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Economic Valuation of Shadegan Wetland

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Abstract:
Shadegan Wetland is located in the southwest of Iran. It is one of the wetlands internationally recognized in the Ramsar Convention. Thanks to its variety of functionalities, this wetland has provided the local people with lots of job opportunities. As a result of being located on the oilfields, this wetland has nowadays been threatened by many projects which are being run in its vicinity, namely oil exploration projects and so forth which are running economic-environmental valuations. Lack of data about the economic value of the wetland has prevented such valuations. The objective of this study is to estimate the total economic value of Shadegan Wetland taking into account its use and non-use values. To achieve this goal, direct use value was first calculated using the market-based method. Subsequently, indirect use value, option value, and non-use value (existence value) were estimated using the method of choice experiment. Based on the results of this study, annual direct use, indirect use, option, and non-use values of this wetland were estimated to be $187104167494, $58568264206752217 and $387974436448, respectively. Also, based on the calculations performed, it was found that over 50,000 jobs have been created by Shadegan Wetland such that its total value accounts for 7.1 percent of Khuzestan province's GDP. The time period of this study was the year 2014.

JEL classification**:** Q5; C22

Keywords: *Use Value, Non-Use Value, Option Value, Choice Experiment, Random Parameters Logit Model*

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1. Introduction

As defined by Ramsar Convention, the oldest convention held on protection of wetlands, wetlands are grasslands and marshlands which are natural or artificial, temporary or permanent, with stagnated or running water, non-salty, semi-salty, salty, or marine regions which are less than six meters deep at low tide (Ramsar Convention, 2010). In light of their direct and indirect uses, and also as an element of the ecologic cycle, wetlands are of high interest to human society (Veit Koester)[1]. This has drawn increasing attention to revival and preservation of wetlands in different societies.

In general, valuation of environmental resources enables planners to select the use of these resources based on their degree of importance. Furthermore, environmental accounting is based on valuation of environmental and ecologic elements. In fact, knowing the value of environmental resources makes it possible to quantitatively calculate the cost of environmental pollution and changes in the environment and to account for these costs in estimating the total budget required for creation of making such changes or running development projects.

Policymakers are always dealing with questions such as whether or not to construct a dam on wetland, whether or not to use its lands for construction of houses, whether to keep it intact as a conserved region or convert it into a region of agricultural use, and so forth. Economic valuation of wetlands can help policymakers when choosing between using and preserving wetlands. This results from the fact that such valuations reveal outcomes of changes in wetland due to a certain activity. Several studies have shown the benefits of using environmental economic models in such situations (Colative, 2002; Creemers and Bergh, 1998; Bennett and Whitten, 2002).

As one of Iran's major international wetlands located in Khuzestan province, Shadegan Wetland offers the opportunity for

[1] Ramsar Convention Bureau, International Union for Conservation of Nature and Natural Resources, 1989.

sustainable development. Notwithstanding, unsustainable activities especially those involving chemical industries, pollution, mismanagement of water resources, and other improper activities have imperiled it (Kaffashi et al., 2011).

This study seeks to calculate the market values of Shadegan Wetland using market prices. In addition, non-market values of Shadegan wetland, that is values for which no market prices are available, are estimated herein using the method of choice experiment.

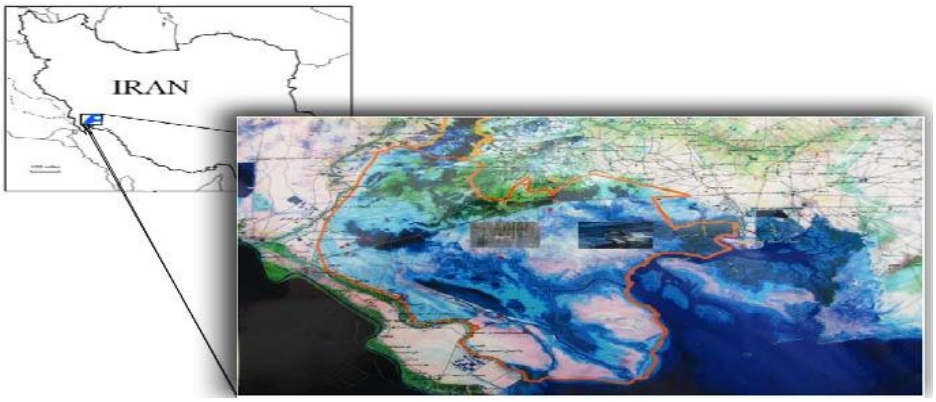
In the next section, Shadegan Wetlands is introduced. Section three discusses the methodology used: design of choice experiment. The results of valuation of the wetland are presented in section four. The final section is devoted to conclusion and gives some recommendations as to the prospective research.

2. Shadegan Wetland

About six percent of total area of the globe, namely 885 million hectares, is covered by wetlands. Of these, Iran's portion is 250 wetlands totaling to 2.5 million hectares in area. More than half of them in terms of area, namely 22 wetlands were registered in Ramsar's Convention and are known as internationally important wetlands. Wetlands located in Iran are unique thanks to their geographical location and special climatic conditions. Shadegan wetland is one of Iran's international wetlands listed in Ramsar's Convention held in 1971.

According to Khuzestan province's statistical calendar, 116703 urban families comprising a population of 670894 people, and also 29390 rural families comprising 127480 people live in twenty kilometers from Shadegan wetland. Rural families have strong dependence on this wetland. As Iran's largest wetland, and the second largest wetland recognized in Ramsar's Convention, it is located at the end of the Jarahi River in the southwest of Iran (Fig. 1).

Figure 1: Wetland's location



With an area of 400000 hectares this wetland is the 34th largest wetland in the world and the largest one in the Middle East. It is in form of a wide indentation whose breadth varies from 5 km in north to 45 km in south. Its depth of water varies from few centimeters to three meters. Its downward slope of bottom varies between 0.1 and0.15 meters per kilometer towards south. From morphologic and topographic view points, it seems that it was once connected to Hourol Azim at Iran-Iraq border. The Jarahi and Maleh rivers are its tributaries.

3. Theoretical Bases and Valuation Methods

In the absence of market prices, the value that is attached by the society to a commodity is hard to determine. Even if the problem of indeterminacy of the consumer's preferences were solved, determining the value of a commodity such as air or water would prove to be difficult due to its intangibility. Even though economists admit that some environmental goods are immensurable, they still need to calculate the benefits that the quality of environment has for the society. Conceptually, society receives benefits from environmental goods in two different ways: use values and non-use values (existence value). Use value denotes the utility or benefit that is obtained from the use or access to an environmental commodity. On the other hand, non-

use value refers to the utility or benefit that durability of a commodity or service offers.

Use value is divided into direct use value, indirect use value and potential value. Direct use value is the value that is attached by an individual to the direct use of a commodity, for example the profit that one makes from fishing in the case of wetland. One the other hand, indirect use value is the value attached by an individual to their indirect use of a commodity, for instance ecological benefits of a wetland. Potential value is the value that an individual is willing to pay to preserve the wetland as a potential for prospective use. Non-use value seems to be abstract. Despite, it is a very important motive for participation of the private sector in funding natural resources, conservation plans and also various environmental policies.

Mitchell and Carson (1989) enumerate vicarious consumption and stewardship as the reasons for existence of non-use values. Vicarious consumption means the valuableness of a public commodity to people due to the advantage that it makes for the others. That is individual's utility is dependent upon other people's utility meaning that an individual obtains utility from knowledge about the fact that a public commodity is used by other people. Stewardship emanates from the commitment to conserve the environment for next generations, and also identification of the inherent value of natural resources. Therefore, the total value of an environmental commodity could be expressed as follows:

Total value = use value (direct, indirect and option value) + non-use value (existence value)

In general, economic valuation methods are based on direct market evaluation, market substitution evaluation, product cost evaluation, or actual impact evaluation (Cui et al, 2012). Direct market evaluation is a method for estimating the monetary value of goods and uses that people directly receive from a commodity. This methods falls into the category of market value and

expenditure methods. The figure obtained from these valuation methods reflects people's willingness to pay for direct goods and benefits of wetlands (Barber et al., 1997).

There are, however, two problems associated with this method: first, many products of a wetland are harvested for domestic consumption of locales and are never sold in the market; second, market prices might be misleading as a result of government's interventions in market through setting price ceilings, controlling the exchange rate, taxing, subsidies and monopolies or by imperfect competition (Tuan et al. 2009). Under such conditions, market substitution evaluation needs to be resorted to.

Market substitution price can be used when, in view of the lack of market for a commodity or service, there is no price. Under certain conditions, prices of the substitutes that are of similar environmental benefits to those of the commodity of interest and are exchanged in the market could be used. This method yields exact information only if two commodities or services can completely substitute each other. Otherwise, some modifications may be needed to achieve valid results. Market substitution evaluation method comprises Traveling Cost Method (TCM), Avoidance Behavior (AB), Defense Expenses (DE) and Hedonic Price Method (HPM) (Cui et al, 2012). Individuals' preferences could be surveyed by observing their market behavior through any of the aforementioned methods. The valuation process of a natural resource comprises three steps: first, problem definition and selection of a correct approach for economic evaluation; second, definition of the domain to be surveyed, limitations of analysis, and the needed information; three, definition of data collection methods and valuation techniques needed in economic valuation including distribution effects (Barbier et al., 1997).

Valuation methods of environmental goods are divided into two groups of methods; those based on revealed preferences and those based on stated preferences. Methods based on revealed preferences are those based on actual observable options and help

to deduce the value of resources directly. In the methods based on stated preferences, on the other hand, survey techniques are used to determine willingness to pay for a marginal improvement or loss. In fact, these methods which are based on hypothetical markets are used when the value is not directly observable.

In this study, to estimate the total economic value of Shadegan wetlands, both methods of market based valuation and non-market based valuation are used.

A summary of the valuation methods is presented in Table 1.

Table 1: Summy of valuation methods

method	Revealed preferences	Stated preferences
Direct	Market-based valuations • Simulation markets	• Provisional valuation
Indirect	• Traveling cost • Hedonics • Avoidance costs	• Feature-based models • Common analysis • Choice analysis • Conditional ranking

Source: Mitchel and Carson, 1989

Non-market based valuation methods are now being used extensively as a powerful tool in policy makers' hands in developed countries. These methods, in particular the choice experiment method, have even attracted private sector's attention (Bennett & Birol, 2010). Choice experiment method is an application of Lancaster's theory of consumer demand (1966), combined with McFadden's random utility model (1973).

In contrast, for Choice Experiment, the individuals are given a hypothetical setting and asked to choose their preferred alternative among several alternatives in a choice set. The CE is a multi-attribute stated preference elicitation technique because each alternative is described by a number of attributes. A monetary value is included as one of the attributes, along with other attributes of importance, when describing the profile of the

alternative presented. Thus, when individuals make their choice, they implicitly make trade-offs between the levels of the attributes in the different alternatives presented in a choice set (Alpizar *et al*., 2001).

Furthermore, the CE method avoids many of the problems associated with the CV method such as information bias, design bias (starting point bias and vehicle bias), hypothetical bias, yea-saying bias, strategic bias (free-riding), substitute sites and embedding effects (see Bateman *et al*., 2003; Hanley *et al*., 1998; Boxall *et al*., 1996).

3.1. Choice experiment design

Choice experiment method should be used in five stages: 1) selecting attributes; 2) assigning levels; 3) designing experimental choices; 4) constructing a set of choices; 5) measuring the preferences (Bateman *et al*., 2003).

Correct specification of the choice set that is used by people for making a choice is of great importance for the method of choice experiments to be successful (Bennett and Blamey, 2001).

The first step in designing choice experiment method is selection of attributes. The second step is to determine proper levels for these attributes. Consequently, the properties selected for this study include natural scenery, preservation of biodiversity, ecological function and educational benefits. Three levels were considered in defining proper levels for attributes: the Current level (‘‘do nothing’’ or ‘‘status quo’’) which shows the current qualitative level of wetland benefits; the next two levels show the moderate and high level qualitative benefits of the wetland relative to the current situation. Noting the fact that the objective of this study is to calculate changes in people’s welfare, it was necessary to include a monetary attribute. The selected monetary value in this study is based on the entrance fee of Iran’s national parks and the consultations given by experts of Iran’s department of environment. The prices used in this study were 70000, 45000 and 0 Rials. After determining the levels of benefits associated to the wetlands and prices using the fractional

factorial design, 15 scenarios were set in the framework of five triple choice cards. In order to utilize the comments made by people from academia and improve the level of cards, the cards were sent to the members of the faculty of economics of the Shahid Chamran University of Ahvaz. Then, based their comments the cards were modified and distributed among a number of randomly selected respondents to verify their clarity and comprehensibility. The cards were finalized after surveying the gathered cards and considering the comments made by the experts from the department of environment. Table 2 depicts a sample card.

Table 2: Sample card

	Scenario 1	Scenario 2	Scenario 3
Natural scenery	poor	poor	moderate
Biodiversity	poor	good	medium
Ecological function	poor	poor	good
Educational function	poor	poor	good
Conservation value	0	45000	70000

3.2. Sampling, questionnaire and data collection

Each questionnaire consisted of three sections. Questions in the first part are about age, education level, level of income, and other personal particularities. In the second section is a table where the respondents' choices are marked in each card. Basically, comparing the current situation with the desirable level of attributes expected from the wetland, respondents state their willingness to pay for changing the situation from the current situation to a desirable condition. Then, they choose the corresponding option on the card. In order to help respondents in answering the questions, there is a set of images, maps, and written and oral explanations. It is expected that this will prevent bias in the answers. With the permission of the Department of

Environment of Khuzestan province the process of distributing and collecting questionnaires was performed by qualified actuaries at various time intervals.
Of all 160 completed questionnaires were collected, 10 were dismissed and the rest were used in the analysis.

3.3. Econometric model

Mixed Logit model, a category of discrete choice models, are used in this study. It is a very flexible model capable of approximating any model of random utility (McFadden &Train, 2000). The simplest method which has been extensively used in recent studies is based on random coefficients. In this model, a respondent is faced with a choice among *j* alternatives. The utility of individual *n* from the alternative *j* is specified according to the following equation:

$$U_{nj} = {}_{n}x_{nj} + b_{n}X_{n} + £_{nj} \quad (1)$$

where U_{nj} is the utility for alternatives *j* for individuals *n*; x_{nj} denotes is the observed variables for alternatives *j* and individuals *n*; β_n is the vector of coefficient for the individual; x_n represents social-economic particularities of individual *n*; and $£_{nj}$ is a random term distributed independently and identically. It is presumed that all variables other than price are random and normally distributed.

For an estimation of willingness to pay (WTP), the price or cost attribute must be included. Marginal willingness to pay is obtained by dividing for each nonmonetary attribute of the wetland by the value of the price attribute $_{p}$

4. Estimation of the direct use values

To estimate direct use values, market price method was used. The direct use values are first divided into five categories of horticulture, agriculture, animal husbandry, fishery and tourism. Subsequently, by designing stratified sampling in each of the villages and rural districts adjacent to the wetland, the size of the

sample was determined. Of all rural districts adjacent to the wetland, only those whose water is supplied by the wetland were studied. Of the remaining rural districts six ones were randomly selected. Depending on the extent of each of those rural districts, some villages were selected in it for sampling.

A pilot study was run to estimate the sample size. This was followed by a complementary sampling. Preliminary sampling and questionnaires were used in the cities of Abadan and Shadegan and in their villages and rural districts. Furthermore, for each rural district, information on the number of people employed in each sector and the information obtained from the village's trustee were gathered. In this section the value corresponding to creation of job by Shadegan wetland and also the values of rental associated with its lands were calculated and added to the direct use values. It's noteworthy that in order to estimate the value associated with tourism, tourism demand function was estimated using travel cost method. Furthermore, the value associated with creation of jobs in each sector and also the values of the lands covered by the wetland were added to direct use values. Given in Table 3 is the estimated value for the annual value of direct use of Shadegan wetland.

Table 3: Annual of direct use values

Type of Service	Total value	
	Rials	Dollars
Fishery	1119940643330	48693071
Animal husbandry	7647414300000	332496273
Horticulture	907892160000	39473572
Agriculture	1094936529000	47605936
Tourism	2838818560	123426
Economic value of job creation due to the wetland	21583530000000	938414347
Annual rental of the lands covered by the wetland	5121778110000	222686004
Total annual use values	37478330560890	1629492633

In order to derive the total value of the wetland, we used the uniform-series present worth factor as follow:

$$A = P\left[\frac{i(1+i)^n}{(1+i)^n - 1}\right] \quad n \to \infty \tag{2}$$

Noting that the number of periods of interest tends to infinity, after some simple mathematical operations the following result is obtained:

$$P = A/i \tag{3}$$

Where,

P denotes present value of the wetland in the next hundred years;

A shows the annual value of the use of the wetland;

i represents real interest rate of the agriculture and natural resources sectors.

The value in Rials and Dollars of direct use benefits associated with the Shadegan wetlands were obtained using the above formula and a value of 0.42 for real interest rate:

Value in Rials = 8923412038307142

Value in Dollars = 38794436448 (based on the exchange rates in the year 2014)

5. Estimation of indirect use benefits and marginal willingness to pay

Once data was collected and put into computer software, action variables were constructed from individual's attributes and fourfold attributes of the wetland and added to the simple RPL (Random Parameters Logit) model to control for the economic-social characteristics of the respondents. Then, Random Parameters Mixed Logit Model was estimated using the method of maximum likelihood. The results are given in Table 3.

$$Choice = .89a_2 + .57\,a_3 + .23d_2 + .21\,c_2 + .61\,e_3 - .000074\,price$$
$$(0.000)\quad (0.046)\quad (0.185)\quad (0.189)\quad (0.000)\quad (0.000)$$

Where,

a_2 is natural scenery at the moderate situation,
a_3 is natural scenery at the good situation,
d_2 is ecological function at the medium situation,
e_3 is educational services at the good situation.

The values enclosed by parentheses are *p*-values. The resulting model is finalized based on likelihood ratio test. Results showed that changing the model with interaction variables to simple model will significantly increase the logarithm likelihood. Thus, the model without action variables gives a more suitable model for valuation of uses of wetland and significantly improves significance of the coefficients. Using the estimated model, the marginal willingness to pay together with its upper and lower limits were obtained for each attribute. (see Table 4).

Table 4: Willingness to pay for indirect use values (Rials)

	a_2	a_3	d_2	c_2	e_3
WTP	120477.9	77792.319	30961.38	28703.50	82152.70

The values in Table 3 represent the monetary value of quality improvement of each attribute of Shadegan wetland to the people residing in its vicinity. For example, changing the scenery of the wetland from its current situation into an intermediate situation is worth 120470 Rials to each individual. Also, improvement of biodiversity from the current level to an intermediate level is of a value of 28700 Rials to each individual.

In order to generalize these figures to all indirect users of the wetland, it is necessary to specify people who enjoy indirect use values of the wetland. Based on the collected figures, all occupants of Shadegan and half of those of Abadan, Mahshahr and Bandar-e-Imam are using indirect use values of the wetland. Based on this fact, indirect use value was obtained by extending this figure to the whole population. Expressed as an annual figure and taking into account the population of this area:

Value in Rials =1347070080000

Value in Dollars = 58568264 (an exchange rate of 23000 Rials per Dollar)

Using the formula of compound interest, the values in Rials and Dollars of indirect use values of Shadegan wetlands were obtained based on a real interest rate of 0.42 in the year 2014:

Value in Rials = 320730971428571
Value in Dollars = 13944824844 (for an exchange rate of 23000 Rials per Dollar)

6. Estimation of the option value

Option value is willingness to pay for preservation of wetland of people who have not yet visited the wetland but have planned to visit it to in the future. In order to control economic-social attributes of the respondents, action variables were constructed from personal attributes and fourfold attributes of the wetland and introduced into the model. After estimating the model using the method of maximum likelihood and eliminating statistically insignificant variables, the best model was estimated. Results are shown in Table 5.

Table 5: Results of estimation of the Logit model using random action parameter for option values

Variable	Coefficient	Standard error	*z*-statistic	*p*-value
Price	-0.0015	0.0005	-2.69	0.007
a_3	2.08	0.59	3.5	0.000
e_2	4.8	2.3	1.08	0.037
e_3	4.72	2.03	2.33	0.020
c_3	4.69	2.01	2.33	0.020
d_3	2.17	0.55	3.94	0.000
e_3g	0.063	0.038	1.64	0.100
e_2i	0.0000016	0.00000049	3.26	0.001
c_3i	0.00000124	0.000000403	3.08	0.002
a_2ed	0.14	0.05	2.60	0.009
e_2ed	0.12	0.06	2.00	0.046
a_2d	0.016	0.01	1.65	0.09
Log Likelihood = -328.72				

a3 is natural scenery at the good situation, e2 is educational services at the medium situation, e3 is educational services at the good situation, c3 is biodiversity at the good situation, d3 is ecological function at the good situation, e2g is interaction variable obtained from educational services (at the moderate situation) and age of respondents,

e3i is interaction a variable obtained from educational services (at the good situation) and income of respondents, c3i is interaction variable obtained from biodiversity (at the good situation) and income of respondents, a2ed is an interaction variable obtained from natural scenery (at the moderate situation) and educational level of respondents, e2ed is an interaction variable obtained from educational services (at the moderate situation) and educational level of respondents, a2d is an interaction variable obtained from natural scenery (at the moderate situation) and distance of respondent's living place.

All of the variables but a_2d are statistically significant at a confidence level of 95%. It's noteworthy that the signs of all variables are as theoretical expectation. As expected, the price variable is of a negative sign which indicates negative effect of price on individual's utility. In other words, an individual loses utility when they pay. The coefficients of all other model variables, including attributes of the natural landscape, biodiversity, ecological function, and educational function of the wetland are of positive sign which implies positive effect of level of qualitative attributes of the wetland on individuals' level of total utility.

Conducting the likelihood ratio test between simple and interaction models indicated that the model with interaction variables is better for option values.

Once a suitable model was estimated for option values of the wetland, each individual's marginal willingness to pay for improving the attributes of wetland was calculated in Logit Model using action variables. Results are shown in Table 6. It's important to note that the estimated values imply a minor tradeoff ceteris paribus.

Table 6: Marginal willingness to pay for potential benefits

	d_3	c_3	e_3	e_2	a_3
WTP (Rials)	14513	31350	31595	32114	13925

Source: results of the study

Potential benefits are not limited to the residents of Khuzestan province. In order to extend the figures obtained for option value of the wetland to the whole population of country, it's necessary to estimate the population who have not ever seen the wetland but have planned to visit it in the future. Based on this, two groups of people, one within a radius of 600 km from the wetland and the other outside that range were studies. In the end, annual option value of Shadegan wetland was found:

Annual value in Rials = 9755300998000
Annual value in Dollars =206752217 (for an exchange rate of 23000 Rials per Dollar)

In order to extract the total value of the wetland, uniform-series present worth factor was used and the following figures were obtained:

Value in Rials =1132214523333333
Value in Dollars =49226718405 (for an exchange rate of 23000 Rials per Dollar)

7. Estimation of the non-use values

As was mentioned previously, the population enjoying non-use values of the wetland was divided into three groups. The first group includes those occupants of Khuzestan province who have not ever seen the wetland and have no plan to visit it. The second and third groups comprise a similar group of individuals who live respectively within and outside a radius of 600 km from the wetland. Population of each group along with the relevant calculations is given in Table 7.

Table 7: Value of non-use benefits for the whole country

	Khuzestan province	Outside the province up to a radius of 600 km	601 km and above
Population	4531720	16319907	54298042
Percentage of people who have no plan to visit the wetland	70	55.9	95.7
Number of people who have no plan to visit the wetland	3172949	9122828	51963226
Non-use value for each group	391817953200	11265661720000	6416782913000
Annual non-use values of the Shadegan wetland in Rials	18074262580000		
Annual value of non-use values of the Shadegan wetland in US Dollar	785837503		

In order to convert the annual value of the wetland to total value, uniform-series present worth factor was used leading to the following results:

Value in Rials = 4303395852380952
Value in Dollars = 187104167494 (for an exchange rate of 23000 Rials per Dollar)

8. Total economic value of the wetland

In this section, total value of the wetland uses, including direct, indirect use values and optional values together with non-use values are derived. Results are shown in Table 8.

As can be seen, the total value of the wetland uses amounts to14679753385449998 Rials which is equivalent to $638250147193 based on an exchange rate of 23000 per Dollar. Obviously, benefits offered to human society by natural blessings such as wetlands are so extensive. Some of these benefits are unknown and some invaluable. Consequently, completeness of the figures obtained is by no means claimed. Clearly, advances in science and evolution of the valuation methods of attributes will result in figures that are more complete and reliable.

Table 8: Total value of values of the Shadegan wetland

Benefits		Value in Rials	Value in Dollars
Use value	Direct	8923412038307142	387974436448
	Indirect	320730971428571	13944824844
	Potential	1132214523333333	49226718405
Non-use value (existence value)		4303395852380952	187104167494
Sum		14679753385449998	638250147193
Value per hectare		36699383463	1595625
Annual rental per hectare		366993834	15956

9. The contribution of Shadegan wetland to gross production of Khuzestan province

Since Shadegan wetland provides residents of Khuzestan province with various benefits, its contribution to province's gross production was calculated. To do so, nominal GDP of the year 2014 and annual value of uses were used. Besides, in order to calculate the contribution of other uses of wetland (indirect-use value, option value, and non-use value) on gross production of the province these numbers were first added to the gross production of the province, since the values of these uses are not accounted for in the gross production of the province. The results are shown in Table 9.

Table 9: The contribution of various values of Shadegan wetland in the gross production of Khuzestan province

		Annual value (Billion Rials)	Contribution on the gross production of the province (%)
Use values	Direct	37478	4.4
	Indirect	1347	0.15
	Potential	4755	0.55
Non-use value		18007	2
Total value of the wetland		61587	7.1

As expected, the contribution of direct use values for which consumers' preferences are revealed in actual markets is much higher than that of other (qualitative) uses. The reason for this difference might be explained by a psychological principle stating that people tend to attach to what they already have a higher value than they do to what they do not have. (Tietenberg and lewis, 2009)

10. Conclusion

Even though a perfect valuation of natural resources is impossible, economic techniques could be used to estimate some aspects of these values. In the present study, it was sought to calculate the total economic value of Shadegan wetland, which is one of the major international wetlands located in Iran, taking into account the values of direct use, indirect use and option values associated with it. To do so, various benefits of the wetland were identified and quantified using the techniques available.

Based on this study, the total economic value of Shadegan wetland was found to be 14679753385449998 Rials ($638250147193**).** Undoubtedly, the high value obtained suggests the high importance of this natural resource to its owners. The values obtained for WTP's of users of the wetland reflects their support for any protective measure that is taken about the wetland. Thus, not only shall the past trend in protection of the wetland be corrected (continuing of which might result in the devastation of the wetland), but also measures

must be taken in order to improve the qualitative situation of the attributes of the wetland.

Hence, all ministries and organizations that are engaged in activities in the vicinity of the wetland that can lead to its deterioration or mutations of intact nature should be responsible for their activities and the ensuing economic or social losses. In this regard, it could be mentioned Shadegan-Mahshahr road part of which is within the territory of the wetland, oil pipelines or booster stations which have subjected the wetland to high risk of pollution due to leakage, or agricultural or industrial plans are detrimental to the wetland.

About 55 km of Shadegan-Mahshahr road which is 80 meters wide (including its shoulders) is located within the territory of the wetland. Based on the estimated value of each hectare of the wetland, the Road Ministry can be charged annually a sum of 161477286960 Rials for occupying the land belonging to the wetland and the money thus obtained can be used for protection of the wetland. Similar calculations might also be performed as to the Oil Ministry. Of course, this does not warrant tearing of the wetland asunder with permission. Instead, before starting any project in the vicinity of the wetland, use should be made of these figures in the economic-environmental evaluations of the plan to see whether it is economical.

One of the methods for long term protection of the wetland is that of improving public awareness about the importance of the wetland. Lack of sufficient information about natural scenery, ecologic function, and economic value of Shadegan wetland has caused its importance not to be displayed properly. It’s recommended that further educational programs are conducted wherein the results of this study are used to increase public awareness about the economic value of Shadegan wetland. Figures obtained for the tourism-related benefits from the wetland are low. Thus, considering the weather condition of Khuzestan province, it’s recommended that recreational facilities are provided to make use of the potential of the wetland for development of the region and increasing local residents’ income.

Likewise, with the aid of advertisement, and in particular, international advertisement and increasing the attention of the domestic eco tourists it would be possible to attract more foreign tourists. This will lead to good exchange earnings for the country and creating lots of jobs in the region.

The figures obtained revealed that the contribution of Shadegan wetland in Khuzestan province's GDP was notable (7.1%). Based on contributions of values of the wetland in provinces GDP, necessary budget for protection of the wetland has been allocated so that provincial budget can be used in a justifiable manner.

In light of high economic value of Shadegan wetland, setting stringent regulations as to preventing the change of functionality of the land belonging to the wetland is recommended. Finally, it's suggested that future research in the area measure the costs imposed on the wetland by effluents of alcohol or chipboard factories, sugar cane cultivation and pertinent industries. Results of such studies might be used

- for actualization of the province's GDP
- as a basis for identifying violating plants
- as a basis for putting taxes on pollution to force them to purify their effluents
- as a basis for encouraging the plants to purchase effluent purification equipment by paying subsidy on those equipment
- as a guide to decide the economy of future projects in the vicinity of the wetland

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Reference:

Alpizar, F., F. Carlsson & P. Martinsson. (2001). Using Choice Experiments for Non-Market Valuation. Working Papers in Economics no. 52. Department of Economics Goteborg University.

Barbier E. B., Mc. Acreman & D. Knowler (1997). Economic Valuation of Wetlands: A Guide for Policy Makers and Planners. Gland, Switzerland: Ramsar Convention Bureau.

Bateman, I. J, G, M. Mace C, Fezzi, G, Atikinson & K, Turner. (2003). Economic Analysis for Ecosystem Service Assessments. Environ Resource Econ, Vol 48 (2): 177-218.

Bennett, J. & R. Blamey. (2001). Introduction to The Choice Modeling Approach to Environmental Valuation. Edward Elgar Publishing, United Kingdom, pp. 1-13.

Bennett, J. & E. Birol. (2010). Choice Experiments in Developing Countries. Edward Elgar Publishing Limited. UK and Northampton MA.

Bennett, J. & S. Whitten. (2002). The Private and Social Values of Wetlands: An Overview, Land & Water Australia, Canberra.

Boxall, P.C., W.L. Adamowicz, J. Swait, M. Williams & J. Louviere. (1996). A Comparison of Stated Preference Methods for Environmental Valuation. Ecological Economics 18: 243–253.

Colavito, L. (2002). Wetland Economic Valuation Using Bioeconomic Model: The Case of Hail Haor, Bangladesh, Paper Presented at Workshop on Conservation and Sustainable Use of Wetlands: Learning from the World, IUCN − The World Conservation Union, Kathmandu.

Creemers, G. & V. J. D. Bergh. (1998). The use of a Hydrological Economic Model to Estrinate Indirect use Values of Wetlands: A Case Study in South Africa. Paper Presented at 4th Workshop of the Global Economics Network, Wetlands: Landscape and Institutional Perspectives, Stockholm.

Cui, M., J. X. Zhou & B. Huang. (2012). Benefit Evaluation of Wetlands Resource With Different Modes of Protection and Utilization in the Dongting Lake region. Environmental Sciences 8: 2–17.

Hanley, N., J. Shogren, & B. White. (1998). Environmental Economics in Theory and Practice. England: Macmillan.

International Union of Conservation of Nature (IUCN), http://iucn.org/.

Kaffashi, S., M.N. Shamsudin, A. Radam, A.Kh. Rahim, M.Y. Rusli & M. Yazid. (2011). Economic Valuation of Shadegan International Wetland Iran; Notes Forconservation. Regional Environmental Change 11(4), 925-934.

McFadden, D. & K. Train. (2000). Mixed MNL Models for Discrete Response. Journal of Applied Econometrics, John Wiley & Sons, Ltd., vol. 15(5): 447-470.

McFadden, D. (1974). Conditional Logit Analysis of Qualitative Choice Behavior. In: Zarembka, P. (Ed.), Frontiers in Econometrics. Academic Press, New York.

Mitchell, R.C. & R.T. Carson. (1989). Using Surveys to Value Public Goods: The Contingent Valuation Method. Resource for the Future, Washington, DC.

Ramsar Convention Secretariat. (2007). Ramsar Handbooks for the Wise Use of Wetlands.3rd. Ramsar Convention Secretariat: Gland, Switzerland.

Tietenberg, T. & L. lewis. (2009). Environmental & Natural Resource Economics (8th Edition). Pearson Education, NewYork.

Tuan, T. H., M.V. Xuan, D. Namb & S. Navrud. (2009). Valuing Direct Use Values of Wetlands: A Case Study of Tam Giang–CauHai Lagoon Wetland in Vietnam. Ocean and Coastal Management, 52: 102–112.

UNEP. (2001). The Mesopotamian Marshlands: the Demise of an Ecosystem. Early Warning and Assessment Technical Report. In: Partow H (Ed.), UNEP/DEWA/ TR.01–3 Rev. 1. United Nations Environment Program, Nairobi, Kenya.

http://www.grid.unep.ch/activities/sustainable/tigris/marshland (Accessed 21.04.10).