Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env.Pharmacol. Life Sci., Vol 4 [6] May 2015: 07-13

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

Identification of Optimal Management Strategies for Water use in the Garden city of Ilam

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ABSTRACT
The management and allocation of water resources is of increasing importance. Undoubtedly, one of the most important tools for optimal allocation of water resources, economic evaluation is that the long-term development of national water strategies is also emphasized. The amount of economic value based decision making and allocation of significant effects on micro and macro aspects of the economy leaves. This study aims to estimate the economic value of water resources management in agriculture was conducted in Ilam city. In this study, the objective and the method of data collection survey. The population of the study consisted of 100 wheat farmers in Ilam city, the sampling method was used to select samples. To collect data, a questionnaire that its validity was confirmed by experts and professors of agricultural management. Cranach's alpha reliability coefficient was used to determine the amount of 0.91, respectively. The software was used for data analysis. In this regard, the economic values of water in different forms, the function were fitted. Using econometric criteria for irrigated wheat crop production function of Cobb-Douglas functional form was found to be the best. Consistent with the results obtained from the estimation of production functions, the value of the marginal product per cubic meter based on a Cobb-Douglas production function is equal to 485.1 Rails, respectively. The results of the production elasticity of water is equal to that show 462 of water in the region is economic and efficient use of water.
Key words: *economic value of water, water resources management, production function, agriculture sector.*

Received 12.11.2014 Revised 01.02.2015 Accepted 12.04.2015

INTRODUCTION

One of the most important factors in determining which is the cornerstone of human material needs, water. The main material of living organisms, including human form. In recent years, efforts have been made in the use of technologies consistent with the nature of control, power and water resource management is done [1]. A study by researchers in different parts of the world, reflect the fact that the Earth is not far from a serious crisis in relation to water resources will be met. Hence, adopting the correct principles and policies in the field of conservation and utilization of water resources and the management of these resources will be inevitable (ibid.).

Water scarcity is one of the major constraints to agricultural development in Iran itself. To combat dehydration, increase water productivity as a strategy can be adopted each year by the government to invest substantially in connection with the planned [2]. Water, not only in personal and social life also plays a major role in the interaction between nations and peoples. This variety of reasons including increased growth and population growth, limited water supplies and poor distribution among the different countries [3]. Today, due to population growth, according to the culture, environment, food security and efforts to improve health on the one hand and resource constraints and shadow vital political issues on human relations, agriculture, water is the greatest volume of water to be extracted the country is allocated, appears crucial [4].

Agricultural sector plays a vital role in all economies and developing economies in particular. Since water is a basic input in agricultural production, which limits agricultural development is a limiting factor. According to published reports, in 1950, 12 countries with a population of about 20 million people, have faced water shortages in 1990 this figure rose to 36 countries with 300 million people. Projections show that, in 2025 over 60% of the world's population will face water shortages [5]. Check the level of water use in agriculture indicates that it is more than 2 times the average per capita consumption of international standards. The agricultural sector is the largest consumer of water resources in the country. The analysis of indicators of water consumption in this sector is indicative of excessive water loss is an inevitable part of it, but much of it to be accurate and efficient strategies, corrected [6].

In Iran, the country's renewable water per capita rate of 13,000 cubic meters in 1300 to about 1,700 cubic meters in 2008 has diminished. Competition among consumers of water, due to the growing demand for water in agriculture, industry and drinking and the addition of new applications such as aquaculture and the environment, rivers and other bodies of water and reduce supply is increasing. Since, the agricultural sector is the largest consumer of water in the country [6]. The main waste water in this part belongs. So that now, the efficiency of water use in irrigated lands almost 0.7 Kg of product produced per unit of water (m^3) is used, which is low compared to the figures of the developed world, where many of the main reasons for the low efficiency of irrigation and water resources in the agricultural sector [7].

Ilam province with an area of over 19,086 square kilometers, less than 1.4% of the country's total area is allocated. Ilam city, located in the northwest of the province, and the statistics of weather stations in the 89-88 season, 565.9 mm rainfall in the growing season 90-89, 379.2 mm and 91-90 years, 360 mm rainfall had. This figure represents a 47 percent reduction in rainfall in recent years, in the province of Ilam. The garden city of Ilam, 35.1213 acres of gardens with an area of 620 hectares is the largest area devoted to the Sivan. An area of 225 hectares, the three sites Pakal-Garab, Dashtlag and Banvizeh allocated. 5011.67 tones annual production of Ilam city gardens. Garden city of Ilam, 2900 people. Most of the gardens, orchards, irrigated by the waters, and flowing fountain. 250 acres of gardens, is under drip irrigation.

Based on field observations and interviews conducted with farmers and agricultural experts to manage the city of Ilam, water issues in the agricultural sector is in the city, including the recent droughts. The cause of most springs is drying or dehydration. Also, the lowering of ground water, sewage integration with downstream water resources in agriculture in the rural gardens. This situation, causing diseases such as canker, is. The low level of farmers to continue to apply modern methods of irrigation and irrigation in the traditional way, in addition to the waste water will be transferred types of pests and diseases.

Farmers lack the financial ability to purchase transmission lines and cover the traditional streams. Small gardens, which makes use of drip irrigation system is not affordable. Currently only the top half acres of orchards that area is able to take credit for the construction of irrigation system. Old trees in the gardens of the efficiency and performance are good, but farmers are not willing to cut up and rejuvenation. Licensing restrictions on drilling new wells, which resulted in most parts of Ilam city limits component excavation and removal of underground water aquifers are considered. At present, it remains unclear how the utilization of limited water resources in a way that the minimum and maximum productivity have. Certainly, with the correct operating procedures and optimal management can overcome the limitations of water resources and agricultural water to apply suitable methods. Therefore, this study seeks to answer the fundamental question of the most appropriate solutions for the optimal management of water resources what are the Elamite city gardens?

In this review, studies on mechanisms to provide optimal management of water use in the world to be explored. Current study, found on the subject, but the optimal management of water, a lot of research has been done in the world, some of them are below.

Taghvai et al [4] in a study entitled "Factors affecting analysis of non-use of pressurized irrigation systems in the villages of Iran," the method is analytical and solidarity, and the collection of statistics and information is done through the field, using Cochran formula, volume sample of 212 individuals from the target population and sampling carried out. Stated that the main problem lies in the lack of use of pressurized irrigation systems in the region, fractionation and distribution of land operation. The literacy rate for most farmers do not use pressurized irrigation system, is located at a relatively low level. Should be trained and knowledgeable professionals pressurized irrigation systems need more attention? Due to the lack of equitable distribution of water in the area and water shortages in many fields, should be given water as an economic good. The pricing and the price of water is essential in the economic value, which is a result of the implementation of this policy requires a precise monitoring system.

Smith and Monaz [8] in a study entitled "Effects of irrigation services' role in the adoption of technology consulting services and irrigation techniques have been shown to increase water productivity. Regner [9] in a study entitled "Participatory irrigation management practices and the impact of complex, centralized systems" did. Failure to provide the necessary training to farmers on irrigation management, water management is an important problem in the context of success. Havartz [10] conducted a study entitled "Raising the reapers power for irrigation and drainage in Nepal" did. Improve water use efficiency in agriculture by increasing the knowledge, attitude and skills of farmers, job promotion and training institutions to implement on-farm water management practices performed correctly.

MATERIALS AND METHODS

The study of the nature of quantitative and qualitative research is considered. For the purpose, the type of application. Data collection, documental- ball. The documentary method, the theoretical framework, the previous studies and statistical sources of Agriculture will visit city of Ilam. The field method, the questionnaire will be used to collect data. The population for this study included 2900 patients from growers in the city of Ilam. Using the formula Cochran had a sample size of 378. For sampling, stratified sampling method was used with appropriate attribution.

In this study the data, using a questionnaire consisting of seven parts. In this study, to assess the validity of research, the questionnaire was supervisors and advisors and its reforms were carried out. In this study, the Cronbach's alpha was used to check the reliability of the scale. Cronbach's alpha (Cronbach's alpha coefficient equivalent of 0.73) for the questionnaire were calculated, the coefficient is statistically acceptable and appropriate and acceptable, indicating the reliability of the questionnaire.

According to the study, descriptive statistics and factor analysis were used. 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, front) and dispersion (standard deviation) of back. Next, using factor analysis and item management solutions to optimize water use in the classification are extracted. Above will be performed using the SPSS software. In this study, in order to identify ways to optimize the management of water use in gardens from the perspective of farmers, exploratory factor analysis was used.

RESULTS AND DISCUSSION

Determining the suitability of data for factor analysis, using statistics KMO and Bartlett test

If, KMO value is less than 5.0 data are not suitable for factor analysis. If it is between 0.50 and 0.70, the correlation existing between the data for factor analysis is appropriate. However, caution should be taken, and if it is larger than 0.70 variables will be very good. In this study, the KMO value 0.806, and the Bartlett test, the 3.9053 and was sig 0.00. As a result, it was found that the data are suitable for factor analysis.

Spin labeling agents and agents

One of the important factors in factor analysis to determine the number of factors could be derived. However, accurate basis for decisions about the extractive agent is not provided, but there are rules that are, in the decision to determine the number of extracted factors are used. These criteria include:

1. Measure the specific value, 2. The former criterion, criterion 3% of the variance, standard test 4. Cuts

As mentioned, one of the important factor analysis to determine the number of factors could be derived. In this analysis, the criterion of eigenvalues is used. Eigenvalues, which is given to each factor, the ratio of the variance of the variables that factor, explains. Eigenvalues, the relative contribution of each factor of the total variance of all the variables. Range of special value, (0) to (1) fluctuates. The amount is more of a factor for the proportion of the total variance explained is more variable. Conversely, the less specific for an agent, implying a lower proportion of the total variance of all the variables. In this study, 6 factors with eigenvalues greater than 1 were extracted, a total of 63.02% of the total variance explained by the factors. Remains, due to factors that were not identified in this analysis. Due to the special factors with eigenvalues 7.18 largest share (25.47%) and the last (sixth) with eigenvalues 11.02 owes (18.2%) of the total variance was explained.

In order to separate the lighter form factor, the Varimax rotation method is used. The final stage of the factor analysis, the matrix element of the name is derived agents. This process, rather than have the exact dimensions, based on the researcher's interpretation are in line with the objectives of the research. In Table 2, each of the agents named, along with the relevant variables and factor loadings are shown.

Table 2.-policy management solution for optimal management of water use in gardens, items and their factor loadings

Load factor	Items	Factor
0.548	The use of pressurized irrigation systems	manager - Policy
0.517	Government support for credits to improve irrigation systems	
0.443	Mechanical control (control) and chemical (spraying) Weed	

0.431	Integrating gardens
0.427	Use of mulch in the garden
0.417	Water delivery system reform in the gardens
0.417	The use of organic fertilizers in the pond rotten trees
0.416	New irrigation systems and watering leveling
0.406	When watering the tree of the product, the intensity of the water needs
0.376	Supplementary irrigation and rainwater harvesting and groundwater
0.375	Watering gardens at sunset to sunrise to reduce water evaporation
0.363	Watering gardens at the right time and not flood the gardens

The results (Table 3), showed that among the factors management - management policy to optimize water use in gardens using pressurized irrigation systems with the highest load factor 0.548, and replace concrete channels or plastic tubing to transfer agricultural water instead of the traditional atmosphere with the lowest factor loadings were 0.321.

Table 3. The technical solution for the optimal management of water use in gardens, items and their factor loadings

Load factor	Items	Factor
0.484	Application of scientific irrigation, using new methods of irrigation	
0.459	Fruit thinning, pruning trees	
0.444	Using new techniques for saving irrigation water	
0.434	Using new techniques for saving irrigation water	
0.426	Placing small pumps in drainage canals for water reuse	
0.405	Avoid the use of chemical fertilizers is accelerating growth, increasing water consumption, such as N fertilizer	Technical
0.405	Trees sprayed with substances that increase resistance to drought.	
0.395	Removing the windings of the traditional channels, dredging canals, wipe out the speed factor, such as thorns, dirt and weeds.	
0.383	Use absorbent material in the pond trees such as perlite.	
0.360	Flood control and water storage facilities.	
0.344	Dry green pruning operations, at the right time.	
0.274	The low efficiency of transferring water from the source to the consumer.	

The results (Table 4) showed that the technical factors, the optimal management of irrigation water use in gardens employment application using the new methods of irrigation and low transmission efficiency load factor 0.484 highest water from the source to the consumer with 0.274, had the lowest load factor.

Table 4. Economic and financial strategy, the optimal management of water use in gardens, and loading related items

Load factor	Items	Factor
0.436	Increase profitability Garden	
0.431	Water and determine the appropriate tariff Abe growers	
0.420	Loss product market	Economic-financial
0.418	Increased investment to expand the garden growers	
0.319	Avoid removing too much water wells and authorized the use of smart meters	

The results (Table 5) indicated that the economic factors, the optimal management of water use in gardens, increase profitability garden with 0.436, the highest load factor and avoid excessive withdrawal of water wells and authorized the use of smart meters 0.319 had the lowest load factor.

Table 5. The educational approach promoting optimal management of water use in gardens, and loading related items

Load factor	Items	Factor
0.554	Awareness of the importance of saving water	Teaching- extension
0.535	Promoting participation in educational programs to raise awareness	
0.514	Farmers aware of the consequences of dehydration and excessive withdrawals of groundwater	
0.486	Visits successful holding of the gardens	
0.419	Increase the knowledge and expertise of human resources involved in the management of water use in public and private institutions	

The results in Table 6 show that the optimal management of water use in gardens factors promoting educational awareness of the importance of water use optimization to 0.544, the highest load factor and increase the knowledge and expertise of personnel involved in the management of water use in public and private institutions with 0.419, had the lowest load factor.

Table 6. The socio-cultural approach to optimize the management of water use in gardens, and loading related items

Load factor	Items	Factor
0.508	Water sharing plan for reducing conflict between farmers	socio-cultural
0.486	Visits successful holding of the gardens	
0.441	Encourage youth to Home	
0.431	Increase motivation collaboration among farmers	
0.411	Traditional irrigation methods	

The results in Table 7 show that the socio-cultural factors, the optimal management of water use in gardens, water sharing plan for reducing conflict between farmers and 0.508, with the highest loadings and traditional irrigation methods with 0.411, had the lowest load factor.

Table 7. Solutions Climate - Environmental management efficiency of water use in gardens, items and their factor loadings

Load factor	Items	Factor
0.544	Specify the type and texture of each region and the permeability	Climate - Environmental
0.393	Add organic matter to the soil and create a fence or a windbreak to reduce evaporation	
0.359	Planting trees resistant to dehydration, such as grapes, almonds, pistachios, figs, olives to dry land	

The results in Table 7 show that the optimal management of water use in gardens climatic factors, determine the type and texture of each region and the permeability of the 0.544 with the highest loadings, and planting trees resistant to dehydration of such as grapes, almonds, pistachios, figs, olives are concerned with 0.359, had the lowest load factor. Categories of water use and management solutions to optimize their specific amount of variance showed that the highest levels of management actions - political, geo-environmental approach is highest and the lowest value (2.52), respectively.

Falsoleiman and Chakoshi [11], in a study entitled "Optimal management of agricultural water use to increase the efficiency and sustainability of water resources in arid and arid regions of the critical state", low irrigation methods such as adding organic matter the soil and create a fence or carminative to reduce evaporation, awareness of water issues, pointing out the consequences of excessive withdrawal of ground

water table in order to optimize the management of agricultural water use, regarded as the important factors.
Regner [9] in a study entitled "Participatory irrigation management practices and the impact of complex, centralized systems" do Dadnd.dm providing the necessary training to farmers on irrigation management, water management is an important problem in the context of success. Najm [12] in a study entitled "Coping with drought planning and strategy in the agricultural sector" crisis of drought, rainfall Overuse of groundwater wells, regardless of the power of this area caused irreparable damage to the natural resources on the one hand on the other hand, economic and financial resources of farmers has arrived.
Factor analysis showed that the use of administrative and technical items pressurized systems, government support for credits to improve irrigation systems, irrigation and application of new irrigation methods using the proposed had the highest coefficient of the lending less than half a hectare of irrigated land under pressure to expand the gardens.
The results showed that economic factors, another major reason for the improved management of water consumption. Increase profitability garden, water and determine the appropriate tariff Abe farmers, loss of product market, the largest among other variables in the economic dimension are allocated. Therefore, it is recommended that water be considered as an economic commodity. Pricing and receive a level equivalent to the economic value of water is essential. However, effective implementation of this policy requires a precise monitoring system. Also, government support for credits to improve irrigation systems, construction and further processing industry and market sales, to increase profits for the farmers.
The results of the factor analysis in relation to education - promoting, informing farmers of the importance of water saving, organizing and encouraging farmers to participate in educational programs - promoting, in order to inform farmers of the consequences of dehydration and excessive interpretations of the table groundwater, water consumption created fertile ground for optimal management.
The results showed that social factors, is another important factor. Water sharing plan for reducing conflict between farmers, holding the highest loadings were successful tours of the gardens. Therefore, it is recommended to use a lot of communication and information transfer the right to use water. Another way to help promote the correct use and optimal culture and Water Acts incentive schemes such as subsidies from the state of modern designs and new correct, and the water consumed subscribers tariffs correct, and the ground water, both in terms of extracting indiscriminate What is the perception of surface waters.
Factor analysis showed that climatic factors - environment, the optimal management of water consumption is another factor. Specify the type and texture of each region, and add organic matter to the soil infiltration rate, had the largest share. Is suggested, by planting trees resistant to dehydration, such as grapes, almonds, pistachios, figs, olives are dry to prevent water loss and management of its consumption.
The results showed that the most covered gardens, irrigation system and a lower level of efficiency is proposed to transfer water from the source to the consumer, with classes - promoting the importance of saving water and water gardeners of the future aware , and by changing the pattern of planting and irrigation systems, to reduce the damage caused by dehydration.
The results showed that a low percentage of gardens, horticultural products are covered by insurance, it is recommended to pay special attention to the planning and implementation of training programs - advocacy to encourage farmers to be insured garden products.
Given that women have little, their number is low. In this context, culture and leisure facilities and incentives may be more women to enter the field of horticulture encouraged.
The results are essential to the training of professionals and experts in pressurized irrigation systems need more attention, and by strengthening and promoting educational programs in quantitative and qualitative aspects, the popular and the development of fertile ground most modern irrigation technologies among farmers there. Therefore, the development of these programs, raising awareness of farmers and gardeners of factors that could be fruitful. Results gardens yield, indicating that the water is in most cases reduce the production of quality products. It is recommended to plant trees resistant to dehydration, such as grapes, almonds, pistachios, figs and olives are concerned, and add organic matter to the soil and create a fence or carminative to reduce evaporation, in addition to productivity increases the performance is.

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CITATION OF THIS ARTICLE

Zahra B, Safa F, Roya E-S . Identification of Optimal Management Strategies for Water use in the Garden city of Ilam. Bull. Env.Pharmacol. Life Sci., Vol 4 [6] May 2015: 07-13