Rangelands and rural development: The case of Evros prefecture

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Abstract

Rangelands are used in many countries for water supply, cattle – breeding, outdoor recreation and many other purposes related to improvement of life quality. The aim of this paper is the investigation of the attitudes of the local people in a remote rural area concerning the contribution of rangeland resources in the rural development. Our study was conducted with the use of a specially designed questionnaire and it took place in the area of Evros prefecture. The questionnaire included questions concerning items measuring various benefits and contributions in the quality of life by rangelands. The data were analyzed using descriptive statistics and the methodology of confirmatory factor analysis. Our results showed that the latent structure of overall benefits from rangelands is strongly related to three main factors of benefits, with most important being the recreational benefits factor, as viewed by the local people.

Key words: rural development, attitudes, confirmatory factor analysis method

Introduction

Rangelands are essential for many human activities as they provide an important amount of raw material for livestock. Also, they provide water and appropriate habitats for wild flora and fauna. Through appropriate interventions could contribute in the development of recreation activities in a remote rural area (Solomon et al. 2007, Ispikoudis 2010).

Grazing of rangelands by livestock could provide a series of benefits to farmers as they can produce better in quality and quantity animal products and improve their income. Barrows (1990) estimated the high value of rangelands for cattle – breeders in Turkana, North Kenya, by collecting raw materials and other natural resources for their animals during the dry period. Harp et al. (2000) in their study indicated the positive impact of grazing in public rangelands in 7 local communities in Central Idaho, USA. In these communities, cattle–breeding has created a series of economic activities (multifunctionality) around the main economic activity of grazing

that are related to the main one and they are dependent to each other. In Turkey, Boz et al. (2005) investigated the contribution of cattle – breeding in the quality of life of local people in Kahramanmaras region, northeastern end of the European part of Turkey. Some of the indirect benefits of cattle – breeding in rangelands are the increase of organic material in the ground due to the natural animal manuring. Through this process farmers can utilize a non productive land which was not available before.

In the current study we investigate the attitudes of the local people in a rural area about the overall benefits from rangelands were recorded and analyzed by applying Confirmatory Factor Analysis method.

Materials and methods

To investigate opinion of local community towards rural development through rangeland resources or rangelands we have used the method of personal interviews through a questionnaire. Specifically, the questionnaire included a total of 23 questions from which we use 11 for our research, all of them measured on an ordinal scale. The questions we use were related to possible amenity factors that influence quality of life of the local people (Tsiantikoudis 2011).

The survey was conducted the year 2009. Based on simple random sampling we have completed a total of 385 questionnaires (Tsiantikoudis 2011). We attempt to measure individual overall benefits from rangelands for the data collected by implementing a Confirmatory Factor Analysis (CFA) model.

Factor analysis is a statistical method for finding a small set of unobserved variables (also called latent variables or factors) which can account for the covariance among a larger set of observed variables (manifest variables). Depending on whether one wishes to explore patterns in the data or to test explicitly stated hypotheses, factor analysis is divided into exploratory factor analysis and confirmatory factor analysis, respectively. Confirmatory factor analysis is theory-driven. With CFA it is possible to place meaningful constraints on the factor model, such as setting the effect of one latent variable to equal zero on a subset of the observed variables. The advantage of CFA is that it allows for testing hypotheses about a particular factor structure. There are several statistical packages providing CFA model fitting, such as LISREL (Jöreskog et al. 2003) and Mplus (Muthen and Muthen 2001).

In the current study, CFA is utilized in order to measure individual overall benefits from rangelands for the data collected from local people. Specifically, by utilizing the 11 observed variables, we hypothesize that the

overall benefits from rangelands use–as described by the respondents through the set of 11 observed variables–are a realization of three other latent structures expressing dimensions of benefits, specifically the following:

The first one includes the following questions: "Provide good income", "Significant cultural and historical value", "High protective value (floods etc)" and "Enhance the residence of local people" and represents the attitudes of the local people for the possible immaterial values of rangeland resources.

The second one of the three structures is constitute by the following questions: "Increase cattle–breeding activity", "Increase agricultural activity" and "Provide opportunities for the enhancement of organic cattle–breeding". It represents the attitudes of local people for the "enhancement of primary sector" and its benefit.

Finally, the third structure constitutes by the following questions: "Enhance landscape beauty", "Rich flora and fauna", "Provide opportunities for recreation and athletics" and "Contribute to hunting activities". This structure represents local people's attitudes about the recreational benefits of rangeland resources.

Due to the ordinal nature of our data we obtain the model estimates by implementing Weighted Least Squares WLS estimation methodology.

Confirmatory Factor Analysis then was used to test the hypothesized factor structure and to assess its fit to the data through significant tests on each factor loading (Jöreskog and Sörbom 1979). Specifically, we test the validity of our model by using several alternative fit statistics (see, for instance, Marsh and Balla 1994), available by the LISREL software.

Results and Discussion

In the current section we present the results of the CFA model already described in the previous section. The following Table 1 and Figure 1 presents the observed items used in the CFA model as well as the three latent factors used for the establishment of the overall benefits latent structure.

As one observes from the results, the total benefit of rangeland resources is represented by the aforementioned three structures from which the structure of "recreation benefits" has the highest contribution in the configuration of the overall benefit (0.95). In this structure the most important factors are "Rich flora and fauna" (0.79) and "Provide opportunities for recreation and athletics" (0.78). Second in contribution is the structure of "primary sector benefits" (0.85). In this structure the most

important factors are "Opportunities for the enhancement of organic cattle–breeding" (0.78) and "Increase agricultural activities" (0.73). Finally the third important structure in the configuration of the overall benefit is "Immaterial benefits" (0.74) having as most important factors "Enhancement of local peoples residence" (0.81) and "Significant cultural and historical value" (0.70).

Table 1. Factors concerning overall benefit and related observed items

Factor	Questions
Possible Immaterial benefits from rangeland use [IMM_BNF]	Provide good income (Q1) Significant cultural and historical value (Q2) Protection value (floods) (Q3) Enhance residence of local people (Q4)
Possible benefits from primary sector from rangeland use [PRIM_BFF]	Increase cattle – breeding activities (Q5) Increase agricultural activities (Q6) Provide opportunities for the enhancement of organic cattle–breeding (Q10)
Possible recreational benefits from rangeland use [REC_BNF]	Enhance landscape beauty (Q7) Rich flora and fauna (Q8) Provide opportunities for recreation and athletics (Q9) Contribute to hunting activities (Q11)

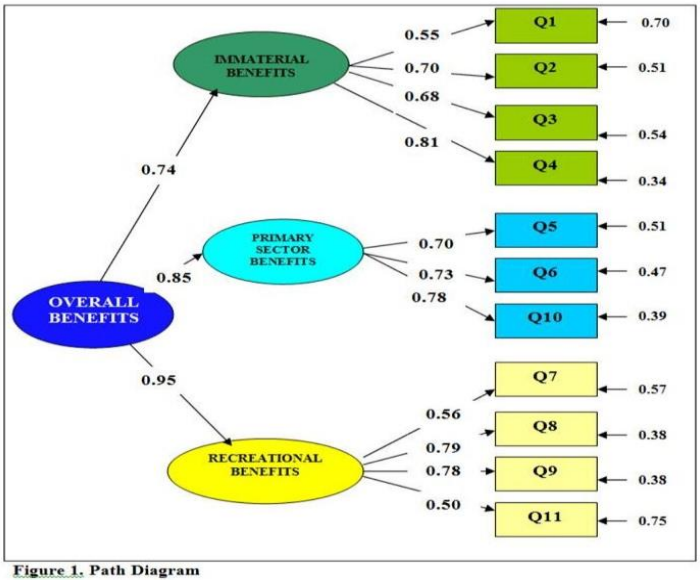

Figure 1. Path Diagram

Table 2 presents goodness-of-fit statistics along with the corresponding boundaries for acceptable model fit for each index in order to summarize results obtained for model fit by goodness of fit indices.

Table 2. Fit Indices obtained by LISREL

Goodness of fit Indices	Index value for the second-order factor model	Accepted boundaries for close fit
RMSEA	0.1	0.00 – 0.06
GFI	0.98	> 0.90
AGFI	0.97	> 0.90
NNFI	0.93	> 0.90
NFI	0.94	> 0.90

As the above results suggest, CFA indicated that the second-order factor model tested provided a good fit to the 11 observed variables.

Conclusions

CFA method that has been applied in this study is adapted satisfactorily to our data and we can confirm this fact through the high loadings of the factors from every structure and also through the high loading value of the overall benefit structure on the three other factors. Local people of Evros prefecture estimate that the available rangeland resources can provide a series of material and immaterial benefits to their communities.

The implementation of such methods of attitude grouping in a local community provides the opportunity to the decision makers to design and implement concrete developmental policies in a remote rural area for the sustainable management of natural resources, such as rangelands. Through these policies, a local community can be developed, enhance its services and improve standards of living.

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