Tripura economy will become stronger.

Hydrological interventions are expected to help considerably for both the wetland for the enhancement of fishery resources, water quality, checking the weed infestation, maintaining proper dissolved oxygen levels, auto recruitment of fish, prawn and crab juveniles

Top-down approaches to resource conservation and sustainability, community-based co-management recognizes that local communities might be replicated to have direct control over the management, utilization and optimum benefits of local resources in order to value and wise-use of both wetland in a sustainable manner.

Table 2. Descriptive statistics for Gajna and Rudrasagar wetland

Sl. No.	Variable	Mean		Standard Deviation	
		Gajna	Rudrasagar	Gajna	Rudrasagar
1	WTP	23.34	181.677	12.79	71.201
2	AGE	40.00	42.22	7.48	7.124
3	EDU	5.00	5.54	2.12	1.876
4	FAM	4.12	4.54	1.57	1.515
5	INC	4.57	7.68	0.42	0.891
6	DIS	8.40	5.524	4.18	2.348
7	ENV	1.50	1.84	0.97	0.710
8	LND	4.79	4.3	1.84	1.418

Table 3. Linear regression results

Variable	Coefficients		Standard Error		Standardized coefficients	
	Gajna	Rudrasagar	Gajna	Rudrasagar	Gajna	Rudrasagar
Constant	-97.051 ^{***}	-554.136 ^{***}	16.199	9.762	-5.991	-56.764
AGE	0.052	0.923 ^{***}	0.162	0.154	0.321	6.009
EDU	0.794	4.266 ^{***}	0.541	0.519	-0.482	8.226
FAM	-0.366	9.809 ^{***}	0.760	0.806	0.573	12.173
INC	24.487 [']	85.340 ^{***}	2.884	1.059	1.468	80.56
DIS	0.178	-6.771 ^{***}	0.310	0.417	8.489	-16.252
ENV	1.565	6.184 ^{***}	1.159	1.224	1.35	5.052
LND	0.005 ["]	-0.169 ["]	0.635	0.553	0.007	-0.306
	for Gajna			for Rudrasagar		
R ²	0.686			0.995		
Adj R ²	0.633			0.995		
F	13.096			1,303.7727		
Df	7.42			7,42		
Sample Size	100			500		

Note: ^{***}=>1%, ["]=>5%, [']=>10%

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