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Economic and social evaluation of Atriplex Lentiformis Plantation and its Effect on the Rural Economy

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Abstract
This paper sought to evaluate cultivation social and economic of Atriplex lentifomis in Golestan rangelands (case study: Chapar Quymeh and Baharmeydan). the present research is conducted in a survey, descriptive and explanatory manner (hypothesis testing) in which field and library researches were used. research population is a number of ranchers in plan region of Chapar Quymeh (93 people) and a number of ranchers in plan region of Baharmeydan (37 people), research sample size for Chapar Quymeh and Baharmeydan was estimated to be 75 and 37 stakeholders according to Krejcie and Morgan formula. Sampling was carried out in systematic random way and tools used in research include researcher made 25-item inventory with Likert scale.
The results of factor analysis test and ranking social and economic indices showed that factors affecting Atriplex cultivation in Baharmeydan area are as follow: production, income and capital, entrepreneurship, social welfare, recreational value, hygiene, sense of belonging to place, institution and education respectively. As for Chapar Quymeh this prioritization is: production, income and capital, entrepreneurship, institutional, social welfare, sense of belonging to place, recreational value, hygiene and education. Using one-sample T test, it was found that the outcomes of social and economic indices affected by bush planting are positive in study areas.

Key Words: *social, economic, Atriplex lentiformis cultivation*

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Introduction

The rangelands of Iran are considered as the most important and valuable national sources of country and it also has crucial role in maintaining country's water, soil and meeting protein needs (Khosroshahi and Ghavami, 1998). Spreading poor and degraded rangelands in many aridarid regions of country has made preventing these resources degradation necessary. Some actions such as applying management methods of livestock grazing, seeding, sowing and bush planting are effective in modifying rangelands and prevent their deredation. In common project of rangeland technical office of country's forest and rangeland and watershed organization with food and agriculture organization (FAO), the experts of this organization introduced three types of Atriplex canescens, Atriplex halimus and Atriplex lentiformis for rehabilitation of arid rangelands in Iran (Ghorbanian et al, 2004).

Bush planting is one of the mainly costly methods for restoration and rehabilitation of rangelands that often serve as a destructive method. Since the components of ecosystem means live creatures and their environment affect each other so using a non-native type for creating vegetation in degradaded rangelands ecosystems needs comprehensive ecological studies to provide an utter recognition of used plant and identify its effects on environment and vice versa. Bush planting in Iran can be considered for Atriplex plant. Winter rangelands of Golestan province have been widely planted with Atriplex plant. In spite of different studies about the effects of cultivating this non-native plant effects on ecosystem, to the best of our knowledge unfortunately there is no study on social and economic impacts of cultivating this plant and recommend results as for whether its cultivation should be continued or stopped. Therefor considering social and economic effects of cultivating Atriplex lentiformis in two regions of Chapar Quymeh and Baharmeydan, the main goal of this study is answering whether social and economic effects of Atriplex cultivation on region are positive or negative.

Problem statement

Given its geographical and climate soil conditions, Golestan province has diverse vegetation such as: dense forest, natural forest, grassland and even desert. Province's rangelands area is about 862 thousand hectares where summer rangelands accounts for 110 thousand hectares and the rest covers winter rangelands (Kouseh Gharavi, 2010). These rangelands support livestock industry and let region societies to maintain their traditional lifestyle. Most of these rangelands with poor condition are located in arid and semiarid with low rainfall (about 250 millimeter in a year) and evaporation is twice a rainfall and also soils' salinity and sodium in terms of ecological have led to sensitive and fragile conditions. Overgrazing, drought, sensitivity erodablity because of being loess and early grazing are considered as the reasons of these rangelands' degradation. Vegetation restoration is an action which can be taken to prevent rangelands degradation. In arid regions where direct seeding isn't successful, cultivating bush plants through replanting grown seedlings is successful (Mesdaqi, 2004).

Restoration and rehabilitation these rangelands require different kinds of adapted vegetation types that be able to prevent soils' destruction quantitatively or qualitatively besides producing forage. Soils' salinity and alkalinity are considered as two deterrent main factors for plants functions; but yet there are some types which can tolerate soil stress and in spite of mentioned limitations can be located in desert lands and grow well. Atriplex types are such these plants which are used for restoring deserts and their cultivation has had good results in a way that by restoring desert areas' exploitation through Atriplex cultivation, a part of required animal protein of country can be provided (Sarafraz Ardakani, 2001). Having fast growth and being compatible with different environments and producing noticeable

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forage, Atriplex has been particularly important in desert and arid areas. This plant with different types is the best one for preventing desert development and restoration desert environmental conditions considering conditions in desert environments of Iran (Rahimizadeh et al, 2010).

In order to rehabilitation of country's rangelands and increasing forage production in past years, Atriplex has been planted in different spatial and temporal scales. This plant gets highly adapted to arid conditions and low temperatures and has been widely used in rangelands restoration. The wide parts of rangelands in arid and semi-arid areas in Golestan are saline or with low salinity where Atriplex is cultivated in vast part of these rangelands and lands under its cultivation are increasing annually. On the other hand vegetation degradation is one of the main factors on declining biodiversity, increasing soil erosion and declining grazing potential of rangelands so vegetation regeneration can affect vegetation restoration and erosion reduction can be positive. Therefore given difficulties of plants' cultivation in arid and semi-arid areas, being aware of the relationship between social and economic factors with plant types introduced to area and also paying attention to these types ecologic nature are necessary to achieve the most appropriate results in rehabilation of vegetation (Heshmati et al, 2006).

A question which is now arises is whether Atriplex cultivation has meet mentioned goals given the high cost spent for it? There are conflicting reports in this field that confirm or reject cultivation of this plant. Now after 20 years from beginning Atriplex cultivation operation in Golestan and the existence of some masses of different ages, an appropriate field has been created to investigate social and economic effects of this plant in area. So the most important goal of this study is to determine social and economic effects of Atriplex cultivation on native and local communities.

Study population

Study area has been selected out of concerned masses in two main Atriplex cultivation areas in Golestan province (Chapar Quymeh and Baharmeydan). Elevation difference between two areas is 370 meters.

Rangeland plan in Baharmeydan is located is in 10 kilometers away Maraveh tappeh southeast. Total area under this plan is covered by 3100 hectare. This area nestled over geographical coordinates 55`, 59`, 43` and 10`, 5`, 56` E and 37`, 51`, 37` and 10`, 51`, 37`N. Annual rainfall average based on weather station's rainfall statistics in Maraveh tappeh is 360 milliliter. General area physiography is as hilly area and average elevation above sea level is 410 meter. Chapar Quymeh rangeland plan is located in 23 km away Gonbad-e Kavus northeast and its area is 6456 hectares which is located in coordinates 45`, 59`, 54` and 8`, 8', 55` Eand 38', 30`, 37' and 45', 24`, 37'N. sea above elevation is almost 40 meter. According to weather statistics of Gonbad-e Kavus the average of rainfall is 350 km (Sheydaei et al, 2013).

Variables' conceptual definition

Social economic factors:

Regardless of the different names which are attributed to it, social-economic factors are one of the most important and functional independent variables in analyzing behaviors and people's belief and their position in social hierarchy. Economic factors clarify status that a person has in economic regime and highlights individual's position in production section more accurate (Biro, 1991). Economic capital is material asset such as: money and material objects that can be used for producing goods and services (Giddens, 1995).

Social factor is a subjective construct that its valuation is accomplished by social-economic criteria functions in society. These factors are attention, credit and value that society considers them for social role of person, group or social class (Biro, 1991). Economic factors are

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derived from property and income but social position is determined by different lifestyle that people or groups follow (Giddens, 1995).

Economic Valuation

Products and services are valuable only in case that people give them value directly or indirectly. Value is usually measured according to exchanges and deals so it is a gradable thing. In order to this, money is usually used as a unit and total value of society is a collection of individual values (Fervor, 2007).

Economic valuation compares the benefits obtained from resources and costs. Costs are those missed benefits. Economic valuation is the process of determining goods and environmental services' value. This is accomplished because of achieving a single output. Goods and services (natural sources) existence in environment and changing in each one of goods and environmental services' (natural sources) performance are valorized in goods and environmental services economic valuation (Suparmoco, 2008).

In environmental policies, economic valuation includes determining monetary value of modifying services and performances and share of environment capital. This monetary value is same as price in effective shape of it (Pierse and Secombehit, 2000). Economic valuation approach of environmental changes is based on people's preferences for their environment changes. Environmental interests and loss are defined in so-called form of human health increase or decrease. If these values are calculated, economic valuation provide the possibility of comparing environmental effects with basic financial costs and interests resulted from each kind of project or policy (Izadi and Barzegar, 2011).

Based on definition which was proposed in 2004 by rangeland community, rangeland is a land including mountain and side hill or surface land covering self-growing plants where its vegetation is often grass, bushes and shrubs or scattered having tree and are used as the source of producing food for livestock and wildlife or other natural gifts. Producing forage and food of livestock is economic role of rangelands; the value of one hectare rangeland during a year is 232 dollars, its forage value 57 dollars in a hectare that 24.5 and 75.5 percent of that are environmental values besides based on mentioned reference the value of one hectare forest is 969 dollars (Khalilian, 2001). Rangelands also play an important role through protecting soil and water by controlling flood and feeding aquifers in protecting wildlife and aesthetic. The role of rangelands in developing countries is more important in terms of social-economic and biological. This ecosystem is considered as the most common source of feeding and foddering livestock meanwhile livestock itself is considered as one of the important income and food resource in rural areas (Amirnejad and Rafiei, 2008).

Methodology

In current study which is survey descriptive and explanatory (hypothesis testing), library and field investigation also was taken into account. data Analyses was performed using factor analysis and one-sample T test in Statistical Package for Social Science (SPSS) software (Azar and Momeni, 2013; Johnson et al, 2013). Experts and professors' opinions have been taken into account for validity of research inventory (face validity). This study's inventory is research made which has 25 questions and is scored by Likert scale (absolutely agree, agree, no idea, disagree, absolutely disagree). This test's reliability was obtained through Cronbach's alpha equal to 0.97. Sample volume was calculated based on Krejcie and Morgan's table (Feli et al, 2014).

Research findings

Given foregoing results and for answering this question that whether Atriplex cultivation has caused positive social and economic changes in local and native communities, we will investigate the results.

a)Demographic descriptive results of study areas:

here are research's respondents with a num-

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ber of 75 people (Chapar Quymeh) and 34 people (Baharmeydan) are male and married that in terms of age in Chapar Quymeh; 93% were 50 to 60 years old and 7% were 40 to 50 years old and in Baharmeydan 91% were 50 to 60 years old and 9% were 40 to 50. About population's education for Chapar Quymeh; 94.6% under diploma and 5.4% had diploma and for Baharmeydan 94.1% were under diploma and 5.9% had diploma. The monthly income of herders in Chapar Quymeh is 2600000 Toman and the monthly income of herders in Baharmeydan is 2000000 Toman. The most type of livestock in Chapar Quymeh are sheep and lamb followed by cow and camel and for Baharmeydan are respectively sheep, lamb, goat and etc.

b)The order of indices based on significance and effectiveness for Baharmeydan considering factor analysis test

Factor analysis was used for prioritizing study social and economic indices in this research which are most affected by Atriplex cultivation. In order to this first KMO coefficient was determined. If this coefficient is more than 0.7, factor analysis method optimality will be confirmed. The value of this coefficient for Baharmeydan was obtained as 0.900. Based on this test's output the order of social and economic indices priorities in Baharmeydan was obtained as it is shown in table 2.

c)The order of indices based on significance and effectiveness for Chapar Quymeh considering factor analysis test

With analyzing the information of Chapar Quymeh, KMO coefficient value was obtained equal to 0.926 and this method's optimality is confirmed. The order of social and economic indices priorities in Chapar Quymeh is as is shown in table 3.

After ranking social and economic indices, one-sample T test was used for clarifying positivity or negativity of Atriplex lentiformis cultivation effects' result in study areas that its

Area's name	Kind and number of livestock						
	Permitted Animal unit	Existing Animal unit	Other livestock	Camel	Cow	Lamb	Sheep and goat
Chapar Quymeh	5960	22833	-	62	590	6230	17065
Baha-rmeydan	2567	10657	53	-	-	3409	8210

Table 1. Type and number of existing livestock in study area

No.	Order of priority	Share percentage of changes
1	Production	47.269
2	Income and capital	25.796
3	Employment	17.516
4	Social welfare	8.251
5	Recreational value	0.445
6	Hygiene	0.246
7	Sense of belonging to place	0.239
8	Institutional	0.163
9	Education	0.075

Table 2. The results of factor analysis test and ranking social and economic indices affected by cultivating Atriplex in Baharmeydan

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No.	Order of priority	Share percentage of changes
1	Production	38.771
2	Income and capital	33.521
3	Employment	23.060
4	Institutional	1.734
5	Social welfare	1.084
6	Sense of belonging to place	0.865
7	Recreational value	0.353
8	Hygiene	0.337
9	Education	0.274

Table 3. The results of factor analysis test and ranking social and economic indices affected by cultivating Atriplex in Chapar Quymeh

Indicator's name	Test number =3					
	Statistict	Freedom egree	Significance level	Averages differences	95% confidence interval for the difference averages	
					Lower limit	upper limit
Sense of belonging to place	9.833	74	0.000	1.02000	0.8133	1.2267
Employment	7.086	74	0.000	0.71556	0.5143	0.9168
Production	13.435	74	0.000	1.33333	1.1356	1.5311
Income and capital	16.561	74	0.000	1.35556	1.1925	1.5187
Hygiene	5.535	74	0.000	0.56381	0.3608	0.7668
Institutional	4.421	74	0.000	0.50000	0.2746	0.7254
Social welfare	10.227	74	0.000	1.04889	0.8445	1.2532
Education	-0.861	74	0.392	-0.12000	-0.3979	0.1579
Recreational value	10.903	74	0.000	1.08444	0.8863	1.2826

Table 4. the results of one-sample T-test for social and economic indices in Chapar Quymeh

results are shown in tables 4 to 6.

As it is observed in table 4 all study social and economic indices in Chapar Quymeh except education whose significance level is more than 5% (education hasn't had neither positive nor negative effect) have had positive effect and their result was also positive.

As it is observed in table 4 all study social and economic indices in Baharmeydan except education whose significance level is more than 5% (education hasn't had neither positive nor negative effect) have had positive effect and their result was also positive.

Discussion and conclusion

According to prioritizing study social and economic indices in this research which are most affected by Atriplex cultivation, it was clarified that in both areas of Chapar Quymeh and Baharmeydan respectively indices: production (farm products have been increased, livestock products have been increased), income and capital (income satisfaction has

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Indicator's name	Test number =3					
	Statistic t	Freedom degree	Significance level	Averages differences	95% confidence interval for the difference averages	
					Lower limit	upper limit
Sense of belonging to place	6.346	33	0.000	1.22059	0.8819	1.5593
Employment	5.416	33	0.000	0.86275	0.5387	1.1868
Production	8.600	33	0.000	1.41176	1.0778	1.7457
Income and capital	10.538	33	0.000	1.46078	1.1788	1.7428
Hygiene	4.695	33	0.000	0.73529	0.4167	1.0539
Institutional	3.348	33	0.002	0.60294	0.2365	0.9693
Social welfare	6.996	33	0.000	1.20588	0.8552	1.5566
Education	0.942	33	0.353	0.20588	-0.2386	0.6504
Recreational value	9.071	33	0.000	1.25490	0.9386	0.5712

Table 5. the results of one-sample T-test for social and economic indices in Baharmeydan

Area's name	Test number =3					
	Statistic t	Freedom degree	Significance level	Averages differences	95% confidence interval for the difference averages	
					Lower limit	Upper limit
Chapar Quymeh	8.299	74	0.000	0.83351	0.6334	1.0336
Baharmeydan	6.028	33	0.000	0.98257	0.6509	1.3142

Table 6. the results of one-sample T-test for result of social and economic indices in two areas of Baharmeydan and Chapar Quymeh

been increased) and employment (Job stability has been increased, the number of family's employed people compared to whole family has been increased, economic activities have been more diverse) were top priorities. With increasing livestock productions which are obtained because of new feeding level for areas' livestock, it is obvious that income sources and herders' capital are increasing and have caused these people to appropriately invest in the field of agriculture mechanization and be able to take advantage of obtained interests out of increasing their farm products. With creating these conditions, employment has being also increasing similarly in areas where bush planting plan has been performed there. It is obvious that with increasing income, social welfare and hygiene will grow as well. Atriplex lentiformis bush planting has promoted natural view of cultivated areas with a special aesthetic which especially in spring it increased its recreational value and in turn strenghten relationship between urban people with villages around bush planting plan areas. As for prioritizing, institutional index (the number of new local institutions such as range land-

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ing union have been increased and new local institutions are more strengthened compared to previous one) in Chapar Quymeh is of great importance. Given vast project area and also the affluence of herders having grazing license, the necessity of strengthening native and local institutions especially range landers union is inevitable as a main issue in Chapar Quymeh. The only index which isn't affected by Atriplex cultivation is education index. In the light of positive outcome of social and economic indicators on planting Atriplex lentifomis, an important step r to increase interest and income of bush planting plan that will increases willing to participations in management operations and rangeland restoration.

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