Analyzing the Role of Agricultural Beneficiaries in Sustainable Management of Natural Resources and Environment (Case of Hamadan County)

Masoud Samian [1*], Reza Movahedi [2], Elham Ansari [3] and Masoud Asadi [3]

Abstract

The countries' economy is basically dependent on both human and the natural resources so that social development of each country depends on them directly or indirectly. Nonetheless, some problems including the rapid growth of the population, unsustainable and unplanned exploitation, and lack of public awareness of development and reclamation rules have given an increase to the degradation process of these resources. So, one of the basic requirements to achieve the sustainable agriculture and rural development is sustainability in natural resource management and its protection. It should also be noted that public participation in natural resource management plays an important role in the prevention of this destructive process. The problem propels the aim of this research to determine the measure of agriculture beneficiaries' role and importance in sustainable management. This research is an analytical - descriptive study which has a survey approach in collecting data. The statistical population consisted of 208 agriculture beneficiaries in villages around Hamadan city. Results showed that farmers could be classified into three groups: 34 percent in unsustainable group, 54 percent in moderately sustainable group and 12 percent in sustainable group. Also, multivariate regression showed that the variables of personal, extension and education, economics, policy and institutional and social activities could explain 79 percent ($R^2 = 0.791$) of natural resources' changes in agricultural sustainable management.

[1] *Ph.D. Student, Department of Agricultural Extension and Education, College of Agriculture, Bu-Ali Sina University, Hamedan, Iran*
[2] *Associate Professor, Department of Agricultural Extension and Education, College of Agriculture, Bu-Ali Sina University, Hamedan, Iran*
[3] *M.Sc. Graduated, Department of Agricultural Extension and Education, College of Agriculture, Bu-Ali Sina University, Hamedan, Iran*
* Corresponding author's email: samian.masoud@yahoo.com

INTRODUCTION

Since the late twentieth century, one of the issues which have been turn into a mental obsession for majority of environmentalists has been the protection and maintenance of environment. Their efforts eventually led to the creation of a phenomenon called sustainable development in Brundtland Commission. The main reasons for the tendency towards sustainable development have been the growing population and technology, unlimited needs, and limited facilities (Zahedi, 2007). In most developing countries, the natural resources have been almost depleted because the population growth, uncontrolled expansion of cities, beneficiaries' lack of awareness, lack of proper planning and quantitative-qualitative degradation have put these resources in danger of destruction (Shaeri and Saadi, 2003). Controlling the destructive factors and encouraging the constructive ones is not only hidden in technical points of view and master plans, but also they are mainly in social behavior of beneficiaries illustrated in a form of participation which are playing an important role in natural resources' revival (Khatounabadi, 1999). Therefore, beneficiaries' participation in the revival these resources is raised as a need and necessity (Allan and Curtis, 2002). Participation is a process that encompasses active and equal involvement of all beneficiaries in planning the policies, scheduling, implementing, supervising, and evaluating activities (FAO, 2004).

Previous studies have indicated how the local communities participate in conservation of natural resources and also have investigated the influencing factors on participation from different aspects in Iran and other countries. Emphasis on people's participation in activities and decision-making associated with natural resources as the simplest and most efficient method to protect these resources dates back to the 1930s. In this decade, efforts were initiated to create appropriate fields and motivation and willingness of local communities to protect natural resources and improve their living conditions (FAO, 2004).

Most studies in the field of public participation in natural resources conservation projects have emphasized the influencing factors on people's participation in the projects. Few studies have been done about the barriers to people's participation in the protection of natural resources, some of which are briefly mentioned in this section.

In a study on the reasons for the lack of participation of Lorestan Province's nomads in natural resource revival projects, Ansari (1994) found historical, political, social, economic and technical reasons for the lack of their participation. Khatounabadi (1999) believes that centralized planning, lack of local coordination, inappropriate technologies, irrelevant projects with rural needs, cultural and structural obstacles, and the scattering of natural resources' beneficiaries are the most important barriers to the participation of beneficiaries. Huntsinger and Fortman (1990) showed that most demographic features have been effective on people' decision to participate in conservation activities, and that not only benefit, but also social factors, values and trends like education, age, income, place of residence and the size of pasturage were effective on ranchers' decision to participate in pasturages' conservation activities. Awareness of needs to improve the management of natural resources throughout the world is growing. Accordingly, studies on development agree that the sustainable development in rural areas requires a re-thinking about how to interact with the development activists, scientists of sustainable development, organizations, and beneficiaries of natural resources (Long and Villareal, 1994). According to the conducted research, it has been determined that the income of about 1.2 billion people around the world is less than one dollar a day, among which 44 percent are living in South Asia, about 25.5 percent in Africa, 24 percent in East Asia and 6.5 percent in Latin America, which 75 percent of these poor people live and work in rural areas (IFAD, 2001). Natural resource management should be an integrated process in which the interaction among institutes, environmental dynamics, economic processes, practical technologies/cultures and local customs

International Journal of Agricultural Management and Development, 6(3): 387-395, September, 2016.

388

are considered for managing and governing natural resources (Rahman and Yamao, 2007). Holistic approaches like sustainable management of natural resources and system's dynamics have been extensively used in vast areas of science. Based on theoretical studies, five types of investment or assets are required to achieve sustainable management of natural resources which are as follows:

Human capital: including age, educational level, farming experience, family size and their participation rate in farming, knowledge and skills, health and ability to work.

Social capital: including formal and informal social relationships, range of support and membership in different organizations like farmers' organizations, being a leader or pioneer, social status, participation rate, situation and type of land ownership, and contact with sources of information.

Physical capital: including infrastructures like the distance of road, canals and irrigation networks from the center of village services, asphalt road, cooperative and producing goods such as agricultural machinery.

Economic capital: including production and farm income, off-farm income or non-agricultural income, access to government subsidies, access to credits, cost of inputs, the use of family labor in agriculture, and dependence on the workforce out of the house.

Natural capital: including land, water and biological resources such as trees, pastures, wildlife, farming, fallow, and crop rotation, though this resource efficiency can be improved or degraded by humans' management.

According to five assets, researchers refer to the literature of sustainable development agriculture by two concepts which are aligned together: the studies which were consistent with these five areas and were the basis of the research, and those which formed the theoretical framework, the sustainable management of natural resources by farmers, for the study (Hassanshahi *et al.*, 2009).

Human capital: Alonge and Martin (1995) indicated that the variations of the classical model of publishing age features and the level of education had been weak predictor for the sustainability of agricultural operations. Also, the results of Omman and Chizari's (2006) research show a negative, significant relationship of wheat growers' age, agricultural experiences, and family size with sustainability of agricultural farming systems' level. In contrast, a positive, significant relationship was found between literacy rate, technical knowledge, and sustainable agricultural knowledge with the sustainability of agricultural farming systems' level.

Social capital: In Cumer *et al.* (1999)'s study farmers' organizations and the number of these organizations have been effective in farmers' perception towards sustainable agricultural systems. In addition, Ommani and Chizari (2006) found a positive significant relationship between attending in educational–extension classes and the adoption of wheat cropping system's sustainability.

Physical capital: Gromwell *et al.* (2001) reported that access to promoting inputs, credit, nongovernmental organizations, seed supply, marketing, and researches had an influence on farms' sustainability.

Economic capital: According to Roosta (1999), there is a positive, significant relationship between yield and sustainability of farming systems. Ommani and Chizari (2006) showed a positive, significant relationship of wheat yield and the amount of product revenue with farms sustainability.

Natural capital

Shaikh *et al.* (2007) showed that the type of the soil, planted area and the frequency of the use of the technology in the soil were effective. Roosta (1999) indicated a positive, significant relationship between sustainability and type of farming system.

Human wealth is based on the use and consumption of natural resources, including materials, energy and land. Continued increase in resource use and the related environmental impacts can have a multitude of negative effects leading to ecological crises and security threats. The sustainable use and management of natural

International Journal of Agricultural Management and Development, 6(3): 387-395, September, 2016.

389

resources have therefore come into focus and have been the subject of many policy discussions over more than a decade, beginning with the summit in Rio de Janeiro in 1992 (EEA, 2005). Sustainability concept is recognized and widely accepted by scientist in this summit. As a result, governmental agencies and other stakeholders have increasingly involved science when dealing with the trade-offs associated with the maintenance environmental values involved in the management of natural resources.

Human activities are having an increasing impact on the integrity of ecosystems that provide essential resources and services for human well-being and economic activities. Managing the natural resources base in a sustainable and integrated manner is essential for sustainable development. In this regard, to reverse the current trend in natural resource degradation as soon as possible, it is necessary to implement strategies which should include targets adopted at the national and, where appropriate, regional levels to protect ecosystems and to achieve integrated management of land, water and living resources, while strengthening regional, national and local capacities. This would include actions at all levels as set out below (UN, 2002).

The problem with strong sustainability is the implicit suggestion that today's natural resource base will necessarily be of significant interest to future generations. On the contrary, conserving today's natural resource base does not ensure that tomorrow's natural resource base is secure. Likewise, drawing down today's natural resource base does not necessarily mean that tomorrow's natural resource base will be put in jeopardy (Taylor, 2002). This problem to try to understand need to examine our common future. According to the Brundtland Report, the problems facing the planet are two-fold. Environmental dimension of this problem: failure to manage the natural resource, resulting in desertification, deforestation, acid rain, global warming, ozone depletion and pollution (UN, 1987).

The aim of this study was to analyze the role of agricultural beneficiaries in sustainable management of natural resources and environment.

MATERIALS AND METHODS

The present study was carried out in Hamedan County using an applied method in terms of the purpose and a survey methodology in terms of data collection. The statistical population consisted of 208 agriculture beneficiaries in villages around the Hamadan city. Morgan table was used to determine the sample size. The study used both documentary research and a standard questionnaire for data gathering. The reliability of the questionnaire was estimated with Cronbach's alpha test as to be 0.78, which shows an appropriate level of reliability for the use in this study. The dependent variable of this study, the extend of the natural resources' sustainable management, was measured first by five relevant parameters about capital (human, social, economic, physical and natural) in terms of sustainability, second by Bossel's method (1999) for classifying homogeneous groups.

In the present study, first variables related to sustainable management of natural resources were selected and they were measured for data analysis. Then, all parameters were coded and were weighted by principal component analysis, and the weight of each indicator was obtained with factor analysis technique. Descriptive statistics such as frequency tables, percent, mean scores and standard deviation, were first used with regard to the research type during the data processing phase. In the analytical phase, multiple regressions was used to determine the relationships between the dependent and independent variables. It should be noted that after data gathering, SPSS software was used for data processing and calculating statistical tests.

Basel method was also used for both assessing the sustainability level and leveling the factors affecting natural resources sustainable management. Then, as mentioned earlier the indicators scaling was done with this method. The weights of the indicators were determined by various methods to control difference among the variables. In this study, a method of dividing into mean was used.

To analyze the level of sustainability of the fields of study, standard deviations from the

Table 1: Sustainable levels based on Bossel (1999)'s method

Sustainable levels	Range
Sustainable	1 - 0.6
Moderately sustainable	0.45 – 0.6
Unsustainable	> 0.45

mean were used (Samian *et al.*, 2014). In this method, the converting methods of the obtained scores based on the proposed Bossel Table are estimated in 3 categories:

A < Mean – St.d: A Unsustainable

Mean- St.d < B < Mean: B Moderately sustainable

C > Mean + St.d: D Sustainable

To analyze the sustainability fields of the study Bossel (1999)'s proposed method for classification and grading of the fields was used. Proposed method is shown in Table 1.

RESULTS

Based on the findings, mean age was 46.42 years (SD=14). Most of the samples of this study were illiterate (27.6%). The majority of the samples had above 20 years of farming experience. Also, 30 percent of households had three members of family, 25 percent had four members, and 45 percent had more than four members. Also, 65 percent of the surveyed farmers were members of agricultural cooperatives. Ten percent were also among the leading farmers. More than 70 percent were the owner of the land. More than 85 percent of villages had road. More than 40 percent of farmers had sprinkler irrigation system in their farms. And the distance of rural villages to the service center was less than 5 km in 20% of cases, between 5 to 10 km in 30% of cases and more than 10 km in 50% of cases. More than 85% of the studied population earned their income from agricultural activities. As well, 60 percent of the population used family labor on their farms.

The results of the factor analysis showed that human, social, natural, physical, and economic capitals are the most important factors which explain the variations of research variables.

Based on the results of factor analysis and calculation of combined parameters, scores were computed for each beneficiary and then, participants were categorized into three groups by the method proposed by Bossel (1999): sustainable, moderately sustainable, and unsustainable

Results in Table 2 have been illustrated:

Based on the results in Table 2, 34 percent of the farmers were included in the first group, i.e. unsustainable, 54 percent in moderately sustainable group, and 12 percent in sustainable group.

Table 2: The numerical values and sustainability of natural resource management among farmers in the study

Sustainability	Range	Frequency	Percent	Cumulative percent
Unsustainable	0 – 0.45	71	34.1	34.1
Moderate sustainability	0.45 – 0.6	111	53.3	87.4
Sustainable	0.6 - 1	26	12.6	100

Table 3: The relative weight of each factor

Variables	First factor (weight)
Human capital	0.364
Social capital	0.221
Natural capital	0.143
Physical capital	0.126
Economic capital	0.112

Table 4: Eigenvalues of the variables

Factors	Eigenvalue	Percentage of variance	Cumulative percent
Human capital	4.63	13.24	13.24
Social capital	4.21	12.15	25.39
Natural capital	3.85	11.16	36.55
Physical capital	3.29	9.76	46.31
Economic capital	3.17	9.21	55.52

Table 5: The relationship between some research variables and level of sustainable management of natural resources among farmers

Variable	Correlation coefficient	p-value
Age	0.477	0.040*
Education	0.566	0.000**
Family size	0.354	0.001**
Number of literate household	0.426	0.002**
Agricultural employment history	0.113	0.206
Income from agriculture	0.512	0.000**
Income from non-agricultural activities	0.452	0.001**
Household expenditure	0.022	0.549
Social participation	0.245	0.030*
Attending in educational–extension classes	0.324	0.045*
Technical knowledge of farmers	0.621	0.000**

* $p < 0.05$
** $p < 0.01$

Also, the weight of each factor and eigenvalue of the variables are presented in Tables (3) and (4), respectively.

The relationship between some research variables and the level of sustainable management of natural resources among farmers are shown in Table 5. There is a significant relationship among family size, number of literate household, income from agricultural and non-agricultural activities, education level, and technical knowledge of farmers with the amount of sustainable management of natural resources at the 1% level. Also, farmers' age, social participation and attending in educational–extension classes were significantly related to the level of sustainable management of natural resources at the 5% level. In general, these findings are in accordance with Ommani and Chizari (2006).

Results of regression analysis from factors affecting the natural resources' changes in agricultural sustainable management

To analyze the factors affecting the natural resources' changes in agricultural sustainable management, multiple regression analysis was used. To this end, first, all independent variables that have a significant relationship with the dependent variable were included in the equation simultaneously.

Regarding factors affecting the natural resources' changes in agricultural sustainable management, it was found that multiple correlation coefficients (R) equaled 0.763 and coefficient of determination (R^2) equaled 0.791 (Table 6). In other words, 79% of the variability could be accounted for by the independent variables and other factors were related to changes that were not studied in this research.

Factors that revealed an effect on agricultural sustainable management in this study included Personal factor and extension and education factors that had significant relationship with the dependent variable, i.e. the sustainable management of agricultural water; that the amount of factor equaled 0.315 meaning that a unit changing in the standard deviation causes the standard deviation of the dependent variable to be

International Journal of Agricultural Management and Development, 6(3): 387-395, September, 2016.

392

Table 6: ANOVA and brief model of correlation and determination coefficient

Correlation	R²	F	p-value
0.763	0.791	19.246**	0.000

** p<0.01

Table 7: Calculated coefficient elated to influencing factors on natural resources' changes in agricultural sustainable management

Variable	B	Beta	t	p-value
Personal and extension and education factor	0.541	0.315	6.214	0.000
Economic factor	0.014	0.261	5.325	0.000
Policy and institutional factors	0.032	0.135	3.618	0.034
Social factor	0.625	0.079	2.218	0.000
Fixed amount	7.625	-	11.024	0.000

changed by 0315 units and Economic factors level is 0.261 and Policy and Institutional factors level is 0.135 and Social factors level is 0.079. The results of the obtained coefficients are given in Table 7.

According to the results in Table 7, the linear regression equation is as follows:

$$Y = 7.625 + 0.541X_1 + 0.014X_2 + 0.032X_3 + 0.625X_4$$

where,

Y = natural resources' changes in agricultural sustainable management

X_1 = Personal and extension and education factor

X_2 = Economic factor

X_3 = Policy and institutional factors

X_4 = Social factor

Therefore, the personal and extension and education factor have a larger proportion in comparison with other variables in predicted the dependent variable. So, one unit change in standard deviation causes the standard deviation of the dependent variable to be changed by 0.315 units.

CONCLUSION

The results of factor analysis showed that human and social capitals are the most important factors that explain the variability of sustainable management of natural resources. Therefore; it is recommended that in programs that are supposed to be done by the relevant or-

ganizations in relation to the sustainable management of natural resources by farmers, there should be enough attention to these two capitals and the variables constituting them. Due to the positive, significant relationship seen between economic characteristics of farmers and sustainable management of natural resources, it is recommended to government to provide comprehensive supports for farmers to improve their economic conditions. Developing educational and promotional programs for the organizers of natural resources, holding training courses and trips in order to visit the successful projects of country and finally cooperating with universities and research centers should be placed in programs of forest organization, rangeland and watershed.

Regarding the problems of natural resources and their major role in development, it is necessary to design appropriate, investigative, educational and executive organizations. Given that the number of literate households is among the factors that affect sustainable management of natural resources by farmers, it seems that educational and cultural programs in the field of sustainable management of natural resources for household members can encourage the head of households to observe the principles of sustainable management of resources.

Results of leveling the natural resources sustainable management among farmers revealed that 34.1 percent of farmers were at unsustain-

able level, 53.3 percent at semi-sustainable, and 12.6 percent at sustainable level. The results of multiple regressions also showed that the personal and extension and education factor variable had the highest proportion in comparison to other variables for determination of the dependent variable. Accordingly, it can be resulted that one unit variation in standard deviation influences 0.315 on dependent variable's standard deviation. Other effective variables were the economic factor, policy and institutional factors, and social factor.

ACKNOWLEDGEMENT

REFERENCES:

1- Allan, C., & Curtis, A. (2002). Participatory rural appraisal: Using it to understand rural communities. *Natural Resources Management*, 51, 24- 34.

2- Alonge, A. J., & Martin, R. A. (1995). Assessment of the adoption of sustainable agricultural practices implication for agricultural education. J*ournal of Agricultural Education*, 3-3, 34-42.

3- Ansari, N. (1994). *Investigate the causes and contributing factors of the tribes involved in the restoration and improvement of range management plan with emphasis on Lorestan tribes.* The first seminar on pasture, Isfahan University of Technology, 25-27 August 1994. Isfahan.

4- Bossel, H. (1999). *Indicators for sustainable development: Theory, method, applications. IISD, A report to the balaton group.* Published by the international institute for sustainable development. Canada.

5- Carney, D. (1998) Sustainable rural livelihoods: what contribution can we make? Presented at the department for international development's natural resources advisers' conference, July 1998. Paper 217.

6-Comer, S., Ekanem, E., Muhammad, S., Singh, S. P., & Tegegn, F. (1999). Sustainable and conventional farmers: A comparison of socio-economic characteristics, attitude, and beliefs. *Journal of Sustainable Agriculture,* 15, 29-45.

7- European Environment Agency (EEA) (2005). Sustainable use and management of natural resources. *EEA Report* (No 9, 4-65), ISBN 92-9167-770-1, EEA, Copenhagen.

8- FAO. (2004). Participation: our vision. Retrieved from http://www.fao.org/participation/vision.html.

9- Gromwell, E., Kumbena, P., Mwanzar, R., & Chirwa, R. (2001) Impact assessment using articipatory approach in Malawi. *Agricultural Research and Extension Network*, 112, 1-11.

10- Hassanshahi, H., Sadati, A., & Rezaei, A. (2009). Sustainable management of natural resources among farmers, city Behbahan. *Journal of Environmental Sciences*, 7(2), 169-180.

11- Huntsinger, L., & Fortman, L.P. (1990). Californias privately owned oak woodlands: Owners, use and management. *Journal of Rang Management*, 43(2), 147-152.

12- International Fund for Agricultural Development (IFAD) (2001). *Rural poverty, report, the challenge of ending rural poverty*. Oxford: Oxford University Press.

13- Khatounabadi, A. (1999). *Human involvement and two-way interaction: A framework for the protection of natural resources and sustainable development department.* Proceedings of the conference on natural resources, participation, and development of forests and rangelands, in collaboration with Tarbiat Modarres University, 20 July 1999.

14- Long, N., & Villareal, M. (1994). The interweaving of knowledge and power in development Interfaces. In: Scoones, I., Thompson, J. (Eds.), *Beyond Farmers First-Rural People's Knowledge, Agricultural Research and Extension Practice.* Intermediate Technology Publications, London, pp. 41–51.

15- Ommani, A., & Chizari, M. (2006). Sustainability analysis of wheat crop (case study in the Khozestan province). *Iranian Journal of Agriculture Science,* 37(2), 257-266.

16- Rahman, M. H., & Yamao, M. (2007). Community based organic farming and social capital in different network structures: Studies in two farming communities in Bangladesh. *American Journal of Agricultural and Biological Science*, 2(2), 62-68.

17- Roosta, K. (1999). Influencing of sustainable agricultural knowledge on performance and sustainability of farming systems. Unpublished thesis, College of Agriculture, Tarbiat Modars University.

International Journal of Agricultural Management and Development, 6(3): 387-395, September, 2016.

394

18- Samian, M., Naderi Mahdei, K., Saadi, H., Balal, H., & Movahedi, R. (2014). Factor affecting the sustainable management of agricultural water. *International Journal of Agricultural Management and Development (IJAMAD)*, 4(4), 297-307.

19- Shaikh, T.H., Hideki, S., & Ueno, H. (2007). Adoption of organic rice for sustainable development in Bangladesh. *Journal of Organic Systems,* 2 (2), 27-37.

20- Shaeri, A., & Saadi, H. (2003). *Practical guide to partnerships and promote natural resource.* Tehran, Poneh Publisher.

21- Taylor, J. (2002). Sustainable development a dubious solution in search of a problem. *Policy Analysis*, 449, 1-49.

22- United Nations (1987). Our common future: Report of the world commission on environment and development. Retrieved from http://www.un-documents.net/ocf-ov.htm, accessed 10/04/2009.

23- Union Nations (2002). *World summit on sustainable development, plan of implementation of the world summit on sustainable development*. Johannesburg, South Africa, from 26 August to 4 September.

24- Zahedi, SH. (2007). *Sustainable development.* Tehran, Samt Publications.

International Journal of Agricultural Management and Development, 6(3): 387-395, September, 2016.

395