

Economic Valuation of Water in the High Basin of the Lerma River, México

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Keywords: value of water, urban use, Lerma river, population.

1. INTRODUCTION

The accomplishment of the present investigation obeys to the problematic that exists on the use of the natural resources, among them the water. The work in the field was carried out in 2015, and it has a practical nature of investigating how much the population is willing to pay for water consumption. More specifically, the contribution to the solution of a broad spectrum problem in the study area, where the lack of estimation of the economic value of the water of the Lerma River basin is evident (a resource that has dramatically decreased its existence during the recent years), it is worth noting that water, in its character as an essential good for the development of human life, has a value per se in monetary terms. Estimates of this work can contribute to improving water use. Although it should be noted that such unpopular measures must be implemented with the caution that the situation requires. In addition to the above, awareness of water care as a scarce resource must be increased. In this context, the objectives of the research are: a) to determine the economic value of water from the Lerma River basin for urban use in the municipality of Almoloya del Río, State of Mexico. The municipality is located at one end of the Upper Basin of the Lerma River, 26 km. from the capital of the State of Mexico.

2. METHODOLOGY

The contingent valuation method was used. Used in several aspects. In our study, the purpose of the procedure is to estimate the maximum amount of money that a person would be willing to pay to consume a certain amount of a good. The municipal area of Almoloya del Río and its surroundings was defined as the study area, due to the fact that this research focuses on the urban use of water.



The format of the questions of the survey used was under options, however, the question corresponding to the willingness to pay, DAP, was handled openly and in some other questions about the perception of the municipal problem, the option was given to Provide an opinion of your own The final survey consists of 22 questions. The sample size was defined based on results obtained in a pilot sample, in addition to the application of the following formula:

$$n = \frac{N * \frac{Z_{\alpha}^2}{2} * \sigma^2}{(N - 1) * d^2 + \frac{Z_{\alpha}^2}{2} * \sigma^2}$$

Where: N = Size of the population 2,419 y, the sample size was: n = 182. The total number of inhabitants was divided, 10 886, between the average number of members per family, 4.5, giving a result of 2419, once the total number of families was estimated, we proceeded to calculate the size of the sample to be interviewed, which It was 182.

The information obtained through the surveys was gathered in a database in which they were validated and later analyzed in the statistical package Statistical Analysis System (SAS), through the GENMOD procedure (Generalized Model). After applying the procedure, we obtained those variables whose coefficients under a level of significance of 5% were significant, these variables are retaken as part of the final model, which is a multinomial logit.

For the calculation of the DAP of the municipality, a column of intervals was established, where they refer to income ranges of the population of Almoloya del Río, determining 4 income ranges: \$ 1 to \$ 2000, \$ 2001 to \$ 4000, \$ 4001 to \$ 6000 and more of \$ 6,000 pesos.

In order to determine the values corresponding to the value column of the interval, four ranges were established, representing the average values of willingness to pay, so that the first value corresponds to the people who said they were not willing to pay, the second value (250) corresponds to the people who manifested a willingness to pay ranging from \$ 1 to \$ 500, the third value (750) corresponds to people willing to pay ranging from \$ 501 to \$ 1,000 and finally, the value of 1250 it corresponds to the people who said they were willing to pay more than \$ 1,000. Finally, the number of families in each interval was multiplied by their corresponding value in the intermediate value column to obtain a DAP per category, which were added to give the municipality's DAP.



3. RESULTS

The interviews indicate that an important part of the population mentioned as problems: insecurity (21.98%), thirdly, problems related to water appeared (18.13%) and that all options presented are important (35.71%). Regarding the issue of water, people were asked what was the most important problem, the majority said none (37.91%). While in equal proportions (18.13%), people pointed to water shortages and regular shortages as the most important problems, and a similar percentage (17.58%) stated that poor quality as the most recurrent in Almoloya's water from the river.

Regarding what the population thinks about water quality, the option on a regular water quality was the one that received the highest mentions with a 51.64%, while the proportion of respondents who believe that water quality is good represents a 32.96%, only 15.38% of respondents describe water quality as bad 82.41% of respondents said that improvements should be made to the municipality's water supply system; and have full knowledge of the serious situation of the Lerma River basin (82%). Almost all the respondents (around 94%) expressed their knowledge about the diversion of water from the local basin to supply (partially) the water needs of the inhabitants of the Federal District and its conurbation.

The income of the respondents is low, \$ 2,000 Mexican pesos per month, is the amount that was mentioned on more occasions. Of the respondents who indicated willingness to pay (68.13%), the majority mentioned that they would pay \$ 200 per year.

In the statistical analysis. Education and Income were obtained as significant variables. The estimator of the variable Education is negative, for the contrary, when increasing the level of income of the population, the probability of its availability to pay will have the same behavior.

In addition it is observed that 1 361 families in the contrary, when increasing the level of income of the population. The availability to pay of all the inhabitants of Almoloya del Rio is \$ 1 142538.72 per year.

4. DISCUSSION

There is a population that does not make adequate use of the water resource, when it is supplied free of charge, so allocating a fee for the resource would help to make use of water more carefully in a region where the bodies of water present from now on. long ago, significant levels of pollution and scarcity.



The estimated DAP is a low amount, due to the income and little importance given to environmental problems, which is why it is difficult to implement an effective policy. The most advisable thing is to attend to the education factor, since as it was shown, education influences the low propensity to pay and, on the other hand, improving the income of the inhabitants is a more complex issue. Thus, awareness campaigns about the importance of taking care of water are important. Aspect that also happens in the middle basin of the Lerma River, where users are reluctant to improve the use of water in the irrigation of crops.

In addition to the above, it is a priority to assign a charge to water consumption, since, in a scenario of shortage and drying of the Lerma Basin, it is absolutely irrational to supply the resource free of charge, such action must be carried out with the greatest possible prudence, since these measures are highly unpopular and could lead to serious social conflicts. An additional strategy could be the combination of resources to implement a real action, that is, a combination of resources from both the authorities of the Federal District and the metropolitan area, the municipal authorities of Almoloya del Río and the contribution of the inhabitants of Almoloya del Río, River.

5. CONCLUSIONS

The population of Almoloya del Rio is fully aware of the problems of water scarcity, however, not all the population considers this as a priority problem. The population was characterized by having a low level in education and income. In the municipality, the water supply has not been charged for years, which fosters an attitude of little respect for the use of water resources. The willingness to pay for all inhabitants of Almoloya del Rio is \$ 1 142538.72 per year. This amount was influenced primarily by two variables, the first of which is education, with a negative impact, as well as the income variable, which has a positive impact on the model.

In contrast, the people who did not agree to pay, it is because they consider it must do the inhabitants of the Federal District, who receive the water service extracted from the Lerma River and, in some cases it was stated that they should be compensated for the service that lend to the inhabitants of this entity. It is also necessary to create greater awareness in the population regarding the care of the water as well as to manage a charge for the water supply.

