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Socio-Economic Factors Influencing Land Use Changes in Maraveh Tappeh Region, Iran

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ABSTRACT The socio-economic factors affecting land use changes in the Maraveh Tappeh region was determined from the viewpoint of beneficiaries and experts. The items of questionnaires designed as rating scale based on the five options Likert. Reliability of questionnaires was determined by Cronbach's alpha. Two sets of questionnaires were designed for beneficiaries and experts. Reliability of beneficiaries and experts questionnaires obtained 0.75 and 0.80, respectively. A total of 310 beneficiaries and 42 experts responded to the questionnaires. Mann-Whitney non-parametric test was used to compare the mean between the experts and beneficiaries. The reality amount of significant difference was obtained from the effect size. Rating average was used for each item and its priority. In ten items, significant difference at the 0.01 level between the viewpoints of beneficiaries and experts was observed. The high cost of living, low income of rural families and unemployment in rural areas were the top three priorities from the viewpoint of beneficiaries. The low income of rural household, the high cost of living and increasing the price of farmland were the most effective factors from the viewpoint of experts. Economic factors were the key priorities of land use change in viewpoint of both beneficiaries and experts, indicating that experts had the necessary experience and understanding of beneficiaries' condition and were positive and important notes for policy making and management issues.

Keywords: *Human factors, Land use management, Rural household, Villages*

1 INTRODUCTION

Land use is defined as management of land cover through human intervention in the style of a certain type of land cover (Orekan, 2007). Common patterns of land use are often changed as a result of human activities in different temporal and spatial scales. Mosser (1996) notes "human driving forces are those

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fundamental societal forces that link human to nature and brings about global environmental changes" and hence, introduces such factors as demographic change, changing technology, socio-cultural and socio-economic organizations. Land use change can be the result of people's reactions to economic opportunities as well. In other words, policies, national and global markets are created constraints and local opportunities. These policies and restrictions on land and its ownership or production and production inputs, can be regarded as one of the factors affecting land use change (Lambin *et al.*, 2001). According to FAO, the agricultural sector is the source of one-third of global warming and climate change as the result of bad management and land use change (Lal, 2005). Sustainable land use in arid and semi-arid regions is under threat due to land degradation, mostly caused by human activity (Dumanski and Pieri, 2000). Changes in land use in several Asian countries during 1952-1995 has been attributed to commercialization as well as government policies (Fox and Vogler, 2005). Long *et al.* (2007) indicated the industrialization, urbanization, population growth, and China's economic reform measures as the four major driving forces contributing to land-use change in the studied area. Urban development patterns not only affect the lives of individuals, but also the ways in which society is organized (Wu, 2008). Demographic characteristics were found to have more influence on deforestation in a Caribbean forest, while economic factors and forest reserve status were more significant as drivers of reforestation (Newman *et al.*, 2014). Jafari Shalamzari *et al.* (2016) in public perception and acceptability toward domestic rainwater harvesting in Golestan showed that lack of experience and observation were the underlying reason of low adoption rate in this area. Since large parts of Iran in arid and semi-arid regions, incorrect management can trigger land desertification widely. Land degradation and desertification depend on type of land use and, subsequently, change of land use is affected by human factors such as social and economical issues. Therefore, assessment of the factors affecting the land use change is necessary to make appropriate management actions. Multiplicity of environmental and human issues in recent years has caused a large scale of land use change and its associated soil and land degradation across Maraveh Tappeh region in Golestan province of Iran. The main objective of this study was to determine the socio-economic factors affecting the land use changes in the Maraveh Tappeh region for achieving sustainable development in natural resources.

2 MATERIALS AND METHODS

2.1 Description of case study

The study area, covering 120900 hectares with an elevation ranging from 140 m to 1360 m, is located in a semiarid region of Maraveh Tappeh in Golestan province, Iran (Figure 1). The mean precipitation is 355.6mm $year^{-1}$, the maximum and minimum of which occur in Feb. and July, respectively. The mean annual temperature is 18ºC (Weather Organization, 2016).

2.2 Methodology

The land use maps for the years 1986, 2000 and 2014 were prepared using images of MSS, ETM and OLI sensors of the Landsat satellite. The land use types and the relevant changes are presented in the respective maps (Figures 2 to 4). Various land-use types covered in this study is shown in Table 1, the largest being the low-density rangelands in all the studied years.

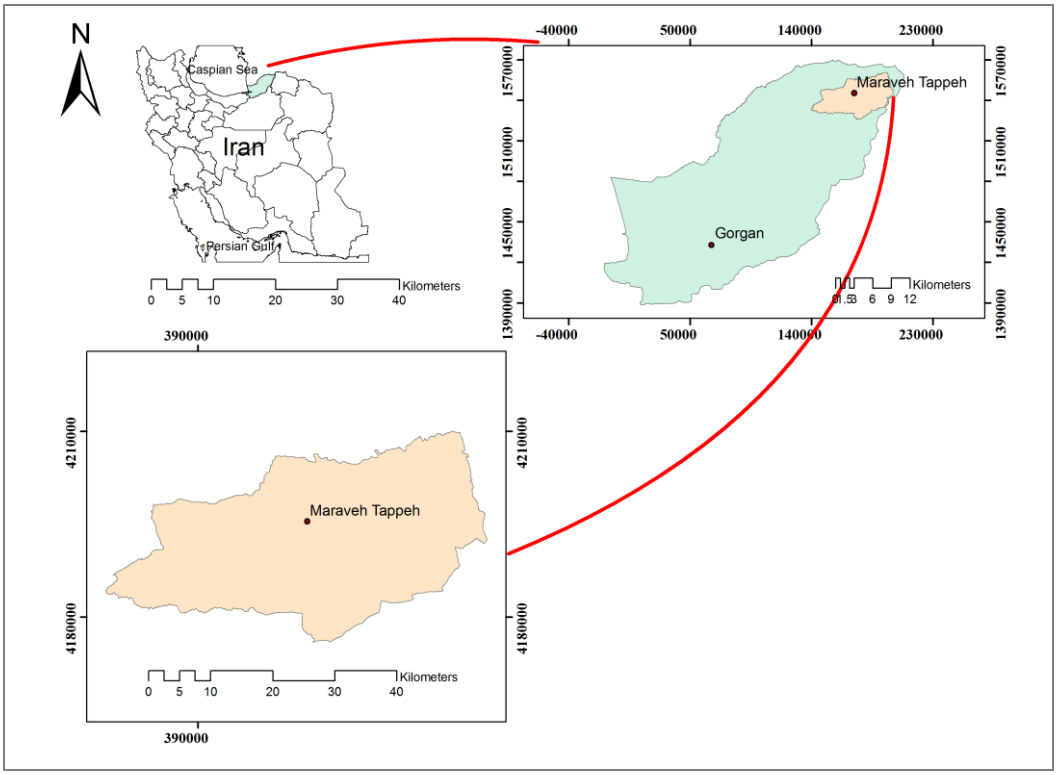

Figure 1 Location of the study area in Golestan province, Iran

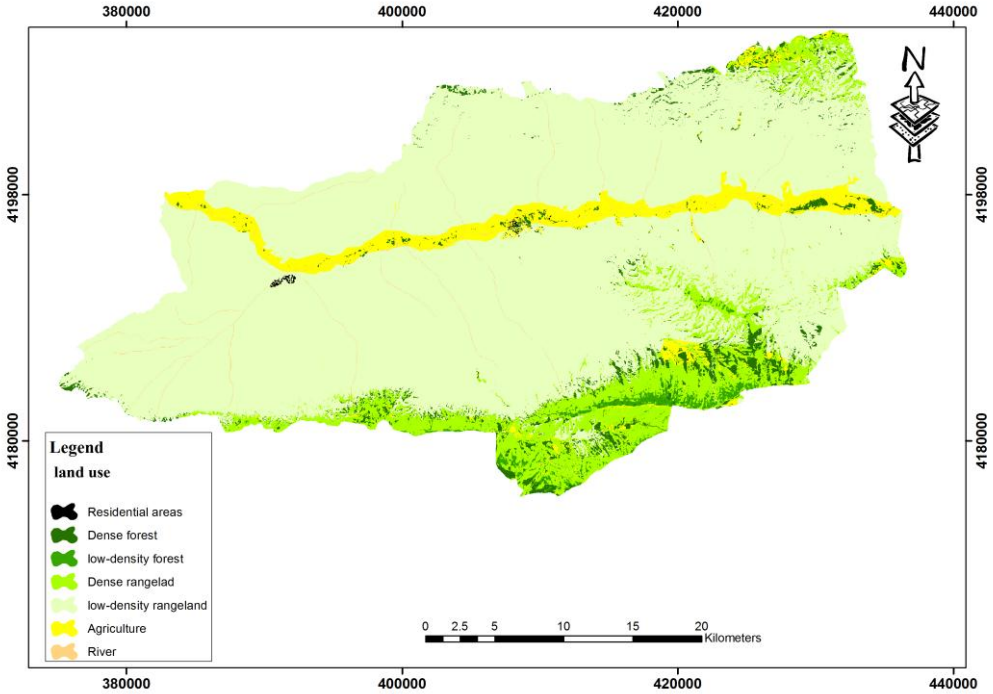

Figure 2 Land use map of the study area in1986

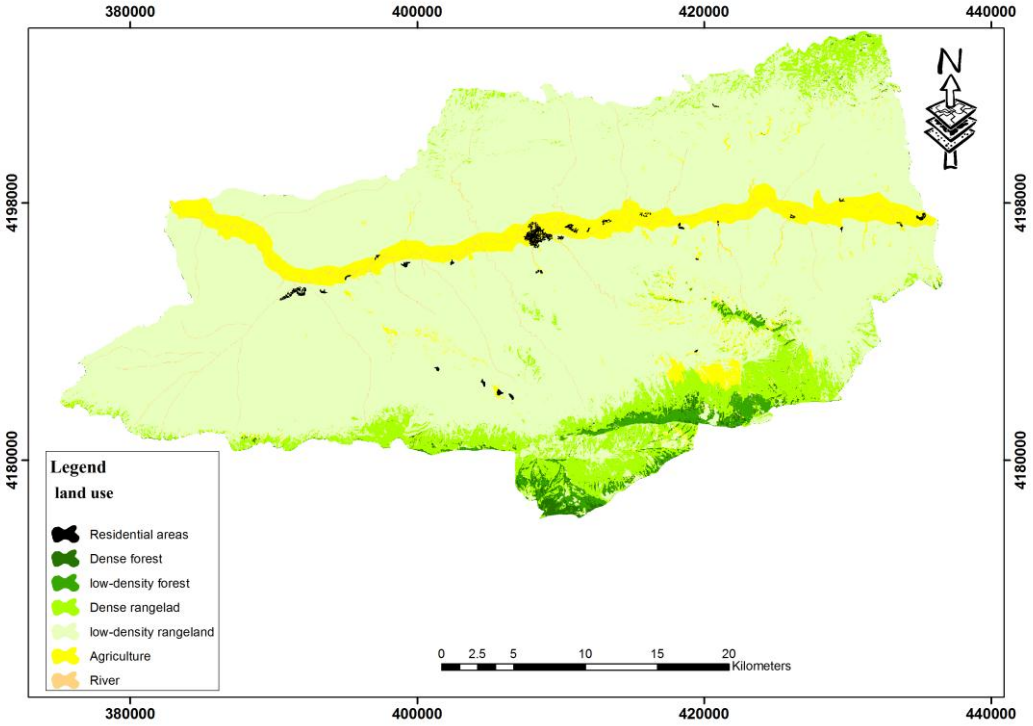

Figure3 Land use map of the study area in 2000

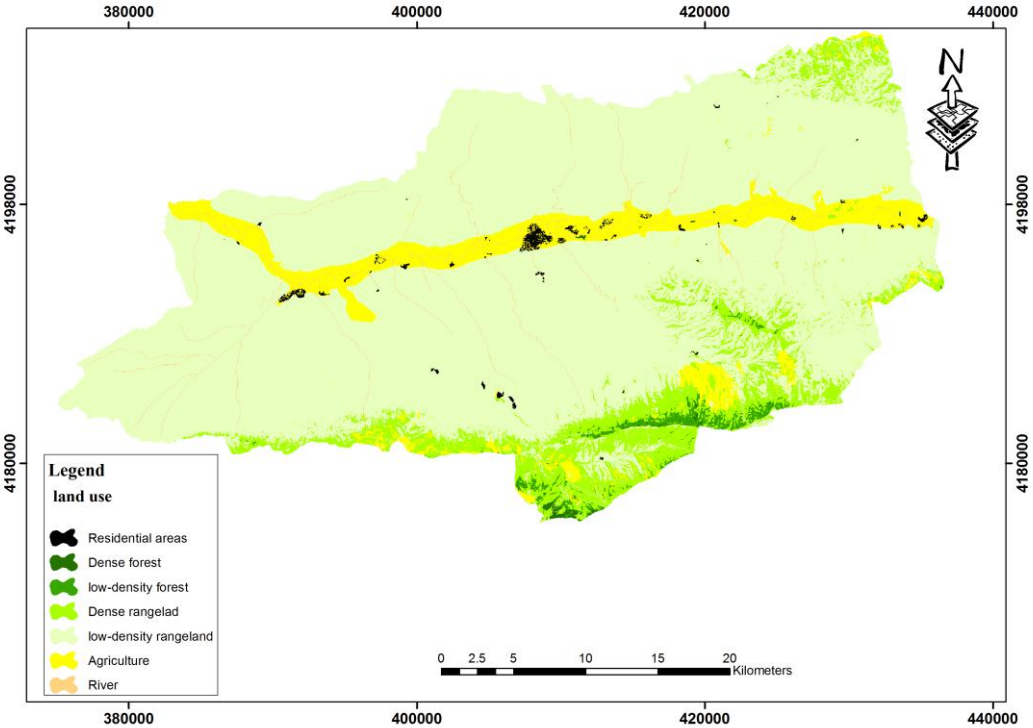

Figure 4 Land use map of the study area in 2014

Table 1 The area of land use in studied years

Land use type	1986		2000		2014	
	Area (ha)	percent	Area (ha)	percent	Area (ha)	percent
Agriculture	7466.85	6.18	9055.16	7.49	10332.97	8.55
Dense rangeland	12432.79	10.28	11366.77	9.40	11513.01	9.52
Low-density rangeland	94932.14	78.52	96330.31	79.68	96182.63	79.55
Dense forest	4120.37	3.41	1277.26	1.06	234.68	0.20
Low-density forest	1273.87	1.05	1620.84	1.33	1213.43	1
Residential areas	43.97	0.04	390.24	0.32	510.24	0.42
River	630.13	0.52	870.22	0.72	913.89	0.76

A total of 16 villages out of 48 were selected in the study area and their total number of households were considered, based on demographics statistic in 2011 (Statistical Center of Iran, 2016). Data collection method was descriptive-survey method. The questionnaires were adjusted using the research background and literature as well as field visits. Validity of the questionnaire was confirmed using experts' opinion related to the research that included land use change and socio-economic issues. After applying specialist's opinion, the final questionnaire was designated. The items designed as rating scale based on the five point Likert scale, ranging from very low to very high. Reliability of questionnaires was determined by Cronbach's alpha (Kalantari, 2003). Two sets of questionnaires were designed for the beneficiaries and experts in order to compare and explain the differences in opinions. Both beneficiaries and experts questionnaires had the same items with different personal characteristics. Questionnaires reliability was 0.75 and 0.80 for beneficiaries and experts, respectively, indicating proper reliability of the questionnaires.

In order to get samples and complete the beneficiary's questionnaires, multi-stage cluster sampling was used (Kalali Moghadam, 2015). Due to the high extent of the study area, some representative villages were selected that were indicative of the environmental and human population characteristics. Statistical pool of the research was formed from the number of households in the selected villages (N=1534).The total number of required samples (310 persons) to respond to questionnaires was obtained according to Cochran's (1977) Equation 1:

$$n = \frac{\frac{z^2pq}{d^2}}{1 + \frac{1}{N}\left[\frac{z^2pq}{d^2} - 1\right]} = \frac{0.96/0.002}{1 + 0.25} = \frac{384.16}{1.25} = 307.34 \quad (1)$$

The name of selected villages and the number of questionnaires in each village according to the number of households in 2011 is presented in Table 2.

Finally, 42 experts from departments and organizations were chosen to answer the questionnaires. Mann Whitney non-parametric test was used to compare the mean between the experts and the beneficiaries questionnaires and the effect size was used to demonstrate the significant difference. Mann Whitney was used to compare two means from two different propositions. This test is one of the most powerful non-parametric tests (Siegle and Castellan, 1988). The effect size in this table was calculated from the Equation 2.

$$\text{Eta2} = z/\sqrt{n} \quad (2)$$

Table 2 The number of required samples in order to complete questionnaires in selected villages

Villages	The number of households in 2011	The number of obtained questionnaires in 2015
Chenaran	262	53
Babashamlak	77	16
Ghazan Ghaieh	451	91
Gauandar	51	10
Yekeh Toot	91	18
Ghareh Aghachli	51	10
Sari Ghomaish	90	18
Hemat Abad	42	9
Ghousheh Tappeh	70	14
Mohammad Shahir	31	6
Bostam Darreh	67	14
Daulamot Orlan	67	14
Yekeh Chenar	88	18
Balkor	27	5
Sojagh	21	4
Ocharan	48	10

In reporting and interpreting results, both the substantive significance (effect size) and statistical significance (*P* value) are essential (Sullivan and Feinn, 2012). In order to determine the most important factors affecting land use change from the viewpoint of beneficiaries and experts, rating average was used for each item and priority of the items were determined for both groups. In addition, the percentage of respondents in each of the five Likert option was obtained. All the statistical analysis was performed in SPSS software.

3 RESULTS

3.1 General characteristics of the beneficiaries

According to personal data of beneficiaries, the age range of 41-50 years (average 44 years) constituted the largest number of respondents (34.5%), 95.8% of whom were the heads of households, 87.8% and 77.7% of whom had the agriculture as the main job and animal husbandry as the secondary occupation, respectively; 66.4% of the respondents had 3-5 dependent family members. Most of the people (70.3%) had one labor force in the family; 24.8% of the studied beneficiaries were involved in agricultural activities. About 41% of the respondents had elementary education and 18.4% were illiterate. More than 60% of the land ownership was private. More than 50% of them had incomes between 5-8 and 10-30 million Rials per year for agricultural and animal husbandry, respectively; 90.6% of the respondents had no any other source of income.

3.2 General characteristics of the experts

According to the analysis, 92.9% and 7.1% of the responding experts were men and women, respectively, and majority of them (52.4%) were in the age range of 41-50 years (average 42 years). Most of the respondents (64.3%) were graduates in natural resources, 21.4% and 14.3% of whom in other discipline and agricultural science, respectively; most of them had master degrees (57.1%). Most of the experts had over 20 years of working experience and the lowest number had less than 7 years working experience (average 16.2

years). About 19% of the responding experts were born in the village and 23.8% of them had secondary jobs related to agriculture and livestock activities.

Table 3 Comparison of the beneficiaries and experts' viewpoint on the items affecting land use change

Item number	Item names	Average rating		Mann-Whitney U	Z	Significance level	Effect size
		Beneficiaries(310)	Experts (42)				
1	Reducing the number of livestock	179.13	157.12	5696	-1.417	0.15	0.07
2	No cost-effectiveness of animal husbandry	177.78	167.06	6113.5	-0.716	0.47	0.03
3	Low prices of livestock	182.79	130.07	4560	**3.504-	0.0001	0.19
4	Low-income of rural household	181.75	137.71	4881	**3.013-	0.003	0.16
5	The need to feed in the off-season of livestock grazing	173.87	195.89	5695.5	-1.403	0.16	0.07
6	The high cost of living	183.46	125.15	4353.5	**4.065-	0.0001	0.22
7	Existence of agricultural machinery and equipment	170.62	219.93	4686	**3.081-	0.002	0.16
8	Increase the price of farmland	166.31	251.74	3350	**5.493-	0.0001	0.29
9	Rising prices of agricultural products	179.74	152.56	5504.5	-1.774	0.07	0.09
10	Tends to land ownership	169.35	229.24	4295	**3.810-	0.0001	0.20
11	Increase the number of farmers	176.81	174.21	6414	0.163-	0.87	0.01
12	Pruning and felling of trees	173.85	196.06	5688.5	1.404-	0.16	0.07
13	Division of land among heirs	174.81	188.96	5986.5	0.885-	0.37	0.05
14	The need for housing of beneficiaries	167.47	243.17	3710	**4.783-	0.0001	0.25
15	Illiterate or low literacy of farmers	170.01	224.43	4497	**3.411-	0.001	0.18
16	Unemployment in rural areas	182.85	1289.63	4541.5	**3.467-	0.001	0.18
17	Not having a secondary job other than farming or animal husbandry	184.13	120.18	4144.5	**4.196-	0.0001	0.22
18	Tends to urbanization by villagers	173.30	200.10	5519	-1.691	0.09	0.09
19	Increasing rural population	179.21	156.50	5670	-1.427	0.15	0.08
20	Social standing of landlordism	177.50	169.14	6201	0.530-	0.59	0.03

** Significant at the 0.01 level

3.3 Compare the viewpoints of beneficiaries and experts

Comparison of the mean of the items in relation to land use change in viewpoint of beneficiaries and experts was performed using the Mann-Whitney analysis (Table 3). About 50% of the studied items showed significant difference ($p \leq 0.01$). A large amount of the effect size in the items containing significant difference indicated that the difference was significant in practice. A small effect size of less than 0.06. was observed only in no cost-effective activities, such as animal husbandry, increase in the number of farmers, division of land among heirs and social standing of landlordism.

3.4 Analysis of the beneficiaries and experts' viewpoints

Frequency of the surveyed items for Likert scale and the mean score of each item from the viewpoint of beneficiaries is presented in Table 4 and Figure 5. The high cost of living, low income of families and unemployment were the top three priorities, respectively, the score of which was above 4. Based on the results, the need for housing and increase in the number of farmers had the lowest influence on land use change with average rating 2.76 and 2.83, respectively.

The frequency of the surveyed items for Likert scale from the viewpoint of experts is presented in Table5 and Figure 6. Three items, viz. low income of rural household, the high cost of living, and increasing the price of farm land were the top effective factors, the scores of which were above 5, while increase in the number of farmers had the lowest effect (2.88).

Table 4 Frequency percentage and average rating of socio-economic factors of land use change from the perspective of beneficiaries

Item number	Item names	1	2	3	4	5	Mean
		Very low	Low	Partly	High	Very high	
1	Reducing the number of livestock	3.5	9	42.9	42.9	1.6	3.25
2	No cost-effectiveness of animal husbandry	1.6	3.2	15.5	59.4	20.3	3.82
3	Low prices of livestock	3.5	1	27.1	57.4	11	3.65
4	Low-income of rural household	0.3	1.9	0.3	39	58.4	4.55
5	The need to feed in the off-season of livestock grazing	5.2	14.8	39	39	1.9	3.13
6	The high cost of living	0.3	2.3	0.3	32.9	64.2	4.62
7	Existence of agricultural machinery and equipment	2.9	25.5	35.5	31.6	4.5	3.17
8	Increase the price of farmland	3.2	11.6	41.6	41.6	1.9	3.25
9	Rising prices of agricultural products	2.3	4.2	14.5	52.3	26.8	3.94
10	Tends to land ownership	0.6	15.5	41.9	37.1	4.8	3.47
11	Increase the number of farmers	4.2	34.8	29.7	30.6	0.6	2.83
12	Pruning and felling of trees	1.9	39.4	36.1	21.6	1	2.93
13	Division of land among heirs	4.8	28.7	34.8	31	0.6	2.91
14	The need for housing of beneficiaries	1.9	41.3	33.5	23.2	0	2.76
15	Illiterate or low literacy of farmers	1.6	31	33.9	32.3	1.3	3.11
16	Unemployment in rural areas	4.5	1.6	5.2	51	37.7	4.15
17	Not having a secondary job other than farming or animal husbandry	4.2	2.6	14.8	57.7	20.6	3.90
18	Tends to urbanization by villagers	4.2	17.1	37.7	36.1	4.8	3.55
19	Increasing rural population	0.3	21.9	36.1	34.8	6.8	3.11
20	Social standing of landlordism	3.5	18.7	30.3	42.9	4.5	3.33

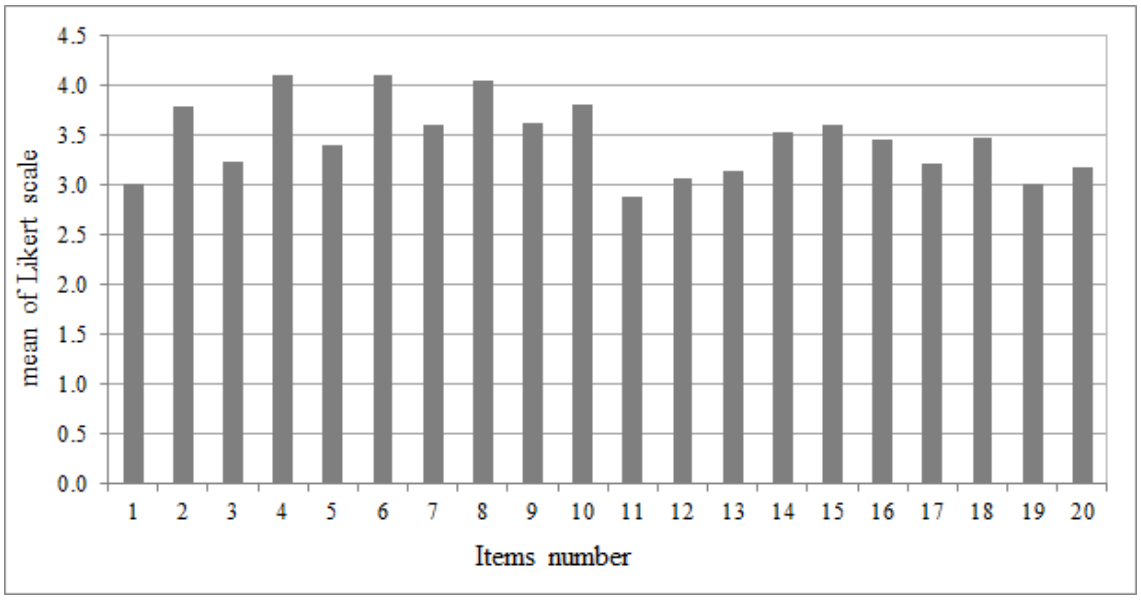

Figure 5 Bar chart of average Likert rating of beneficiary's questionnaire items

Table 5 Frequency percentage and average rating of socio-economic factors of land use change from the perspective of experts

Item number	Item names	1	2	3	4	5	Mean
		Very low	Low	Partly	High	Very high	
1	Reducing the number of livestock	14.3	23.8	19	33.3	9.5	3
2	No cost-effectiveness of animal husbandry	4.8	4.8	23.8	40.5	26.2	3.79
3	Low prices of livestock	4.8	14.3	38.1	38.1	4.8	3.24
4	Lowincome of rural household	2.4	4.8	14.3	38.1	40.5	4.10
5	The need to feed in the off-season of livestock grazing	2.4	14.3	33.3	40.5	9.5	3.40
6	The high cost of living	2.4	2.4	14.3	45.2	35.7	4.10
7	Existence of agricultural machinery and equipment	7.1	11.9	21.4	33.3	26.2	3.60
8	Increase the price of farmland	2.4	0	19	47.6	31	4.05
9	Rising prices of agricultural products	7.1	11.9	11.9	50	19	3.62
10	Tends to land ownership	4.8	7.1	16.7	45.2	26.2	3.81
11	Increase the number of farmers	9.5	21.4	50	9.5	9.5	2.88
12	Pruning and felling of trees	9.5	28.6	21.4	26.2	14.3	3.07
13	Division of land among heirs	7.1	33.3	16.7	23.8	19	3.14
14	The need for housing of beneficiaries	4.8	9.5	28.6	42.9	14.3	3.52
15	Illiterate or low literacy of farmers	7.1	9.5	31	21.4	31	3.60
16	Unemployment in rural areas	2.4	31	14.3	23.8	28.6	3.45
17	Not having a secondary job other than farming or animal husbandry	4.8	23.8	31	26.2	14.3	3.21
18	Tends to urbanization by villagers	2.4	14.3	31	38.1	14.3	3.48
19	Increasing rural population	4.8	38.1	14.3	38.1	4.8	3
20	Social standing of landlordism	7.1	14.3	35.7	40.5	2.4	3.17

Bar chart of Likert rating average of beneficiary's questionnaire items is shown in Figure 5. According to the chart, item 4 and 6 have the highest rating of Likert scale (more than 4.5). Bar chart of Likert rating average of expert's questionnaire items is shown in figure 6. According to expert bar chart, the items of numbers 4, 6 and 8 are rated higher than four score, but in comparison to beneficiary bar Chart, can be easily seen that rating average of any items is not reached to 4.5 in the expert's questionnaire and the highest amount is related to the high cost of living and low income of rural household.

Priority of items for the beneficiary and expert questionnaires was based on average rating in Tables6 and 7, respectively, where the seven top priority items from each of the two groups are specified. According to results, the high cost of living was the most important factor on land use changes in Maraveh Tappeh region from the viewpoint of both groups. The low income of rural household was the second priority for both groups. However, opinions regarding the third to seventh priorities were so different that some factors considered effective by one group were considered as ineffective by the other group.

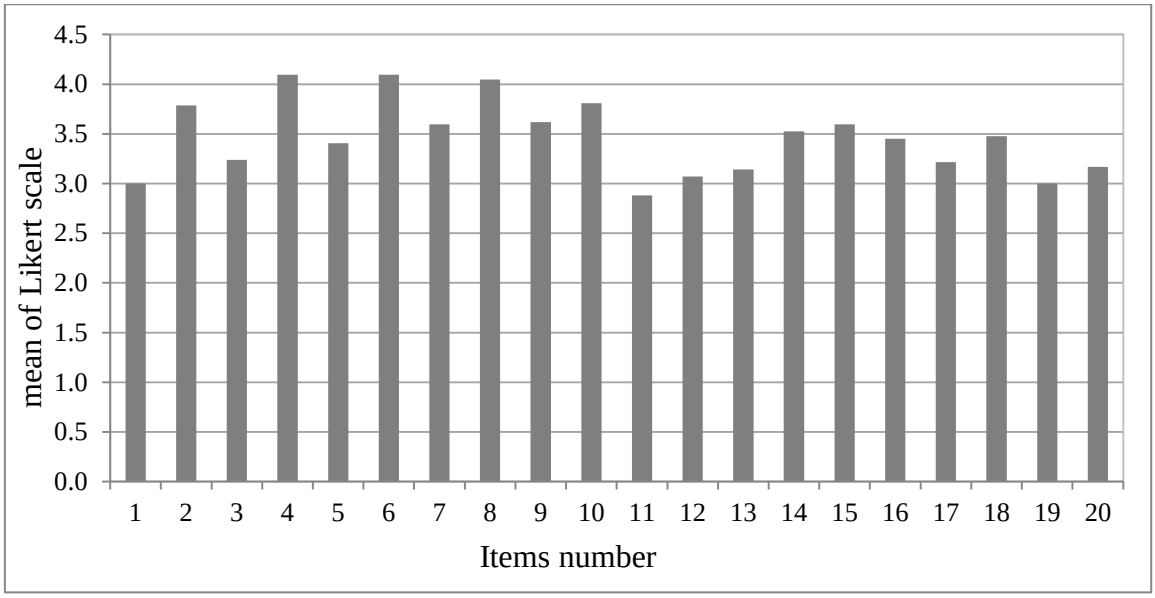

Figure 6 Bar chart of average Likert rating of expert's questionnaire items

Table 6 Seven top priority items for the beneficiary's questionnaire, based on the average rating

Priority	Item name	Mean	Standard deviation	Coefficient of variation
1	The high cost of living	4.62	0.65	0.14
2	Low income of rural household	4.55	0.64	0.14
3	Unemployment in rural areas	4.15	0.93	0.22
4	Rising prices of agricultural products	3.94	0.88	0.22
5	Not having a secondary job other than farming or animal husbandry	3.90	0.79	0.20
6	No cost-effectiveness of animal husbandry	3.82	0.90	0.23
7	Low prices of livestock	3.65	0.81	0.22

Table 7 Seven top priority items for the expert's questionnaire, based on the average rating

Priority	Item name	Mean	Standard deviation	Coefficient of variation
1	The high cost of living	4.10	0.90	0.22
2	Low-income of rural household	4.10	0.98	0.24
3	Increase the price of farmland	4.05	0.85	0.21
4	Tends to land ownership	3.81	1.06	0.28
5	No cost-effectiveness of animal husbandry	3.79	1.04	0.27
6	Rising prices of agricultural products	3.62	1.14	0.32
7	Existence of agricultural machinery and equipment	3.60	1.21	0.33

4 DISCUSSION

By studying land use changes and the factors causing these changes, the principle management of the land can be done partly in line with the region's potential and sustainable exploitation of natural resources. Changes in land use patterns in different spatial and temporal levels reflect the interaction and conflict between human and the environment needs that sometimes can be useful and sometimes harmful. In the detrimental condition, irreversible impacts can be seen on the welfare of human communities (Briassoulis, 2001). According to results of the current study, the high cost of living, low income of rural families, and unemployment in rural areas were, respectively, the top three priorities from the viewpoint of beneficiaries and had the highest effects on land use changes. Low income of rural household, the high cost of living and increasing the price of farmland were the most effective factors from the viewpoint of experts. This is in correspondence with the results of Caldas *et al.* (2010) and Long *et al.* (2007) in expressing the driving forces of land use change and the consequent increase in residential land and forest degradation. Economic problems (low income and lack of financial background) and no cost-effectiveness of agricultural activity in some villages of Mazandaran province (Mehrabi *et al.*, 2013) and Rasht city (Kalali Moghaddam, 2015) have been blamed as the most important factors on land use changes, which is consistent with the results of this study. Meanwhile, increasing land prices as the result of tourists rush and unemployment are considered among the important factors on land use changes and deforestation. Reform of government's economic policy in agricultural section, organizing the subsidies and supports in the domestic manufacturing section are suggested to alleviate the problems of land use change.

Urban use was found to grow with population and affluence in some parts of the USA (Alig *et al.*, 1988). Changes in personal income also appear to have altered patterns of forest ownership. Rishi (2006) found that people and government, as the actors in forest management, were unable to protect and develop forest when they acted individually. There fore, sustainable forestry can be achieved through the cooperation and collaboration of all the interested groups. Income from natural sources had the second place after agriculture in average total income of rural households in Ethiopia (Bablo *et al.*, 2009). Three factors of unemployment, lack of a secondary job other than farming or animal husbandry, and low prices of livestock were considered as the effective factors by the beneficiaries. However, experts identified three other factors, including land ownership, increase in the price of farmland, and existence of agricultural machinery and equipment. Both beneficiaries and expert groups identified rising prices of agricultural commodities and no cost-effectiveness of animal husbandry as the effective factors in the seven listed ones, but

differed in the priority categories. Adamo and Crews-Meyer (2006) showed that land and vegetation degradation programs in the central region of Argentina were linked to human activities such as irrigation, cultivation methods, livestock grazing, cutting plants and human settlement. Many scientists have claimed that desertification in China mainly is rooted in human activities (Wang *et al.*, 2008). With formulation of the effective law concerning land use and government supporting for farmers and horticulturists, land change and degradation can be shifted toward sustainable development, as have been pointed out in earlier studies (Geist and Lambin, 2002; Long *et al.*,2007; Mohammadi *et al.*, 2012).

5 CONCLUSION

Among various studied factors affecting the land use changes, high cost of living, low income of rural families, and unemployment in rural areas were, respectively, the top three priorities from the viewpoint of beneficiaries; low income of rural household, the high cost of living, and increase in the price of farmland were the most effective factors from the viewpoint of experts. According to the findings, economic factors were the key priorities of land use change in viewpoint of both beneficiaries and experts, indicating that experts had necessary experience and understanding of beneficiaries' condition and were positive and important for policy making and management issues. Management policies and programs should address the economic problems of villagers and beneficiaries in the studied region.

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عوامل اقتصادی- اجتماعی مؤثربر تغییر کاربری اراضی در منطقه مراوه‌تپه ایران

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چکیده عوامل اقتصادی- اجتماعی مؤثر بر تغییر کاربری اراضی از دیدگاه بهره‌برداران و کارشناسان در منطقه مراوه تپه بررسی شد. گویه‌های پرسش‌نامه به صورت کمی با مقیاس رتبه‌ای بر اساس طیف پنج گزینه‌ای لیکرت طراحی شد. پایایی یا قابلیت اعتماد پرسشنامه‌ها با استفاده از آزمون آلفای کرونباخ تعیین شد. دو سری پرسشنامه به منظور مقایسه و تبیین تفاوت نظرات برای بهره برداران (روستاییان) و کارشناسان طراحی شد. تعداد کل نمونه‌های موردنیاز جهت پاسخگویی به پرسشنامه‌ها، ۳۱۰ نفر برای بهره‌برداران و ۴۲ نفر برای کارشناسان به دست آمد. به منظور مقایسه میانگین نظرات کارشناسان و بهره برداران از آزمون ناپارامتری من وایت‌نی استفاده شد و به منظور نشان دادن مقدار واقعی تفاوت معنی‌دار از اندازه اثر استفاده شد. هم‌چنین جهت اولویت‌بندی گویه‌ها، میانگین رتبه‌ای گویه‌ها لحاظ گردید. در ده گویه از بیست گویه مورد مطالعه، اختلاف معنی‌دار در سطح ۱ درصد در بین دیدگاه بهره‌برداران و کارشناسان مشاهده شد. بر اساس نتایج به دست آمده، بالا بودن هزینه‌های زندگی، کم‌بودن درآمد خانواده روستایی و بیکاری موجود در مناطق روستایی به ترتیب دارای اولویت اول تا سوم از دید بهره‌برداران منطقه مراوه تپه هستند و کم‌بودن درآمد خانواده روستایی، بالا بودن هزینه‌های زندگی و افزایش قیمت زمین زراعی سه عامل موثر تغییر کاربری اراضی از دیدگاه کارشناسان بودند. از دیدگاه دو قشر بهره‌بردار و کارشناس، عوامل اقتصادی (کم بودن درآمد و بالا بودن هزینه‌های زندگی) عوامل موثر و اساسی تغییر کاربری اراضی در منطقه مراوه تپه هستند که نشان‌دهنده درک کافی و شناخت کارشناسان از شرایط بهره‌برداران استکه در تصمیم‌گیری و رفع مشکلات مدیریتی منابع طبیعی راهگشا می‌باشد.

کلمات کلیدی: خانوار روستایی، روستاها، عوامل انسانی، مدیریت کاربری زمین