Effectiveness of range management plans in middle Zagros region from viewpoint of rangeland experts

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Abstract:

Assessment of Range Management Plans (RMP) enables policy makers and governmental planners to understand their impact from different environmental, social, human, and economic aspects in order to improve future planning. The purpose of the present study was to explore the effective variables on RMP in Middle Zagros Mountain in Lorestan, Ilam, Kurdistan, and Kermanshah provinces, Iran in 2018. Data were collected using a structured interview technique and questionnaires (N = 140) prepared in 6 sections and filled by rangeland experts of local offices of natural resources in four provinces. Seven factors were asked about weaknesses of range plans and 6 factors were asked for strengths of the plans. Result of the logistic unit (Logit regression) showed that the variables of lack of government credits ($p \leq 0.01$) and lack of continuous monitoring on the proper implementation of the project ($p \leq 0.10$) were negative while the variables of users' participation in the implementation of RMP ($p \leq 0.01$) and specifying customary system for herders ($p \leq 0.01$), controlling herders' grazing license ($p \leq 0.10$), the rate of acceptance of the rural municipality, Implementation of modifying and rehabilitation operations, establishing livestock and rangeland balance ($p \leq 0.05$), Intersection cooperation between the involved institutions and departments ($p \leq 0.01$) and rural council the range management projects ($p \leq 0.05$) were positively significant from the perspective of the experts. Also, 47% of experts were against renting rangeland to nomadic and non-rural nomad herders. They also suggested the implementation of RMP could be done in the divided rangelands rather than common form. In sum, the available projects and plans in the region under study area were not efficient due to technical, social, and economic problems. Hence, they need to be reviewed in this regard. It should be attempted to take into consideration the technical, social, and economic issues more seriously while preparing new projects.

Keywords: Nomads; Participation; Zagros rangelands; Grazing license

1. Introduction

Natural resources are granted to a country naturally and without any efforts [1]. A major part of Iran's natural resources area is composed of rangelands that play an important role in conserving water and soil, air conditioning, livestock food source, and so on [2]. The intricacy of sustainable rangeland management is increasingly known as a consequence of our better understanding of the intricacy of ecological and socio-economic phenomena [3] and participation of local communities. The protection and modification of natural resource areas, before depending on the management and government systems of the country, depends on the behavior and treatment of people who live in and around the natural resource areas or indirectly take advantage of its positive benefits and effects [4].

Range Management Plans (RMP) are as one of the best tools to rangeland management and utilization [5] and Evaluating the effectiveness of these implemented plans and projects is highly required to identify the strengths and weaknesses of the plans and improve their efficiency and effectiveness [6]. The implementing programs for prognosis RMP for the optimal use of rangelands and restoration of natural resources could include fitted sustainable development and participation of local communities while reducing the degradation of these sources [7].

In this regard, it will be necessary to pay attention to the

correct use of rangeland with the real and permanent participation of users and producers living in the region in the form of organizations and systems that make the process of rangelands utilization logical. Despite the relative success of RMP, these projects are not able to compensate for the damages caused by the destruction and elimination of rangelands without the full participation of users in a way that it can be said that non-participation of rural and nomadic users in preserving and implementing RMPbis not that much fruitful except the fact that they spend a lot of expenses on these projects. Therefore, the participation of local people will have a significant role in the improvement and effectiveness of RMP in their area of operation. Existing conditions and quantitative and qualitative indicators of rangelands status show that principled management does not govern these areas. Resource destruction, vegetation loss and soil erosion are an emphasis on the point that appropriate scientific, practical and executive solutions should be specifically considered. The common utilization system governing the natural areas implements a competitive free utilization system, so it seems that in order to modify and revitalize these areas, more supervision should be done by the trustee agencies.

To mitigate the risk factor of economic activity by the activities of farmers and herders is the most important concern for planners, policy-makers and practitioners [8]. The results of the studies also showed that the protection of natural resources will affect economic capability. Increasing the economic productivity of society and retrieving the quality of the environment are two variables that are positively related to each other [9]. One of the main causes for the failure of governments is the lack of active participation of the people in the decision-making process and monitoring environmental programs and resources of those communities. Efforts by natural resource-related organizations to control the crisis of rangelands destruction and reconstruction of these resources have so far been unable to achieve much success. Available experiences indicate that as much as the governments have the skill of using the ability of people in the process of natural resource management, the closer they are to the goals of sustainable development and indeed, long-term sustainable needs designing procedures and performing [10]. Forest and rangeland as natural resources and God-given wealth in the country have attracted a lot of attention to themselves in terms of the importance they have on the country's economy and environmental issues. The importance of the issue becomes clearer when these major sub-sectors (forest, rangeland and watershed) are tied to the fate of the people who have settled within them while having abundant economic resources.

Among the renewable natural resources, the role of rangelands is undeniable due to their large area [11]. There has also been debate among scientists and the experts on politics, at least in recent times, about the need to compile policies that have addressed the access to and protection of basic environmental resources [12]. Also, many studies have been done in this field, among which the research of Khosravi Pour et al. investigating the factors affecting the participation of farmers in the eastern villages of Ramhormoz city in irrigation projects can be mentioned. The results of the Pearson correlation test showed that there is a positive and significant relationship between the variables of social trust, social dignity and willingness with the ratio of farmers' participation in irrigation projects. Mohammadi and Barani studied 16 RMP in Mashhad County and observed that according to the beneficiaries' responses and many interviews conducted, RMPs are evaluated positively from a socio-economic point of view [13]. Alishah Aratboni et al. Investigated factors influencing participation of ranchers in RMP in Savadkooh, Mazandaran and their results showed that age had a significant negative effect on participation in the implementation of RMP [14].

Abdelrahim and Fashir Kodeal assessed the role of competition in rangelands utilization in the occurrence of conflicts between land users in the semi-arid areas of Eldebeibat, Sudan [15]. They found out that the two groups resort to traditional local administration (Godeyah) for reconciliation and solving the conflicts among them. Moradi et al. analyzed the Success and failure of RMP in Golestan province and conclude that insurance of range managers, and financial supports of plans supervisors distinguishing between committed and uncommitted applications and proposing plans with economy justification are the most important success factors of RMP [5].

In this research, four provinces in middle Zagros mountains including Lorestan, Ilam, Kurdistan, and Kermanshah were studied to identify the main effective factors in success and failure of RMP. The rangelands are used in two forms: Common (National rangelands) and Divided (by people who have grazing license for a distinct rangeland). All of these provinces are subjected to rangeland and forest degradation because of overgrazing of nomads and rural's livestock (sheep and goats) and other factors such as drought, mining activities, road and city construction and so on.

The aim of this study was to determine the effective variables on RMP in four provinces in the middle Zagros from the Perspective of Rangeland Experts (in the general office of Natural resources) in order to better and more effective planning in range management and achievement sustainable development and optimal use of rangelands.

2. Materials and methods

2.1 Study area

Four provinces in Middle Zagros Mountains including Lorestan, Ilam, Kurdistan, and Kermanshah were selected for analyzing the success and failure of RMP. The provinces are located in western Iran and have semi-arid and Mediterranean climate. Rangelands of this region utilize and graze during at least 6 months per year by Livestock (local sheep and goats) of nomads and rural herders. Rangeland area in each province is about: Lorestan: 883,500 ha, Kordestan: 1,414,000 ha, Ilam: 785000 ha, Kermanshah: 1,190,000 ha. Woody rangelands (parklands) and woodland (dominated by Querqus pesica and Pistacia mutica) also are visible in these regions.

Table 1. Descriptive variables of experts.

Variable	Descriptive statistics	Lorestan	Kermanshah	Ilam	Kurdistan
Age	Mean	38	37	44	45
	Minimum	29	31	35	35
	Maximum	50	45	57	56
Work Experience	Mean	8	8	10	11
	Minimum	4	3	3	6
	Maximum	16	18	20	18

2.2 Data collection and model selection

In this research, it was trying to obtain the desired information in the field from the four provinces of Lorestan, Ilam, Kurdistan and Kermanshah. Data and information collected via a questionnaire. The population under investigation included experts and managers (rangeland and watershed experts in the local general office of natural resources in each province). Also, some interviews done with plans supervisors and Natural resource managers.

The questionnaire was prepared in 6 sections:
1. Demographic characteristics (Age, Level of Education, discipline, etc.),
2. Viewpoint of experts about RMP (23 items based on Likert scale 1-5),
3. Viewpoint of experts about rangeland deterioration (15 items),
4. Viewpoint of experts about factors affecting the weakness of RMP (7 items),
5. Viewpoint of experts about factors affecting the forte of RMP (6 items),
6. Viewpoint of experts about factors affecting rangeland improvement (8 items).

Also, some open questions were supplied to explain the subjects.

The validity of the questionnaire was confirmed by range experts and scientific members of universities. Also, we performed a pretest to finalize the questionnaire. The reliability of questionnaire was done via Cronbach's alpha test, in which all the variables were confirmed (Cronbach's alpha> 0.7).

Then, the desired model was introduced to examine the effective factors and then, the variables considered for estimating the model are stated. Also, due to the discreet of the dependent variable (participation or non-participation in RMP), the model used to recognize the factors affecting the participation and non-participation of users has been dual models. Economists in acceptance and non-acceptance models assume that the dependent variable is a set of continuous values. Logit Models were used for such purposes with qualitatively dependent variables or dual regression models [16]. In these models, there are only two values of zero and one for the dependent variable. That is, in these models, the dependent variable is binary. In this model, it is assumed that the average desirability obtained from a choice depends on the properties of that choice, which are different for various people [17].

In logit models, the regression equation is defined as Equation (1):

$$Y^* = \acute{\beta} X_t + \varepsilon_t \tag{1}$$

In which Y^* is a so-called hidden variable, which is the same desired characteristic. If this characteristic exists, it is $Y^* > 0$, otherwise it is $Y^* \leq 0$. In the present study, this characteristic is the same as the participation or non-participation of users in RMP.

The probability of the occurrence of this characteristic, which is the same as the probability of occurrence Y_i, is specified by the Y^* structure. Therefore, if $Y_i = 1$ probability is shown by P_i, Equation (2) can be written as follows:

$$P_i = \Pr(Y_i = 1) = \Pr(Y^* \geq 0) = \Pr(\acute{\beta} X_t + \varepsilon \geq 0) \tag{2}$$

The logit model follows the logistic function as Equation (3):

$$F(I_i) = F(\acute{X}\beta) = \int_{-\infty}^{I_t} \frac{1}{\sqrt{2\pi}} \exp(\frac{-i^2}{2}) di \tag{3}$$

In which $F(I_i)$ is the individual cumulative normal density function of the i and I_i is also a linear function of the model's explanatory variables. X_i is the matrix of explanatory variables and $\acute{X}_i$ is its transposed. The β is also a matrix of estimated parameters. The logit model can also be expressed as Equation (4):

$$P_i = \Pr(Y_t = 1) = F(\acute{X}_i\beta) = \frac{1}{1 + \exp(-\acute{X}_t\beta)} \tag{4}$$

In which P_i is the probability of being a dependent variable and zero value means non-participation in the implementation of RMP.

3. Results

The mean age and work experience of experts in terms of areas under investigation by users are presented in Table 1. The level of education of the experts under investigation in various provinces is presented in Table 2. The Experts' Education Levels in Lorestan (67 and 47%), Kermanshah (33 and 47%), Ilam (40 and 47%) and Kurdistan (33 and 60%) were Bachelor and Master Degrees, respectively (Table 2). The number of RMP in each province and also the number of active and non-active (resting) plans are presented in Table 3.

The prioritization of factors affecting the weakness of RMP by experts using questionnaires was as follows in Table 4.

Table 2. Experts' level of education.

Province	Level of Education No (%)				Total
	Associate	Bachelor	Master	Ph.D.	
Lorestan	0 (0%)	10 (67%)	5 (33%)	0 (0%)	15 (100%)
Kermanshah	1 (7%)	5 (33%)	7 (47%)	2 (13%)	15 (100%)
Ilam	0 (0%)	6 (40%)	7 (47%)	2 (13%)	15 (100%)
Kurdistan	0 (0%)	5 (33%)	9 (60%)	1 (7%)	15 (100%)

Lack of participation of users in the implementation of RMP (39%), Lack of investment of rangeland owners in the implementation of RMP (20%), Shortage of government credits (13%), lack of continuous monitoring on proper project implementation (11%), Not holding training classes for users (7%), lack of compiling comprehensive service description (6%) and Defect in preparing project by experts (4%).

These were the factors affecting the weakness of RMP from the perspective of experts.

Viewpoints of experts about agreement with renting rangeland to nomadic and non-rural nomad herders were based on Likert scale 1-5 (agree completely, agree somehow, disagree and disagree completely). The result of ratio of experts was somehow (23%), disagree (47%), disagree completely (30%), respectively. Therefore, 77% of experts were against renting rangeland to nomadic and non-rural nomad herders. The frequency of range management plans (RMP) implemented in two common shared and partitioned rangelands is presented in Table 5. The result of experts' viewpoint in all the provinces under investigation was high agreement for implementation of RMP in the Partitioned rangelands (Table 5).

3.1 Logit regression

The results of the logit models are presented in Table 6. According to these results, from the experts' point of view, the variables of defect in the preparation of the project by experts (consulting companies), the lack of continuous monitoring on the proper implementation of the project, not holding training classes for users, the shortage of government credits have negatively, and the variables of users' participation in the implementation of RMP, the use of local and indigenous forces in doing RMP, controlling herders' grazing license, the implementation of modifying and re-

vitalizing operations, establishing livestock and rangeland balance, the reception rate of rural municipality and rural council of RMP, intersection cooperation between involved institutions and departments, specifying customary system for herders had positively affected performance of RMP in the Zagros region.

The variable of users' participation in the implementation of RMP with a positive sign was significant from the perspective of experts ($P < 0.01$). This means that by 1% increase in the participation of users in RMP, 1.253% will be added to the performance of these projects. It should be mentioned that this variable is not significant from the perspective of users. The estimated b value of the variable of the lack of continuous monitoring on the proper implementation of the projects from the perspective of experts was negatively significant ($P < 0.10$) and Lack of continuous monitoring on the proper implementation of projects reduces the performance and effectiveness of RMP. The variable of not holding training classes for users has become insignificant from the experts' point of view. This variable is ($P < 0.05$) and its sign is negative. This means that holding training classes for users will increase the performance of RMP. The next variable that was negatively significant ($P < 0.05$) was the shortage of government credits. The shortage of government credits reduces the performance and effectiveness of projects. Therefore, 1% reduction in the shortage of government credits will increase 2% the performance of projects from the perspective of experts. The use of local and indigenous forces in the implementation of RMP is another variable that was positively significant ($P < 0.10$).

The variables of controlling the herders' grazing license, the implementation of modifying and revitalization operations, establishing livestock and rangeland balance, the rate of acceptance by rural municipality and rural council of RMP, intersection cooperation between involved institutions and

Table 3. Number of range management plans (RMP) in each province.

Range management plans	Lorestan	Kermanshah	Ilam	Kurdistan
Active RMP	30	234	243	43
Non-active RMP	270	448	136	444
Total	300	682	379	487

Table 4. Prioritization of factors affecting the weakness of Range Management Plans (RMP) from the perspective of experts.

Factors description	Percentage	Rank
Lack of participation of users in the implementation of RMP	39	1
Lack of investment of rangeland owners in the implementation of RMP	20	2
lack of government credits	13	3
Lack of continuous monitoring on the proper implementation of RMP	11	4
Not holding training classes of users	7	5
Lack of compiling a comprehensive service description in RMP	6	6
Defect in the preparation of the project by experts (consulting companies)	4	7

departments, specifying the customary system for herders were also positively significant. This means that the increase of each one of these variables leads to increase the level of performance and effectiveness of RMP. McFadden's determination coefficient is ($R^2 = 60\%$), which shows that the explanatory variables have well explained the changes of the dependent variable. Also, the statistics of Maddala confirm this point [16]. Based on the statistics, the percentage of correct prediction which has been obtained 88% means that the estimated desired model was able to predict a high percentage of the value of the dependent variable according to the explanatory variables. In other words, almost 88% of the respondents responded correctly to the effectiveness of rangeland projects according to the information (Table 6).

4. Discussion

Examining the experts' opinions from the General Departments of Natural Resources of the four provinces under investigation, the variables of participation of users in the implementation of RMP, lack of continuous monitoring on proper project implementation of projects, lack of government credits, use of local and indigenous people in the implementation of RMP, controlling herders' grazing license, the implementation of modifying and revitalizing operations, establishing herders and rangeland balance, the rate of acceptance by rural municipality and rural council of RMP, intersection cooperation between involved departments and institutions, specifying the customary system for herders are factors affecting the effectiveness of RMP. In general, the RMP is a compiled program for the im-

plementation of management with the aim of principled and sustainable maintaining, modifying, revitalizing and exploiting the rangelands. In this regard, the most important strategy in the management of the country's rangelands is the preparation and implementation of RMP in customary systems or the areas of exploitation of central organizations. The results of this research also indicate the importance of the same issue. Specifying the customary system for herders is an important variable that according to the experts with a positive sign has become significant.

The results of this part of the research are consistent with the results reported by [9, 10, 18]. Intersection cooperation between the involved institutions and departments is another variable that has become positive and significant. Among the causes of the non-implementation of RMP, the inconsistency of the predicted programs and projects and the lack of intersection cooperation between the institutions and departments can be mentioned, which is consistent with the results of [7, 19].

The regression coefficient (b values) of the variable of controlling herders' grazing license has become positive and significant. This issue is one of the basic factors in planning and presenting a suitable method of livestock and rangeland management in order to specify economic and social units, which is in accordance with the findings of [11, 20]. Quinn et al. stated that it is essential that the public sector supports the implementation of plans and projects related to natural resources [19]. In this research, the variable of the shortage of government credits was negatively significant and the same issue confirms the point that the public sector can play an important role in the effectiveness of RMP. Also

Table 5. Comparison of two range management plans (RMP) implemented in two forms: common and divided, from the perspective of experts.

Rangeland management techniques	Lorestan Frequency (%)	Kermanshah Frequency (%)	Ilam Frequency (%)	Kurdistan Frequency (%)
Common share	0(0%)	6 (40%)	3(20%)	3(20%)
Divided (partitioned rangelands)	15 (100%)	9 (60%)	12(80%)	12(80%)
Total	15(100%)	15(100%)	15(100%)	15(100%)

Table 6. Results obtained from the logit model estimate (experts).
RMP= range management plans; Maddala R-Square = 0.5; McFadden, R-square = 0.6; Percentage of Right Predictions = 0.88; Likelihood Ratio Test = 82.74; *, **, *** significant at the level of 10%, 5% and 1%, respectively.

Variables	Estimated Coefficient	T Statistics	Estimated Tension	Final Effect Statistics
Participation of users in the implementation of RMP	3.789***	4.638	1.253	0.764
Defect in the preparation of the project by experts (consulting companies)	-0.084	-1.110	-0.180	-0.009
Lack of continuous monitoring on the proper implementation of the plans	-2.621*	-2.773	-2.005	-0.244
Not holding training classes for users	-1.003	-1.523	-0.303	-0.258
lack of government credits	- $0.851 \times 10^{***}$	-2.002	-1.003	$-0.181*10^4$
Using local and indigenous forces in the implementation of the RMP	1.871*	1.866	0.141	0.377
Controlling herders' grazing license	$0.106 \times 10^{4*}$	1.902	0.508	0.401×10^3
Implementation of modifying and rehabilitation operations, establishing livestock and rangeland balance	1.998**	2.001	0.431	0.339
rate of acceptance by rural municipality and rural council of RMP	0.241**	2.103	0.163	0.045
Intersection cooperation between the involved institutions and departments	2.702***	3.031	0.802	0.468
Specifying a customary system for herders	0.640***	2.887	3.052	0.143
Constant	5.102	1.875	3.210	

Arzani et al., Khalili et al., and Moradi et al. stated that the predicted projects in RMP for various reasons such as the lack of adequate supervision and executive guarantee, the shortage of credits and facilities, non-participation of users are not implemented or if implemented, it will not be performed in accordance with the quantity and quality existing in the project and according to the time schedule predicted in the RMP [5, 7, 20]. Weakness in supervision for the implementation of projects according to the results obtained from this research as well as other researches is another important problem for the implementation of projects. Since the natural resources departments are facing force shortage and on the other hand, the number of RMP is more than the human resources and equipment of the natural resources departments, so full supervision for the implementation of the projects of RMP practically is an impossible action. It seems that the formation of groups or companies of rangelands supervising engineers in this regard can be helpful to monitor the stages of the implementation of projects such as farms supervising engineer in the agriculture sector.
On the other hand, other results of this research specified that the problems of neighbors of customary systems and the disagreement of project implements are the most important social problems for the implementation of RMP. Considering the results of previous researches, and the opinion of many users in this research, there is no justification class in which at least the representatives and elders of the users could be justified at the time of preparing the projects, and afterwards, it has not been held either by the relevant institution. Some users even declared to be unaware of the existence of the project for their rangelands, and it was completely clear from the evidence that no acceptable training and promotion have been performed by experts and managers of natural resources in the city and provinces to implement the projects. In this regard, the above problems can be removed by recognizing the real needs of users according to its time and place, principled planning to de-termine the most appropriate promotion methods in each region, holding regular and purposeful promotion classes, creating motivation in users to participate in classes and promotion programs through the selection of sample users, the goals of awards and special facilities along with training local promoters familiar with the customs of the users of each region. In general, the existing projects in the region under study did not have the necessary efficiency due to technical, social and economic problems and should be reconsidered in this regard. In preparing new projects, it should be tried to have a more serious look at technical, social and economic problems. Also, projects designed in accordance with the social, economic and ecological conditions must be implemented in accordance with the quantity, quality and the time plan of each project. Only in this case, the preparation and implementation of RMP can be helpful for the problems and issues in the rangelands. It is also necessary to consider the multi-purpose use of rangelands in the preparation of these projects because looking at the rangeland economy only from the point of view of livestock products will be a type of single-product economy that is fragile and unstable, and is politically dependence-inducing. Therefore, considering the multi-purpose use of rangelands in RMP can be an important factor in promoting the income level of rangelands users and also an important step towards economic prosperity and rangelands sustainable management.

5. Conclusion

Generally, the available RMPs in the region under study were not efficient due to technical, social, and economic problems. Hence, they need to be reviewed in this regard. It should be attempted to take into consideration the technical, social, and economic issues more seriously while preparing new projects.

Conflict of interest statement:

The authors declare that they have no conflict of interest.

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