**Bulletin of Environment, Pharmacology and Life Sciences**
Bull. Env.Pharmacol. Life Sci., Vol 4 [6] May 2015: 14-21

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD
Global Impact Factor 0.533
Universal Impact Factor 0.9804

**ORIGINAL ARTICLE**

# Management of Water Resources through the estimated economic value of Water in Agriculture city of Ilam

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**ABSTRACT**
*Water resources, due to rising demand and different uses of the highly pressurized. Water use, by a group of users to take advantage of the impact. Hence, the optimal allocation of water resources management has become increasingly important. Undoubtedly, one of the most important tools for optimal allocation of water resources, the economic value of water in the Leaders long-term development of the country, it has been emphasized. Also, decision-making and allocation based on the amount of economic value, significant effects on micro and macro aspects of the economy remains. The present study aimed to estimate the economic value of water resources management in the agricultural sector has been Ilam city. In this study, the objective function and the method of data collection, survey. The research includes 100 of Ilam city were wheat farmers. Sample selection and census methods were used. Data collection tool, the face validity of the questionnaire was confirmed by experts and professors of agricultural management. To determine the reliability, Cronbach's alpha coefficient was used to estimate the value 0.91. For data analysis, SPSS software was used. In this context, in order to estimate the economic value of water, form fitting function was different. Using econometric criteria for producing wheat, Cobb-Douglas functional form is known as the best. According to the results of the estimation of production functions, the final value per cubic meter of water based on the Cobb-Douglas production; rial was equal to 485.1.*
***Keywords:*** *economic value of water, water resources management, production function, agriculture.*

Received 12.11.2014 Revised 01.02.2015 Accepted 12.04.2015

## INTRODUCTION

Water, one of the few resources that are used in countless and used for different purposes. People to water as a public good and the government, as the people responsible for the uptake and distribution of water and other consumers looking. However, this argument mainly on the scarcity of water on our planet is involved. In fact, the price is much lower than water and agricultural water prices that can be obtained from households or industries. Thus, only a fraction of the price or value of the economic value of water used to show [1].

Water, the most important and the most restrictive set of known agricultural production. Despite investments worthy of consideration in the water sector has been done in recent years, due to reasons like the high cost of producing one cubic meter of water resources in the country, uncontrolled harvesting of some resources, lack of nutrition suitable for surface and underground aquifers, does not conform to the principles relating to the maintenance and conservation of resources, the development of industry and urban development, and the emergence of the phenomenon of drought in recent years, and some of the sources of pollution, as can be observed. As a result, the water supply in some areas, it is able to meet growing demand. So that the water has become a commodity market for various uses [2].

New crisis has arisen in relation to natural resources and their sustainability, for countries (both developed and developing) countries is cause for concern and a more serious approach to the problem of natural resources is created [3].The need to develop in order to achieve the necessary self-efficacy and optimal utilization of water due to the limited water resources in the country, denying inexplicable facts that should be considered more of them [4]. We can say that water is the most important agricultural inputs, since a party of about 37 million hectares of fertile lands in the country due to limited water resources are only 8.7 million hectares are irrigated and cultivated the other side of 88.5 billion in meters

cube extraction of groundwater and surface water resources, which is approximately 82.5 billion cubic meters, about 93% of it is devoted to agriculture [5].
Water, as one of the most valuable natural resources, including the national capital in each country, where a special place in the development of sustainable agriculture. Scarce water resources of the country, regardless of variations between years, nearly constant with increasing population and development in various aspects, the water needs to be faced with many restrictions. So, with time and its allocation among the new requirements, the feature extraction and limited water resources and subsequently reduced its quality [6]. If the price is set properly, it is expected that many of the issues resolved in the management of water resources [6], the optimal allocation of water between different products and to take reasonable and appropriate use efficiency and productivity, which ultimately causes, will help. Unrealistic and uneconomical to continue with the price of water will intensify the use of indiscriminate casualties. In other words, the real price of water resulted in the removal of underground aquifers and surface shall be authorized capacity [7]. In fact, we can say that the real price of water, a tool that feeling of long term water shortages will become. If the price is set properly, it is expected that many of the issues resolved in water resources management [8]. Keramat Zadeh et al [9] in a study of "the economic value of water using the optimal combination of agriculture and horticulture crops Barzou Shirvan dam" to determine the economic value of agricultural water, the use of linear programming techniques. In this regard, after determining the optimal cropping pattern, shadow price of water, which is equal to the value of the final product, as the economic value of water was considered.
Johnson et al [10] using linear programming techniques, in three models for small farms, medium and large parts of La Pakistan, to estimate the ultimate value of short-term climate scenarios predict the impact of water supply on cropping pattern, harvest intensity product and net income of farmers, showed that the shadow price of water by time (monthly) changes. Also, the survey results showed that about the value of water, respectively, for small farms between 1.31 to 0.45 Rupees, average farms up 0.86 to 1.64 Rupees, and large farms are 1.84 to 0.95 Rupees.
Tssure and Dinar [11] using linear programming in Morocco and PMP in China, Mexico, South Africa and Turkey, the water in China's yuan per cubic meter equal to 0.035, 0.07 currency of South Africa in cubic meters, 0.46 to 3 dirhams per cubic meter in Morocco and Turkey Lear 12 to 16 million ha have been to Turkey.
Ilam Province, shortage of water resources is evident. This suggests relatively high water losses in the agricultural sector, which is the indicator function of improper management of water demand in the consumer sector. The overall aim of this study was to estimate the economic value of water, agriculture, water resource management through the city of Ilam.

## MATERIALS AND METHODS

The study of the nature of the research is quantitative and qualitative. The objective, practical, for the purpose of research is to find principles that can be applied in practical situations, and will help to improve procedures. To estimate the economic value of water in the dominant products, the most common functions of agricultural production in classical methods, such as the Cobb-Douglas and translog transcendental were calculated using econometric and classical assumptions, the form of the production function is selected.
The population of the study consisted of all irrigated wheat farmers that the number 100 is the city of Ilam. To select the sample in this study, a census method used. In this study, data were collected using a questionnaire is. The questionnaire consists of four parts: a) personal characteristics and professional farmers, b) the cost of wheat production, c) to determine the source and amount of water pricing and water and d) crop patterns, and how to divide the amount of water. After completing the questionnaire, the statistical test used to analyze the data.
In this study, to measure the reliability of the questionnaire, the Cronbach's alpha using SPSS software is used. 30 questionnaires at the beginning of the work to be done before the test, questionnaire, and Cronbach’s alpha value (0.91) were calculated as the amount of research is acceptable.
Depending on the study, from both descriptive statistics and regression. First, descriptive statistics to categorize groups of subjects with different traits and characteristics of the population frequency distribution tables, percentages, cumulative percentages, measures of central tendency (mean, median, and front) and dispersion (standard deviation) was used. To calculate the economic value of water production function will be used. Above will be performed using the SPSS software.
Compatibility with the theory of (agreed to sign with the theoretical model coefficients and elasticity’s) and (4) the power of generalization and prediction (compare predictions with reality and experiences) is. Will take place. Therefore, an experimental model for irrigated wheat crop in the area is as follows.
Cobb-Douglas production function of wheat in blue are defined as follows:

$Ln\ y = α_o + β_s\ Ln\ sed + β_p\ Ln\ per + β_w\ Ln\ wat + β_L\ Ln\ L + β_f\ Ln\ fer + β_n\ Ln\ N$

Symbol Ln is the natural logarithm. Stretch Cobb-Douglas production function coefficients are equal.

Transcendental production function of wheat in blue are defined as follows:

$Ln\ y = α_o + β_s\ Ln\ sed + β_p\ Ln\ per + β_w\ Ln\ wat + β_L Ln\ L + β_f\ Ln\ fer + β_n Ln\ N + β_s X_s + β_p Xp + β_w\ X_w + β_L X_L + β_f X_f + β_n X_n$

Translog production function of wheat in blue are defined as follows:

$Ln\ y = α_o + β_s\ Ln\ sed + β_p\ Ln\ per + β_w\ Ln\ wat + β_L\ Ln\ Lab + β_f\ Ln\ fer + β_n\ Ln\ N + 1/2\ βs\ (Ln\ sed)^2 + 1/2β_p\ (Ln\ β)^2 + 1/2β_w\ (Ln\ wat)^2 + ½\ β_L\ (Ln\ Lab)^2 + {}^1/2β_F(Ln\ fer) + 1/2β_n(Ln\ N) + β_{SP}\ Ln\ sed\ Ln\ per + β_{SW}\ Ln\ sed\ Ln\ wat + β_{SL}\ Ln\ sed\ Ln\ Lab + β_{SF}\ Ln\ sed\ Ln\ fer + β_{Sn}\ Ln\ fer\ Ln\ N + β_{PW}\ Ln\ per\ Ln\ wat + β_{PL}\ Ln\ per\ Ln\ Lab + β_{PF}\ Ln\ per\ Ln\ fer + β_{PN}\ Ln\ per\ Ln\ N + β_{WL}\ Ln\ W\ Ln\ Lab + β_{WF}\ Ln\ W\ Ln\ F + β_{WN}\ Ln\ W\ Ln\ N + β_{LF}\ Ln\ Lab\ Ln\ Fer + β_{LN}\ Ln\ Lab\ Ln\ N + β_{FN}\ Ln\ fer\ Ln\ N.$

The main variables used in the estimation of production functions are:

Y: The amount of production in kilograms per hectare;

Xsed: consumption per kilogram of seed;

Xper: the use of pesticide per kilogram;

Xwat: water consumption per cubic meter;

XLab: the number of workers per person / day;

Xfer: fertilizer consumption per kg and

XN: irrigation frequency.

In this research, analyzed data collected from farmers in irrigated wheat Ilam city has to offer. The results of multiple regression and descriptive findings. In the analysis, multiple regression (simultaneous), wheat production function analysis to estimate the economic value of water, stretching and shadow price (the value of the final product) for agricultural water provided.

## RESULTS AND DISCUSSION

### Regression

Production function coefficients and calculating the economic value of water

In this section, the coefficients of Cobb Douglas and translog transcendental for wheat production in the study area is estimated in table (2), (3) and (4) have been reported. The most appropriate form of the production function are selected on the basis of the economic value of water in wheat production is calculated.

As shown in Table 3 can be seen, Cobb-Douglas function with a coefficient of determination is 684/0, showed that the variables of seeds, pesticides, chemicals, water, labor, fertilizer and irrigation have been able to count 68% of the explained variance of crop production, as well as the Cobb-Douglas function with a coefficient of determination adjusted rate is 0.606, the independent variables could explain the variability of 60.6. The Cobb-Douglas function is 1.858 Watson camera shows the autocorrelation function is not available; the F statistic is significant at one percent of the overall regression.

As Table 4 shows, the transcendental function coefficient is determined by the rate of 0.759, ie variables, seeds, pesticides, chemicals, water, labor, fertilizer and irrigation have been able to count 75% of the variance wheat production is explained, as well as the coefficient of determination adjusted for the transcendental function is equal to 0.646 shows that the independent variables have 64.6 the percentage of variability explained. Value is equal to 1.775 Watson camera which shows that it is a phenomenon of the autocorrelation function does not exist. A significant F statistics also show an overall regression in the level of one percent.

As Table 4 shows, the coefficient of determination in the translog function is equal to 0.870. In other words, variables, seeds, pesticides, chemicals, water; labor, fertilizer and irrigation frequency of 87% of the variance could be explained crop production. The coefficient of determination adjusted for the translog function is equal to 0.740 shows that the independent variables could explain 74% of the variability. Value is equal to 2.044 Watson camera which shows that it is a phenomenon in the autocorrelation function does not exist. A significant F statistics also show an overall regression in the level of one percent.

Table 2: Estimation of Cobb-Douglas production function Wheat city of Ilam

| Significant level | T-statistics | estimated coefficient | Symbol | Variable name |
|---|---|---|---|---|
| 0.758 | 0.310 | 0.742 | $b_0$ | Constant |
| 0.041 | 2.106 ** | 1.013 | $B_s$ | Logarithm consumption of seed |
| 0.001 | 3.587* | 0.954 | $B_p$ | Logarithm consumption of chemical pesticides |

| | | | | |
|---|---|---|---|---|
| 0.020 | 2.289 ** | 0.462 | $B_w$ | Logarithm consumption of water |
| 0.004 | 3.086 ** | 0.0466 | $B_n$ | Logarithm of the number of workers |
| 0.017 | 2.399 * | 0.899 | $B_f$ | Logarithm consumption of chemical pesticides |
| 0.069 | -1.946 | -0.0277 | $B_n$ | Logarithm of the number of irrigation |
| $R^2$= 0.684 | 0.606= $^2\bar{R}$ | D.W=1.858 | F=7.435 * | |

Source: research findings, symbols * and ** indicate significance at the level of one percent and five percent.

Table 3: Estimated wheat transcendental production function Ilam city

| Significant level | T-statistics | estimated coefficient | Symbol | Variable name |
|---|---|---|---|---|
| 0.710 | 0.376 | 29.692 | $b_0$ | Constant |
| 0.586 | 0.550 | 1.059 | $B_s$ | Logarithm consumption of seed |
| 0.713 | 0.371 | 0.174 | $B_p$ | Logarithm consumption of chemical pesticides |
| 0.004 | 2.383 ** | 1.514 | $B_w$ | Logarithm consumption of water |
| 0.001 | 3.604* | 2.743 | $B_L$ | Logarithm of the number of workers |
| 0.001 | 3.508* | 1.908 | $B_f$ | Logarithm of chemical |
| 0.087 | 1.768 | 1.953 | $B_n$ | Logarithm of the number of irrigation |
| 0.605 | 0.522 | -1.008 | $\gamma_s$ | consumption of seed |
| 0.668 | 0.433 | 0.218 | $\gamma_p$ | consumption of chemical fertilizer |
| 0.677 | 0.421 | 1.668 | $\gamma_w$ | consumption of water |
| 0.004 | 3.150** | -2.372 | $\gamma_L$ | Total workforce |
| 0.001 | 3.799* | 2.125 | $\gamma_f$ | consumption of chemical fertilizer |
| 0.049 | -2.052** | -2.240 | $\gamma_n$ | Surface irrigation frequency |
| $R^2$= 0.759 | 0.644= $R^2$ | D.W= 1.775 | F=11.432 * | |

Source: research findings, symbols * and ** indicate significance at the level of one percent and five percent.

Table 4: Wheat translog production function Ilam city

| Significant level | T-statistics | estimated coefficient | Symbol | Variable name |
|---|---|---|---|---|
| 0.202 | -1.316 | -11.002 | $b_0$ | Constant |
| 00.17 | 2.403 * | 16.417 | $B_s$ | Logarithm consumption of seed |
| 0.523 | 0.650 | -23.422 | $B_p$ | Logarithm consumption of chemical pesticides |
| 0.016 | 2.621* | 1.303 | $B_w$ | Logarithm consumption of water |
| 0.384 | 0.888 | 21. 923 | $B_l$ | Logarithm of the number of workers |
| 0.048 | 2.706 ** | 1.728 | $B_f$ | Logarithm of chemical |
| 0.295 | 1.073 | -7.304 | $B_n$ | Logarithm of the number of irrigation |
| 0.005 | 2.994** | -3.078 | $(\beta_s)^2$ | Square of logarithmic consumption of seed |
| 0.008 | 2.925 | -0.964 | $(\beta_p)^2$ | Square of logarithmic consumption of chemical pesticides |
| 0.004 | 2.146 ** | -6.651 | $(\beta_w)^2$ | Square of logarithmic consumption of water |
| 0.000 | 4.112* | -3.183 | $(\beta_l)^2$ | Square of logarithmic consumption of Task Force |
| 0.030 | 2.320** | 11.904 | $(B_f)^2$ | Square of logarithmic consumption of chemical fertilizer |
| 0.006 | 3.029 | -9.246 | $(B_n)^2$ | Square of logarithmic consumption of number of irrigation |
| 0.723 | 0.360 | -4.650 | $B_s\,\beta_p$ | Interaction between seed and chemical pesticides |
| 0.042 | 2.814 ** | 13.927 | $B_s\,\beta_w$ | Interaction between seed and water |
| 0.616 | 0.509 | 5.572 | $B_s\,\beta_l$ | Interaction between seed and labor |
| 0.241 | 1.206 | 17.913 | $B_s\,B_f$ | Interaction between seed and fertilizer |
| 0.061 | 1.978 | 13.191 | $\beta_s\,\beta_n$ | Interaction between seed and irrigation frequency |
| 0.619 | 0.504 | -1.116 | $B_p\beta_w$ | Interaction of pesticides and water |
| 0.433 | -0.800 | -0. 762 | $B_p\,B_l$ | Interactions between pesticides and labor |
| 0.911 | 0.113 | 1.364 | $B_pB_f$ | Interaction of pesticides and chemical fertilizers |

| | | | | |
|---|---|---|---|---|
| 0.052 | 2.055** | 4.173 | $B_p\ \beta_n$ | Interactions between pesticides and irrigation frequency |
| 0.853 | 0.187 | 0.452 | $B_w\ \beta_l$ | interaction of water and labor |
| 0.036 | 2.233 ** | -11.617 | $B_w\ \beta_f$ | interaction of water and fertilizer |
| 0.408 | 0.845 | -22.260 | $B_w\ \beta_n$ | interaction of water and irrigation frequency |
| 0.354 | -0.948 | -12.267 | $B_l\ \beta_f$ | coefficient of the interaction of labor and chemical fertilizer |
| 0.307 | 1.046 | 2.638 | $B_l\ \beta_n$ | coefficient of the interaction of labor and irrigation frequency |
| 0.250 | 1.182 | 5.064 | $B_f\ \beta_n$ | coefficient of the interaction of chemical fertilizer and irrigation frequency |
| $R^2$= 0.870 | $R^2$= 0.744 | D.W=2.044 | F=6.680* | |

Source: research findings, symbols * and **, respectively Byangrmny at the level of one percent and five percent.

**Comparison of estimated production functions**

The model estimated that the number of significant coefficients of criteria to identify the strengths and weaknesses of a model. The coefficient of determination and adjusted coefficient of determination in Table (5), has. As the results in Table 5 shows, the coefficient of determination in the translog function is high. If the number of significant coefficients of this function is low. It can be concluded that in this function, there is a linear problem. This, the transcendental function is also clearly marked. Due to this, if the linear regression equation above, this means that there is a high correlation between the independent variables together-and in this case, despite the high $R^2$, the reliability is not high.

Variance inflation factor index in tabular form (6) is calculated to be visible. Table (6) using the Cobb-Douglas production function of VIF and review of the manuscript deals. Based on the value obtained for the linear estimation problem there.

Table (5): The coefficient of determination, and a significant percentage of the estimated coefficients in functions

| Trans log | transcendental | Cobb-Douglas | statistics |
|---|---|---|---|
| 41 | 50 | 84 | significant percentage |
| 11 to 27 | 6 to 12 | 5 to 6 | Coefficients |
| 0.870 | 0.759 | 0.864 | **$R^2$** |
| 0.740 | 0.646 | 0.606 | **$\bar{R}^2$** |

Source: research findings

Table (6): VIF index coefficients Cobb-Douglas

| $B_n$ | $B_f$ | $B_L$ | $B_w$ | $B_p$ | $B_s$ | Parameters |
|---|---|---|---|---|---|---|
| 1.183 | 1.809 | 1.859 | 1.403 | 1.426 | 1.293 | **VIF** |

Source: research findings

Table (7): VIF index in the transcendental production function coefficients

| VIF | Parameters | VIF | Parameters |
|---|---|---|---|
| 462.796 | $\gamma_s$ | 190.460 | $B_s$ |
| 31.334 | $\gamma_p$ | 27.412 | $B_p$ |
| 1.953 | $\gamma_w$ | 1.942 | $B_w$ |
| 70.497 | $\gamma_L$ | 72.005 | $B_L$ |
| 38.877 | $\gamma_f$ | 36.768 | $B_f$ |
| 148.027 | $\gamma_n$ | 151.718 | $B_n$ |

Source: research findings

Table (8): VIF index translog production function coefficients

| VIF | Parameters | VIF | Parameters | VIF | Parameters |
|---|---|---|---|---|---|
| 153.492 | $B_p\ B_l$ | 101.248 | $(\beta_l)^2$ | 2.415 | $B_s$ |
| 2.355 | $B_pB_f$ | 4.447 | $(B_f)^2$ | 2.136 | $B_p$ |
| 696.935 | $B_p\ \beta_n$ | 1.574 | $(B_n)^2$ | 41.757 | $B_w$ |
| 983.378 | $B_w\ \beta_l$ | 2.712 | $B_s\ \beta_p$ | 1.019 | $B_l$ |
| 4.572 | $B_w\ \beta_f$ | 4.866 | $B_s\ \beta_w$ | 1.012 | $B_f$ |
| 1.158 | $B_w\ \beta_n$ | 1.960 | $B_s\ \beta_l$ | 7.831 | $B_n$ |
| 2.814 | $B_l\ \beta_f$ | 3.806 | $B_s\ B_f$ | 178.556 | $(\beta_s)^2$ |
| 1.074 | $B_l\ \beta_n$ | 7.512 | $\beta_s\ \beta_n$ | 18.346 | $(\beta_p)^2$ |
| 3.101 | $B_f\ \beta_n$ | 828.512 | $B_p\ \beta_w$ | 2.651 | $(\beta_w)^2$ |

Source: research findings

 

As the results of the linear transcendental and translog production functions in the Tables (7) and (8) show, for transcendental functions and translog estimates, the basic problem is linear. There are linear functions can be due to cross-terms of the functions described in the explanatory variables. Given that one of the criteria for selecting the best model, camera Watson test statistic is based on the correlation between the error terms implies no problem. The statistic (DW) in tabular form (9) is obtained. As the results table (9) can be seen, none of the functions of the estimated autocorrelation phenomenon does not exist.

Table (9): The camera Watson (DW) in their study estimated correlation functions

| translog | transcendental | Cobb-Douglas | Variable |
|---|---|---|---|
| 2.044 | 1.775 | 1.856 | Watson camera test statistic (DW) |
| 27 | 12 | 6 | **df** |

Source: research findings

As mentioned, one of the criteria for comparing the superior functions, a significant factor of production functions, F-test results in table (10) states. The results obtained in the above table, it is observed that all production functions are estimated at a rate of at least one non-zero coefficient.

Table (10): F test was significant in the overall evaluation of the estimated functions

| translog | transcendental | Cobb-Douglas | Variable |
|---|---|---|---|
| 6.680 * | 11.432 ** | 7.435 * | test statistic (F) |
| 27 | 12 | 6 | **df** |

Source: research findings, symptoms Byangrmny ** significant at the one percent.

The following table is based on the significance level of 0.000, which is less than 0.05, so the null hypothesis is rejected and a confirmed. In other words, it can be concluded that the variance of the three functions are not equal.

Table (12): the test during the evaluation of the estimated variance anisotropy functions

| Significant level | Degrees of freedom 2 | Degrees of freedom 1 | During the test |
|---|---|---|---|
| 0.000 | 297 | 2 | 223.673 |

Table (13), the value of F in the analysis of variance, the model shows. So the table (13), using the F-test to compare the average of the three groups studied. Based on the significant level of 0.000 is achieved here and is less than a certain amount 0.05. Therefore, we can conclude that the null hypothesis is rejected and a confirmed. In other words, we cannot accept the assumption of equality of the means of production functions.

Table (13): F test

| Significant level | F | MS | DF | SS | |
|---|---|---|---|---|---|
| 0.000 | 46202.979 | 9347276839.04 | 2 | 18694553678.0 | Between groups |
| | | 202308.964 | 297 | 60085762.21 | Within Groups |
| | | | 299 | 18754639440.2 | Total |

**Select the appropriate type of wheat production function**

According to the results of the various functional parameters of the Cobb-Douglas function and translog transcendental functions were significantly more variable. Comparison of different ones for wheat production functions show that less than 50% of the translog model variables are significant. Calculated based on the Cobb-Douglas Water economics' done. The results (Table 15), it can be said that the coefficient of determination obtained for the Cobb-Douglas model, is 0.864; that is to say 68% of the changes in crop production is explained by the variables used in the model.

The estimated coefficients for the variables used in the production of pesticides and fertilizer consumption, 0.954 and 0.899 respectively, and have a positive impact on production. Also, seed, water and labor for farmers studied at five percent had significant effects. The estimated coefficients for the variables of the seeds, water and fertilizer production function, respectively, 1.013, 0.462 and 0.446 is. Variable has a negative impact on production and the irrigation frequency is not statistically significant.

Top logarithmic form of the production function (Cobb-Douglas) is as follows:

$Ln\ y=0.742+ 1.013\ Ln\ sed +0.954\ Ln\ per + 0.462\ Ln\ wat + 0.466\ Ln\ Lab + 0.899\ Ln\ fer - 0.277\ Ln\ N$

**Production elasticity estimates and the shadow price of water in wheat production**

As mentioned, the coefficient of elasticity of production with respect to the Cobb-Douglas production represents a slight elasticity. The results of the pull factors irrigated wheat crop in the table (14) are obtained. As the results in Table (14) shows that, according to the sign of the coefficients of the variables significantly Bzrmsrfy, chemical pesticides, water consumption, the number of workers is expected to increase the use of inputs and fertilizer production to be increased. Accordingly, a one percent increase in the use of inputs Bzrmsrfy, chemical pesticides, water consumption, labor and fertilizer provided fixed number of other factors, in order of about 1.013, 0.954, 0.462, 0.446, 0.899 percent increase in production will bring. Variable irrigation frequency, indicating that the use of these inputs gradually increases, total production is low. This is also not statistically significant.

Table (14): the elasticity of production, inputs for crop wheat

| $B_n$ | $B_f$ | $\beta_l$ | $\beta_w$ | $B_p$ | $B_s$ | crop wheat |
|---|---|---|---|---|---|---|
| -0.277 | 0.899 | 0.446 | 0.462 | 0.954 | 1.013 | Estimated value |
| Third | Second | Second | Second | Second | Second | Economic area |
| non Optimized | Optimized | Optimized | Optimized | Optimized | Optimized | Consumption |

Stretch average production for consumption of water, using a Cobb-Douglas functional form (equation (1)) shows that the economy is in the area of water and the water in a rational and efficient, will be used.
$E_w = 0.462$
Shadow price (the value of the final product) of water, with an average water consumption of other production inputs and output elasticity with respect to the sale price of wheat, is estimated. To this end, the end of the stretch of water from the equation (2) is extracted and then the price of wheat (10,500) multiplied. Then equation (3), the economic value of water is obtained. Calculated shadow price of water in wheat production of Cobb-Douglas model, equal to 485.1 rials per cubic meter, is obtained.

$$MP_w\ 0.462 \times \frac{1000}{10000} = 0.046$$

$$VMP_w = 0.462 \times \frac{1000}{10000} \times 10500 = 485.10$$

In the above calculations, the stretch of water equal to 0.462, the average value per acre of wheat production in the region of 1000 kg and the average sales price of 10,500 rials per kg of wheat. Marginal productivity of water is equal to 0.046 kg, i.e. in excess of 46 grams per cubic meter of water is added to wheat production. The value of the marginal product of water, 485.10 Rial respectively. In other words, by adding additional water per cubic meter of crop production, farmers' incomes; 485.10 Rial increases.

Table 15: Description of personal and professional characteristics of wheat farmers

| minimum | maximum | Standard deviation | Mn | Variable |
|---|---|---|---|---|
| 20 | 67 | 10.813 | 46.78 | Age |
| 2 | 2 | 0 | 2 | Gender |
| 1 | 2 | 0.287 | 1.91 | Marital status |
| 1 | 4 | 0.886 | 1.89 | Level of Education |
| 2 | 6 | 1.032 | 3.31 | Family labor |
| 8 | 56 | 9.184 | 25.32 | Agricultural work experience |
| 3 | 1 | 0.642 | 1.80 | Side jobs |
| 1 | 2 | 0.472 | 1.67 | Agricultural Insurance |
| 1 | 2 | 0.435 | 1.25 | Land ownership |
| 1 | 2 | 0.482 | 1.64 | Participation in agricultural training courses |

Source: research findings

According to the above-mentioned criteria and standards, the Cobb-Douglas function seems to be more suitable than other forms of wheat production in the region is incidental. The parameters for calculating the tension produced by the shadow price of water is used. Calculate the shadow price of water in the mean values of all other variables is taken into account. Economic price per cubic meter of water is calculated according to the Cobb-Douglas function parameters, the IRR 4888555.10. Production of medium tension of water is obtained 0.462. In other words, the logical form of water consumed. This value is indicative of the Second District. Production in the second, only the logical production. In this area, with increased use of inputs, final production and average production of both reduced. The economic value of water is achieved in line with theory is obtained.
Khaje roshanaei et al [4] In "The economic value of water in the production function approach using classical models and entropy of wheat in Mashhad city," the results show that the entropy method is able to accurately estimate the coefficients of the functions do not can be calculated from the results of the economic value of water. While the classical approach, translog function of the different types of functions, as the best form of wheat production, and selected economic value of water was calculated in 1870 dollars.

According to studies, the consumption of wheat in the region, at least 8,500 and up to 18,500 cubic meters per hectare per year (an average of 10,000 cubic meters per hectare per year) were measured. Due to the scarcity of water resources in the province, it is necessary that the problems facing farmers as primary beneficiaries of water resources, the management and all-round, come to grips with their own limitations.

The results show that, per cubic meter of water has economic value. While farmers do not pay a price Ilam city, which results in the loss of incentives for farmers to invest in new technologies to increase the efficiency of water use and irrigation is. As a result of the use of traditional methods of irrigation and removal of excess water in the farm. According to the results suggest. Supply and pricing policy, in order to achieve reasonable prices for water, to conserve water and create efficiencies in production such as wheat and barley, water price based on the value of the final production of the products, determine.

According to the results, the average stretch of water in the region's economy. If the figures show, water use in agriculture in the region under study, a loss is high. To resolve this paradox, it is more accurate and comprehensive survey of water use in agriculture is done at the state level.

If the policy is to increase irrigation efficiency by increasing investment in the sector, the policy can increase the efficiency of water prices in order to increase efficiency. Training of farmers, which is the efficient use of irrigation systems, can lead to efficient water use. Also, by providing low-interest loans and encourages the use of pressurized irrigation systems in order to increase irrigation efficiency, the efficient use of water is effective. In sum, it appears that policies such as the promotion of agricultural education in order to use its policy of gradual liberalization of the market price so competitive, it can lead to a reduction in water consumption in the water.

## REFERENCES

1. Salehnia, N., Ansari, H. (2007). Evaluation of agricultural water pricing using a general equilibrium model "AGE". Sixth National Conference of Agricultural Economics.
2. Torkamani, G., and Rezai, B. (2000). Estimating demand for agricultural inputs for production and supply of wheat in Iran, Journal of Agricultural and Development Economics, 31: 114-78.
3. Shamsuddini, A., Mohammadi, M., Rezai, R. (2010). Determining the economic value of water in agriculture in Mashhad city. Sugar Journal 26 (1): 103: 93.
4. Khaje Roshnaei, N., Danehvarkaki, Gh., Mohtashami Brzadran, F. (2009). Determining the economic value of water in the production function approach, using classical models and entropy of wheat in Mashhad city. Journal of Agricultural Economics and Development (Agricultural Science and Technology), Volume 24, Number 1, spring 2010, pp. 119-113
5. Abrishamchi, A., and Tajrish, M. (2007). Management of water demand, available in WWW.las.ac.ir.
6. Soltani, V., Zibei, M. (1996). Agricultural water pricing, Journal of Water Affairs Ministry of Energy, Water and Development magazine.
7. Jafari, J. (1998). Critically examined in natural waters, Water Conference, p. 2.
8. Gibbons,D.C.(1987). The economic value of water. Resources for the future, inc., Washington D.C., USA.
9. Keramat Zadeh, A., Chizari, A., Mirzayi, A. (2003). Determining the economic value of agricultural water use optimization models integrating agriculture and horticulture crops Barzou Shirvan dam. Agricultural and Development Economics, Vol. XIV, No. 54, 1385.
10. Johansson, R. C, Tsur, Y., Roe, T. L., Doukkali, R and Dinar, A.2002. Pricing irrigation water: a review of theory and practice. Water policy 4: 173-199.
11. Tssure, Yacov and Ariel, Dinar. (2007)." The Relative Efficiency of Implementation Costs of Alternative Methods for pricing Irrigation Water". The world Bank Economic Review, vol. 11, No. 2, pp. 243-62.
12. Garali, A. (2002). The value of irrigation and cropping pattern of lack of water in the dam area Dorudzan, College of Agriculture, Shiraz University.

**CITATION OF THIS ARTICLE**

Zohre K, Roya E-S. Management of water resources through the estimated economic value of water in agriculture city of Ilam. Bull. Env.Pharmacol. Life Sci., Vol 4 [6] May 2015: 14-21