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

Maede Nasry¹, Mehdi Ghorbani²*, Mohammad Jafari³, Hamed Rafiee⁴

¹ M.Sc. Student Desert Management Department of Arid and Mountains Regions Reclamation, Faculty of Natural Resources, University of Tehran, Karaj, Iran
² Associate professor, Department of Arid and Mountains Regions Reclamation, Faculty of Natural Resources, University of Tehran, Karaj, Iran
³ Professor, Department of Arid and Mountains Regions Reclamation, Faculty of Natural Resources, University of Tehran, Karaj, Iran
⁴ Assistant Professor, Departments of Agricultural Economics, Faculty of Economics and Agricultural Development, University of Tehran, Karaj, Iran

Corresponding author: Mehdi Ghorbani, Department of Arid and Mountains Regions Reclamation, Faculty of Natural Resources, University of Tehran, Karaj, Iran, Tel: +98 912 769 5257, E-mail: mehghorbani@ut.ac.ir

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);

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

\[ \Delta U = U(1, Y-A; S) - U(0, Y; S) + (\varepsilon_1 - \varepsilon_0) \]  

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).
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).

\[
E = \frac{\partial[Y_i]}{\partial x_k} = F(x_i^{'b}) \beta_k = \frac{\exp(-x_i^{'b})}{[1 + \exp(-x_i^{'b})]} \beta_k
\]  
(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):

\[
P_i = \Pr(Y_i = 1) = F(x_i^{'b}) = \frac{1}{1 + \exp(-X_i^{'b})}
\]  
(3)

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 to 10 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>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Variation coefficient</th>
<th>Max.</th>
<th>Min.</th>
<th>Description</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>43</td>
<td>17.11</td>
<td>0.39</td>
<td>84</td>
<td>21</td>
<td>Less than 30</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>From 31 to 50</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>From 51 and more</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Can read and write</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Primary school</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>University</td>
<td>12</td>
</tr>
<tr>
<td>Education (year)</td>
<td>5</td>
<td>3.16</td>
<td>0.63</td>
<td>12</td>
<td>0</td>
<td>Less than 5</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>From 5 to 10</td>
<td>32</td>
</tr>
<tr>
<td>Household size</td>
<td>4.72</td>
<td>2.26</td>
<td>0.4</td>
<td>12</td>
<td>2</td>
<td>less than 5000000</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Between 5000000-1000000</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>more than 1000000</td>
<td>32</td>
</tr>
</tbody>
</table>

Table 1 Socio-Economic Features of Respondents in Gomorgan Village
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, every one-year increase in 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 $0.21 \times 10^{-3}$.

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 $0.4 \times 10^{-6}$.

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%.
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 Gomorogan 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

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 Gomorogan 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

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

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

Likelihood 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
Percentage of right prediction = 0.93

*, **, and *** are significance levels at 1, 5, and 10% and ns implies insignificance
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 due 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.

References
4. Baddgi GL. People participation in soil and water conservation through watershed


تحلیل متغیرهای اقتصادی-اجتماعی موثر بر تمایل به مشارکت جوامع محلی در حفاظت از مناطق (منطقه مورد مطالعه: روستا گمرگان - شهرستان مرزداران)

مقدمه: مطالعه جوامع محلی به عنوان یکی از اصلی این عوامل رشد و توسعه اجتماعی-اقتصادی در در مدریت مراع مطرح می‌باشد.

یکی از مهندی‌های موانعی برای مشارکت جوامع محلی در حفاظ رونده کشور عدم توجه به نیازهای اجتماعی-اقتصادی اجتماعی بهبودیار است.

به این ترتیب تحلیل پژوهشی موثر بر مشارکت جوامع محلی به عنوان یکی از این مشکلات مطرح می‌شود.

مواد و روش‌ها: منطقه مورد مطالعه در این تحقیق روستای گمرگان-شهرستان مرزداران می‌باشد. مطالعه حاضر به کمک رایگان مدل رگرسیون نجات به بررسی تأثیر این متغیرهای اقتصادی-اجتماعی تأثیرگذار بر مشارکت جوامع محلی می‌پردازد.

نتایج: نتایج نشان داد این متغیرهای مورد مطالعه پژوهشی تأثیر پذیرند.

بحث و نتیجه‌گیری: می‌توان بیان کرد بررسی رابطه اقتصادی و اجتماعی جوامع محلی می‌تواند ابزار مناسبی برای افزایش سطح پژوهشی حفاظت از مناطق باشد.

کلمات کلیدی: جوامع محلی، شهرستان مرزداران، متغیرهای اقتصادی-اجتماعی، مدل نجات، مراع