Analysis and comparison of conventional methods of water resources exploitation

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A B S T R A C T

Reduced rainfall and frequent droughts in recent years have created concerns about the exploitation of water resources, especially in the West Country. One of the main reasons for it is the structure of livelihood of farmers in this region This study review the process of water harvesting of resources in the recent period, and trying to determine the best strategy for harvesting in the area of water resources In this study different methods of harvesting water sources have been studied West Country. Which are the direct interference of the state, harvesting of resources by the private sector with government regulation, the absolute non-interference of the state and eventually combine government and private sector activities. By comparative performance of each operating methods, this study attempts with the introduction of a better way to harvest the resources to improve agricultural conditions. Results show Water harvesting has not efficiency in state sector and the private sector has no foresight. For this reason harvesting cannot withdraw from sources outside the government as absolute discretion and done, the results suggest the combined harvest yield of 55% harvested compared to other models. Choose the method that has been picked as the preferred method.

1. Introduction

People unwillingness to pay for the resources that are free and they are even willing to political campaigns against it, President Morales in Bolivia is an example of this after opposition leader privatization of water supply and protection of vulnerable people and the opposition, was elected president The low price of water in the form of hidden subsidy paid to the public. Even in countries with free economy, a small part of the population has used the services of private companies, rest water from the facility to the government to set prices based on the cost of transmission and distribution and purchase (Kempen et al. 2010). Improvement of water supply is one of the ways that can be used to protect the source, Water out of the traditional irrigation systems often means the loss of influence of the nutrient in the soil and transfer it to water supplies, a small revival Where water can be extracted for reuse, But the amount of water in the

hydrological system through evapotranspiration exits is waste water, Because no one can enter the atmosphere is water that is used (Mainuddin 1997). Economic balance between supply and demand for water is the most significant and most influential point in management of water resources. Studies have shown that due to population growth and the need for the population to food and health and safety facilities water demand has increased It can observed increase water demand as the increase in use of land in the process of agricultural production, increase in crops cultivated, reduce ground for fallow and cultivated the changes of pattern towards products with high water demand (Hellegers *et al*. 1983; Liu *et al*. 2012) Agricultural development of water include water management, valuation of water and water quality. To achieve the realization of agricultural development need to adopt effective water management as part and this reveals the enormous importance of water resources management. Iran's climate conditions dry and poor distribution of rainfall in time and space is an inescapable reality then any productive activity is agriculture depends on exploiting the resources available are limited. Scarcity and irregular distribution of rainfall has caused a negative impact on the underground water reservoirs. (Mehta 2007; Kucukmehmetoglu and guldmann 2005). One of the challenges in the management of water resources is allocation between sectors and various applications, this problem is exacerbated by increasing population and a growing demand (Mohammadi and Mohammad zadeh 2011; Weatherhead and Knox 2002). Similar to other regions in the western regions of the country that is facing with a shortage of water resources The principle of water pricing can help correct the problems in society that encourages consumption first and then cover the operating costs, refining and transportation and distribution.In the western regions of the country has been growing value of water resources and water use, however, the value of which depends, But this value can be competitive in the economic use of water

resources. It makes people have limited access to these resources (Abdollahi Ezzatabadi and Javanshah 2006) Water conditions in western broadband available in all parts of the country is in crisis and disaster and this while the system-wide utilization of water resources west of the country has seen in recent times to make a positive difference. In the same period, the conditions is much less than the lowest standards, the same time also makes it very clear that in the absence of western expanse of water nourished only by precipitations, not to restore water management (Gassabi *et al*. 2016). Now that the West is in drought conditions can have little hope of renewable natural resources and therefore need to be more careful harvesting and utilization of water resources. Unfortunately, in the same years were also seen what severe crisis in the countries of this valuable resource is excessive utilization and Lack of proper planning, What is today the country's groundwater resources is a sharp drop is because of this of excessive exploitation, this exploits not only in our country and observed that in many countries the crisis has made these countries (Mohammadi and Mohammad zadeh 2011). International organizations in publishing reports on the world's highest level of water withdrawals from three of China and India and Iran. And this in Iran that has always been known as a semi-arid country is very disturbing and painful, because Iran, due to large-scale production of horticultural products and crops will suffer severe damage from this crisis. Adopt a set of policies ranging from economic, cultural and social that surround planning and implementation and control the period of time in the short, medium and long term to reduce the pressure on water resources and long-term interests of farmers and the national economy at risk not seem necessary.

2. Materials and Methods

2.1. Thermodynamic modeling

Tables

For data collection in this research field that during which, according to the data, estimated data for water resource area West Country, to

stipulate an econometric model resulted to the exploitation of resources.Used in this function is Cobb-Douglas type models, Cobb-Douglas of the most popular functions in order to express the structural relationships in the exploitation and production has been used. This function is required features such as homogeneity, uniformity, concavity,continuity, differentiable, non-negative and is simultaneously occurring being depleted The estimated elasticity's operation inputs With this function usage is clearly visible and the main parameters (Abufayed and El-Ghunel 2001). The overall form of Cobb - Douglas function is:

$$Q = AL^{\alpha}K^{\beta} \qquad (1)$$

The logarithmic form

$$\ln Q = \ln A + \alpha \ln L + \beta \ln K \qquad (2)$$

ere the α, β elasticity of operation, A technology index, Q the exploitation, L labor, K capital and ln natural logarithm.This method has the advantage in the analysis because capacity is testable However, against this method requires sufficient evidence, as it was originally described, Cobb-Douglas production function was used to calculate the productivity of factors of production The estimated parameters, define their productivity, In the water sector is a function of multiple production exploiter groups. (Debertin 2012). In this study, 3 groups of government sector, private sector, a combination of the two is used as a elements of operation function, In which the Q water production) cubic meters (G public sector, P private sector, W a combination of the two institutions and A technological index and parameters are research. (Debertin α, β, θ 2012). The production function used is:

$$Q = AG^{\alpha}P^{\beta}W^{\theta} \qquad (3)$$

Efficiency is the ratio of total output, the amount of activity every institution is calculated by the following formula:

Marginal productivity of public sector	$MPG = \dfrac{\partial Q}{\partial L} = \alpha AG^{\alpha-1}P^{\beta}W^{\theta} = \dfrac{\alpha Q}{G}$	(4)
Marginal productivity of private sector	$MPP = \dfrac{\partial Q}{\partial P} = \beta AG^{\alpha}P^{\beta-1}W^{\theta} = \dfrac{\beta Q}{P}$	(5)
Marginal productivity of hybrid	$MPW = \dfrac{\partial Q}{\partial W} = \theta AG^{\alpha}P^{\beta}W^{\theta-1} = \dfrac{\theta Q}{W}$	(6)

In economic development, the ratio of output from a given amount of one or more factors referred efficiency, this quality standard scale exploitation of resources available for activity quality technology, efficiency in operation shows the product of the total inputs (Debertin 2012). Changes in productivity from period to period, the productivity gap between production units at a point in time, overall, this description reflects both efficiency and effectiveness in the use of agents for the production and including all qualitative factors that makes optimal use of resources in order to increase the output per unit input used. In general the effective ways to increase productivity including improved relations between managers and employees, optimal use of inputs, particularly labor and land, improve the use of technology and improve the quality of work (Urszula et al. 2015) Change indicator and the difference in technical ability and performance of the unit or economic sector in turning inputs into goods and services. In other words, changes in the effectiveness of a set of inputs to produce outputs.

3. Results & Discussion

The aim of this study was to evaluate the efficiency of utilization of water resources, in a study to estimate the operation of the software used Eviews 8 and SPSS20 both software has proven performance in the analysis and conclusion. With the introduction of data related to different inputs were collected through the site and statistics experts, Then enter all data in SPSS software And then use the model to include these three factors ENTER significant inputs operation. Based on observations and statistics were obtained from

the operation of water according to the following equation:

Thus, as has been observed below the productivity efficiency of public institutions, private institutions due to the lack of optimal functioning institutions. The efficiency of the private sector as well as the method of combining two types of operation is lower, by reason of the uncertainty of the experts in the private sector can be pursued. To check the result first need to be based on expert opinions in this section were collected through questionnaires. Each section is whether the geographical area and production to meet the needs identified by the experts and studied in the region has been created. The economy is formed with the allocation of scarce resources to provide this need until the source of the problem is not scarcity is pointless to discuss the allocation. But when resources are scarce, what quantity and what quality it comes to questions about how scarce resources are used optimally. Economic outlook at the time of the decision can be made into decision-making structure Which then can be followed on performance, Despite the economic tools in the management of groundwater and surface water resources are similar, But special factors such as the cost of extracting underground water resources, renewable longer and direct water capabilities creates differences in the two sources. Can be different reasons for the efficiency of the private sector in the exploitation of water resources be taken into consideration, including:

Reliance on the economic perceptions based welfare policies often high costs imposed on society Change visibility and economic structure in order to exploit and maximize profits go to the community Damage to the private sector that has less power due to government high natural ability Multi-job phenomenon among government employees, which means reduced productivity caused his tenure is working in all jobs. Regulation is based on the idea of no confidence in the government sector cooperation and trust in the private sector The lack of deal decisively with

the financial and administrative mismanagement and the existence of corruption - administrative public sector Affecting the government's priority in different situations In contrast, management models generally stable Private companies that mainly operate in the specialized Since competitive markets and private producers, Is not able to work, the government must take into work and production, But if the government will increase manufacturing activity and called the government takeover will increase the share of competitive markets and the government dropped into the big monopolist. Under such circumstances, as well as the private sector will not be able to operate as well as reduced product quality. While can entrust this business to the private sector increased quality and efficiency at the same time. In general, management tools and exploiting of water resources of the two groups, instruments are divided into economic and non-economic Economic recognized tools, enacted tariffs on water use, progressive tariffs, tariff and non-seasonal and seasonal price difference between contingent and non-economic instruments including restructuring and reform of laws, public education, information and warning, planning for decline in demand, in order to create the necessary stimulus just taking off, targeting supply and consumption and so on.

These are matters that need to have direct supervision and responsibility of every government to take care of these matters, and therefore wider doing this will result in less efficient that the government will work in both axles. Finally, if the government does pay to do the things that did not essential to intervene and even the private sector can work better and more efficiently, so public sector or the same Government fails to their main task, which set the program and legislative and targeted measures. In other words, the presence of the government in all matters alone is unacceptable, but the government's ability to monitor and apply the balance of power in the direction of society is obvious. In general, the state will be released in the event that the market alone does

not have the ability to create efficiency in the economy and prices reflect social costs and benefits alone is not social. But the failure of the market mechanism alone does not justify government intervention in the economy, market failure is a necessary condition but not sufficient, it is necessary for satisfactory because if the market acted, not government intervention. It is not enough, because government intervention may also be associated with failure but Market failure is enough to be identified that conditions will be improved with partnership in the public and private sectors. The role of government in many fields such as income tax schedule is important because taxes leads to the redistribution of income between the different strata of society. But, unfortunately, can lead to negative effects on labor supply and investment incentives and for this reason the participation of the private sector and the government Are necessary and inevitable. The following policies will be clearly mentioned on the importance of both specified. There cooperation between the government and the private sector will make Found to be most appropriate strategies to improve conditions for the exploitation of water resources. These policies certainly can do many things in common Increase efficiency between the government and the private sector and eliminate the problems faced by both groups.

4. Conclusions

A. Determine the specified volume for exploitation by exploitation groups:

Consumption per unit of water can be determined within the framework of quotas, the fact that each of the institutions of their products and services demand and specific needs water Cause of economic form of available water. This method when is effective and functional that a coercive force against non-compliance with existing standards and quotas, However, quotas or as an economic device is not necessarily standard or economic efficiency no improvement, However incentives for efficiency will follow.

B. Tax planning in order to identify Exploiters and the exploitation level:

Tax on the extraction of surface water to surface water standard pre-specified exploiting is limited. The most common valuation method to determine the price or the pricing of the region have always considered water and the consumer pays based on the value of water in an area where water is used. The amount depends on the type, area, and exploiter water. In agriculture, season and type of product known cultivated the most important factors while in the industrial sector Type and the main factors are considered industry sectors and taxes should be based on all these factors. General utilization of tax efficiency as a management system that is largely based on technical and environmental factors. Choose a pricing method and the method of taxation is fully depends on factors such as the type of inputs, execution ability and control inputs, create and control instruments, the ability to collect fines and fees topics such, If a technology for control and maintenance of water resources at our possession, Pricing tier for determining the value and volume can be used to determine the fixed two-part tariff pricing method. This method is referred staircase. This growth despite operating costs and improve efficiency but demands a high level of control and record the amount of tax due because of differences problem. The financial impact is influenced by tax refunds, so taxes on the extraction of water from the common to a particular water source water extraction could increase costs and reduce the amount of water extracted.

C. With the help of natural forces to refund the cost of the destruction of public property:

In dealing with the pollutant in the world impose a fine on them to prevent the growth of pollution, its fine as pollution tax, and by reducing the level of contamination trying to bring pollution to a level that is tolerable The tax affects the welfare and profitability of farmers to convince them to make optimal use of resources. In contrast, the operator is trying

to maximize their profits is to control environmental degradation, If exploitation of water resources among resource destruction and put it up some sort of count The tax can be situation and the drop in water levels, especially in the case of groundwater pressure control and increase their lifetime.

D. Relying on resources that affect trade structure in the state governments have failed:

Business licenses for balance between supply and demand by government agencies and official permits including economic tools to control and manage distributed operational, These licenses may be limited in the use of resources used in the privatization contract As the owner of the certificate is able to exchange contracts within the framework of national water can provide a small market for water and help manage performance, The licenses awarded in different regions. According to regional ecological characteristics to those individuals and so the blue field of interest and harvest of these areas puts at the disposal of carriers or entities. These bonds tend to trade a significant point in the groups that are difficult to procure its needed water In other words, consumer groups by providing the ability to exploit these securities will be required, On the other hand, due to the restriction against excessive debt and high value helps to manage these inputs, In other words, increased harvesting costs and longevity increased supply.Chile, Mexico, Peru, Brazil, Spain, South America and some states of Australia and Colorado are among the countries that use this tool, this structure permits to increase in value added is the source.

E. cross-linking between the government and the people, Create a public association:

One of the tools that has created great hope to the future of water resources can be a mutual agreement between farmers and facets of government. It is considered more economical controversial among farmers Meet farmers and exploiters who try to exploit and control of water resources is regular. The agreements and contracts between the two groups will lead to optimal utilization, because every two groups

are familiar to local conditions and this agreement will be completely accepted and as profits and losses on both sides correctly distributed there will be have fewer problems This kind of tool if the government's commitment to work toward the growers and farmers compensated for loss of potential earnings can be effective the substrate control and optimal utilization of water resources, the public sector had they not interested in these policies.

F. Contact protectionist policies against the wishes of the government:

One of the tools in the border area rivers leading to Lake Uromia and the land around the the lake was used Possible income payments to farmers of irrigated cultivation in the region. In other words, the amount paid to farmers the difference between the amount of cultivation in the region with and without the use of water. The usual procedure cannot force people to react and he did know the farmer community of farmers is satisfied. This method cannot be considered as a permanent way but could within a few years to help revival of the region's water resources.

G. Government Accountability and reasonable Collision:

Property rights are one of the most important economic laws and all economic schools are defined based on the type property. Given the lack of property rights is a problem that occur in public events, including natural resources. In any structure, whether public or private There should be a reference for dealing with those who false and aggressive use of water resources What public authority or a person of group committed to not to use excessive utilization adopted And the rule of law and public law imposes power And will restore rights, In this regard the principle of exploiting legal caring resources because it hoped to improve operation.

H. Everything from water pricing starts, to estimate the potential value of water consumption in the future:

In order to estimate that future value what is water, water use required to identify, As well as water resource exploitation groups.

However, willingness to pay is often used as a valuation criterion but there are other ways. The remaining The value of valuation method for determining the value of water The value of all inputs and subtract the residual value of the final product, the value of water, Another method of valuation method is the principle of hedonism, In other words, based on the characteristics of a product suggested that pleasure is pleasure in our water supply value is calculated, these overall structure for decision makers valuation of groundwater resources and determine the appropriate policies And the possibility of exploiting determine the optimum operating groups. All the above tools without a clear picture of the value of available water resources is the only things that are, in theory, be investigated and discussed. By recognizing the value of each source can be on the correct conclusion obtained from the source and the highest productivity decided,One-sided deal with issues ranging from security and economic well-being and security of food and other sectors affected that. Without examining all the factors working without a rational structure, Determine the contribution of each sector to this point is completely dependent on the utilization of resources, in addition to the above source in the region and which entity capable still necessary in order to improve and maximize its utilization.

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