ECOPERSIA

DOI: 10.18869/modares.Ecopersia.5.3.1829 **2017, 5 (3): 1829-1836**

An Analysis of the Impact of Socio-Economic Variables upon Local Communities' Participation in Rangeland Protection (Case study: *Gomorgan* Village-*Malard* County)

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Received: 27 August 2016 / Accepted: 8 July 2017 / Published Online: 23 September 2017

Background: The participation of local communities is considered as one of the major factors contributing to social and economic growth and development in rangeland management. Therefore, an analysis of variables affecting their participation contributes greatly to foreseeing the needs and fulfilling the shortages of a participation program. The present paper is an attempt to investigate the impact of socio- economic variables effecting local communities' participation.

Materials and Methods: The pilot area of the present study was *Gomorgan* village in Malard County (Tehran Province). Regression function was used for examining the impact of explanatory variables (socio-economic) upon participation of local communities to rangeland protection. Shazam 9 software was applied for logit regression function analysis.

Results: It was found out that the variables such as age, education, bid and importance of rangelands as livestock production inputs had negative effects upon local communities' participation in Malard's rangeland protection, while income had positive effects.

Conclusions: It can be concluded that enhancing the socio- economic condition of local community could be a useful tool to increase the success level of the conservation projects in rangeland management.

Keywords: Local Communities, Logit Model, Malard County, Rangelands, Socio-Economic Variables

1. Background

The need for local communities' participation in the conservation and management of rangeland is understood globally (1). Recognizing the socio-economic factors affecting the participation of local communities will accelerate protection programs on environment and natural resources (2). The socio-economic status of local community is known to have significant influence on determining the types of activities as well as

the impact on different types of interaction toward the natural resource (3).

Several studies have been conducted on the importance of participation and factors affecting it. Baddgi (4) argues that social condition of beneficiaries, number of household members, sex and age are the main variables affecting the participation of beneficiaries in watershed projects. Reed *et al*. (5) have demonstrated that not only one's interest but also social factors such as education, age, income, habitat and the size of rangeland can impact decisions of beneficiaries. Heydari *et al*. (6) asserted that the state credit facilities, annual income, and awareness of rangeland management had positive effects, while expansion of rangeland area had negative effect upon the level of participation of rangeland beneficiaries.

2. Objective

The main research question in this study is what socio-economic variables affect the local communities' participation in *Gomorgan's* rangeland protection.

3. Materials and Methods

3.1. Study area

The *Gomorgan* village, located 45 kilometers west of Malard County, is one of the lowlands of the county (35°38´, 35°42´N and 50°42´,50°41´E). The average annual precipitation of the region is about 171.69 mm and maximum elevation is 1180 meters.

3.2. Methodology

The data were collected by conducting personal interview with some 50 selected household heads that were residing in *Gomorgan* village, using a well-structured questionnaire that was designed with the help of specialist. Descriptive statistics (frequency distribution, mean and standard deviation) and Excel software was used to analyze the data. In addition, logit regression function was used for examining the impact of explanatory variables (socio-economic) upon participation of local communities in rangeland protection. Shazam 9 software was applied for logit regression function analysis. In logit function, the dependent variable is binary i.e. dependant variable is either 0 or 1 (7). In this study, the participation of *Gomorgan's* local community in rangeland protection is the dependent variable and socio-economic variables, including households' income, age, proposed payment (bid) for protecting the rangelands of the district, education and the importance of rangelands as livestock production inputs are the independent variable. It is presumed in this model that average utility of a choice depends on traits of that choice which differ in different people. People tend to participate in rangeland protection when its profit is higher than when they do not take part. It is concluded based on Eq. (1) that (7);

$$U(1, Y- A; S) + \varepsilon_1 \geq U(0, Y; S) + \varepsilon_0 \quad (1)$$

U is indirect utility. Y and A are individual income and bid variable, respectively. S refers to other socio-economic properties influenced by personal utility. ε_0 and ε_1 are random variables which are distributed equally and independently and their average equal 0. Utility difference is explained as follows (2) (7):

$$\Delta U= U(1, Y- A; S) – U(0, Y; S) + (\varepsilon_1 – \varepsilon_0) \quad (2)$$

If utility difference is bigger than 0, the respondent maximizes his utility by agreement for paying to gain the commodity. Therefore, for each respondent we face either 0 (No) or 1 (Yes) as an answer. As mentioned above, factors which influence upon respondents' responses are Y, A, and S. Thus, according to Eq. (3), there is an econometric model at work, dependent variable of which is either 0 or 1(7).

$$P_i = Pr(Y_t = 1) = F(X_i'\beta) = \frac{1}{1+\exp(-X_t'\beta)} \quad (3)$$

In estimating the logit regression model, predicting the effects of change in explanatory variables (socio-economic factors) upon the probability of an individual's participation is of high importance that is obtained from Eq. (4) (7).

$$ME = \frac{\partial P_i}{\partial X_{ki}} = F(X_i'\beta_K)\beta_K = \frac{\exp(-X_i'\beta)}{\left[(1+\exp(-X_i'\beta)\right]^2}\beta_k \quad (4)$$

Elasticity at means (E) shows percentage change in the probability of accepting the bid for each one percent change in each of the explanatory variables (socio-economic factors) that is obtained from Eq. (5) (3):

$$E = \frac{\partial(BX\kappa)}{\partial X\kappa}.\frac{X\kappa}{(B'X\kappa)} = \frac{e^{\kappa x}}{(1+e^{kx})^2}.B\kappa.\frac{X\kappa}{(B'X\kappa)} \quad (5)$$

4. Results

4.1. Demographic characteristics

The findings indicate that 72% of the respondents were between the age of 30 to 50 years, while 12% of respondents were less than 30 years of age (Table 1). The respondents of over 50 years old represented only 16%. University degree holders constituted 12% of the respondents, 68% had primary education, while the rest 20% had no formal education but could read and write. About 68% of the respondents had the families with less than five members and the rest 32% had 5 to10 members. The monthly income of 4% of the respondents was less than 5000000 (Iranian Rials), whereas about 64% of them were making 5000000-10000000 and the rest 32% were earning more than 10000000 Rials.

Table 1 Socio-Economic Features of Respondents in *Gomorgan* Village

Variables	Mean	Standard deviation	Variation coefficient	Max.	Min.	Description	%
Age (year)	43	17.11	0.39	84	21	Less than 30	12
						From 31 to 50	72
						From 51 and more	16
Education (year)	5	3.16	0.63	12	0	Can read and write	20
						Primary school	68
						University	12
Household size	4.72	2.26	0.4	12	2	Less than 5	68
						From 5 to 10	32
Income (Iranian Rials)	11782000	17526020	1.48	75000000	0	less than 5000000	4
						Between 5000000-1000000	64
						more than 1000000	32

4.2. Overall analysis

Results for the logistic model showed that the variables such as age, education, bid, and the importance of rangelands as livestock production had negative effects, while the income had positive effects (Table 2). The Mc Fadden R-Square (0.4) shows that explanatory variables of the model can well explain variations of dependant variable. Maddala R-Square and Esterlla R-Square also stress this explanatory power. The percentage of right prediction of the model (0.93%) indicates that the estimated model can predict high percent of dependant variable value, based on the explanatory variables. It must be noted that although some variables in the model, such as household dimension and community-based management were not significant, they left an effect on logit model goodness of fit.

According to Table 2, the age variable has negative effect at 5%, which indicates that the older the respondent, the less he is inclined to respond positively to proposed payment. In other words, in *Gomorgan* village, youngsters mind rangeland protection more than the elders do. Elasticity at means of this variable shows with every 1% increase in the respondents' age, the probability of accepting proposed payment for rangeland protection reduces by 0.94%. Estimating marginal effect, following every one-year age increase, the probability of accepting proposed payment decreases by 0.018.

The education variable had negative effect at 5%, which indicated that the more educated the respondent, the less his willingness to participate. Elasticity at means of this variable shows with every 1% increase in the respondents' total education years, the probability of willingness to pay reduces by 0.35%. Estimating marginal effect, every one-year increase in the total education years, the probability of accepting bid decreases by 0.614.

The coefficient of the variable "propose" as expected was significantly negative at 1% significance level, which indicated that if the suggestion (bid) increases in amount, the probability of acceptance will reduce. Elasticity at means of this variable also shows that with every 1% increase in proposed payment, the probability of people's acceptance for payment will reduce by 0.7%. Based on marginal effect, every one Rial increase in proposed payment, the probability of acceptance will reduce 0.21×10^{-3}.

The variable "income" from the job had a significant positive value at 5% level, which indicated that individuals' income had direct impact on the probability of accepting proposed payment. In other words, the higher one's income, the more is the probability of accepting proposed payment. Elasticity at means of this variable shows that with every 1% increase in proposed payment, the probability of people's acceptance to pay will increase by 0.36%. Based on marginal effect, every one Rial increase in the proposed payment, the probability of people's acceptance will increase by 0.4×10^{-6}.

The variable "importance of rangelands as livestock production units" had a significant negative value at 1% level. Elasticity at means of this variable shows that with every 1% increase in the livestock production, the probability of accepting proposed payment will reduce by 0.68%. On the other hand, marginal effect shows that when using rangeland as a livestock production units increases by 1%, the probability of accepting bid decreases by 0.617%.

Table 2 Variables Influencing upon the Probability of WTP of Individuals in *Gomorogan* Village

Variable	Estimated Coefficient	T- ratio	Elasticity at means	Weighted elasticity	Marginal effect
Age	-0.122**	-2.34	-0.94	-1.10	-0.018
Education	-0.418**	-2.19	-0.35	-0.362	-0.061
Bid	-0.154	-0.18	-0.044	-0.045	-0.0226
Income	0.0000027**	2.11	0.36	0.317	0.0000004
Rangelands as livestock production inputs	-4.2*	-1.7	-0.68	-0.711	-0.617
Constant	12.7**	2.37	2.27	2.42	-

Likellhood ratio test = 16.277 With 8 D.F. P-value = 0.038
Estrlla R-square 0.48
Maddala R-square 0.39
Cragg-uhhler R-square 0.56
Mcfadden R-square 0.40
Perecentage of right prediction = 0.93
* , **, and *** are significance levels at 1, 5, and 10% and ns implies insignificance

5. Discussions

Income is one of the most important factors affecting people's willingness to pay and participate in the rangeland protection. In other words, since the benefits of investment in environment protection come in long term, people whose income is low tend less to do such investments. Hence, financial support to local communities and increasing their income level, especially among those with low income, increases willingness to pay and participate in rangeland protection. Consequently, systems of justly income distribution and increasing welfare of local communities at macro level will enhance the participation of local communities, which has also been pointed out by Lin and Chang (8). Age is another driving force in participation process. It was found out that younger people tend more to participate in rangeland protection. Therefore, due attention must be given to appropriate planning in encouraging the youngsters' participation. On the other hand, it seems that as one gets older, accepting new methods and giving up the old traditions becomes very difficult. Heydari et al. (6) contends that refraining from risk taking and reluctance to change previous conditions are the main reasons that make the elders reluctant to participate. To put it differently, older beneficiaries misunderstand the concept of participation and are more self-centered. Increasing the proposed payment will lessen the probability of willingness to pay and participation, which is in line with the finding of Lee *et al*. (9). Since shepherding was the main occupation of respondents in *Gomorgan* village, utilizing rangelands (natural and plantings) for livestock grazing was very important for them. So, this option i.e. participation in rangeland management and utilization is a good motivation for protection projects. Thus, reclamation of degraded rangelands and assigning them (natural and

restored) to the beneficiaries will motivate local communities' participation. Respondents' outlook toward rangeland as livestock production units has direct but negative relationship with local communities' participation in rangeland protection. Negative value shows that those who consider rangeland as livestock production inputs, are less willing to pay than those who see rangeland as a factor for decreasing air pollution. It can be consequently stated that people's outlook regarding the importance of rangeland protection is another influential factor for participation and utilizing rangeland. According to present study, ethical people tend more to participate. In fact, the more a shepherd is attached to rangeland, the less he is inclined to conserve it, which is in line with the finding of Laeane *et al*. (10). Strong reliance of shepherds' economy on rangelands of the village and lack of an appropriate alternative makes that this factor (utilizing rangeland as livestock production unit) have reverse relationship with people's willingness to participate. Thus, initially it is required that shepherds should not be concerned with removing their subsistence and some measures should be taken for producing and distributing fodder among them. Besides, it is recommended that those who are worried about providing fodder for their livestock must be made aware of the consequences of rangeland degradation and the threat to their future job. Meanwhile, local communities must be informed about the consequences of such degradation since the damage will not only threaten the future generations but also endangers the welfare of the present generation. Mahmoudi *et al*. (11) state that appropriate design and implementation of conservation programs for restoring natural resources both decrease the degradation of these resources and guarantees sustainable development and participation of local communities.

6. Conclusions

It can be concluded that determining the socio- economic condition of local community could be a useful tool to increase the success level of the conservation projects in rangeland management. Considering the socio-economic variables in designing rangeland protection program can enhance its utilization efficiency. Also consider these variables increase the participation of local communities in protection rangeland duo to these programs are accepted by local communities because of the socio-economic structure of adaptive more.

Conflict of Interests

There are no conflicts of interest with respect to the Tehran University.

Acknowledgements

The authors wish to thank the peoples of *Gomorgan* village who have kindly accepted to take part in this survey and we are very grateful for suggestions and comments from technical committee's editors.

Authors' Contributions

Each of the authors contributed to the development of the paper.

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تحلیل متغیرهای اقتصادی- اجتماعی موثر بر تمایل به مشارکت جوامع‌محلی در حفاظت از مراتع (منطقه مورد مطالعه: روستای گمرگان- شهرستان ملارد)

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تاریخ دریافت: ۶ شهریور ۱۳۹۵/ تاریخ پذیرش: ۱۷ تیر ۱۳۹۶/ تاریخ چاپ: ۱ مهر ۱۳۹۶

مقدمه: مشارکت جوامع‌محلی به عنوان یکی از اصلی‌ترین عوامل رشد و توسعه اجتماعی- اقتصادی در مدیریت مراتع مطرح می‌باشد. یکی از مهم‌ترین موانع مشارکت جوامع محلی در حفظ مراتع کشور عدم توجه به نیازهای اقتصادی- اجتماعی بهره‌برداران است. بنابراین تحلیل متغیرهای موثر بر مشارکت می‌تواند به پیش‌بینی نیازها و رفع کمبودهای برنامه مشارکت کمک قابل توجهی نماید.

مواد و روش‌ها: منطقه مورد مطالعه در این تحقیق روستای گمرگان- شهرستان ملارد می‌باشد. مطالعه حاضر به کمک رویکرد مدل رگرسیونی لجیت به بررسی میزان اثر متغیرهای اقتصادی- اجتماعی تأثیرگذار بر مشارکت جوامع محلی می‌پردازد.

نتایج: نتایج نشان داد از بین متغیرهای مورد مطالعه متغیر سن، تحصلات، پیشنهاد، اهمیت مرتع به عنوان نهاده تولید دام دارای اثر منفی و میزان درآمد دارای اثر مثبت بر میزان مشارکت جوامع محلی منطقه مورد مطالعه هستند.

بحث و نتیجه‌گیری: می‌توان بیان کرد بررسی شرایط اقتصادی و اجتماعی جوامع محلی می‌تواند ابزار مناسبی برای افزایش سطح موفقیت پرژوه‌های حفاظت از مراتع باشد.

کلمات کلیدی: جوامع محلی، شهرستان ملارد، متغیرهای اقتصادی- اجتماعی، مدل لجیت، مراتع