

# Natural Resources in Regional and Rural Development: Moving from Public Perceptions to Policy Action

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## Introduction

Natural resources management policies refer to a set of principles, on which a country or a region regulates its utilization and conservation of the environment and its natural resources to achieve its rural development goals and objectives (Garmendia and Stagl, 2010). Nowadays, the development prospects have been proven unsustainable and thus, countries and regions are moving towards a path of preserving the natural resources. On the one hand, regional societies make an effort to expand the development process without harming their environment and conserve valuable natural resources. On the other hand, scholars and researchers are investigating various policy models to deliver more effective policy outcome that ensures a higher degree of implementation.

The effectiveness of natural resources policies is highly dependent on various social, environmental and economic factors that influence the stages preceding policy implementation (Jones et al., 2011; Benn et al., 2009). The role of the state is indispensable during these stages, including the development of the policy agenda and the decision-making process that lead to policy formation. However, additional entities may have also a significant role and specifically the citizens through the deliverance of public opinion and their

## Abstract

*Resource-rich regions might be expected to exploit their natural endowments in order to develop comparative advantages; however, resource abundance may be futile if poorly managed. Intriguingly, changes in regional economies and social values entail a more holistic approach of how, where and why management decisions about natural resources are made. The present paper examines public perceptions concerning the significance of natural resources and the role that they may play in regional and rural development. Primary data were collected through personal interviews to a sample of 255 citizens that were analysed through a combination of factor, confirmatory, cluster and discriminant analyses. Results reveal three distinct groups of citizens: the "active-conscious" citizens, the "environmentally-moderate" citizens and the "environmentally-passive" citizens. The results highlight sectors and resources eligible to maintain and invigorate the regional and rural developmental path.*

**Keywords:** Natural resources, rural development, regional, public perceptions.

## Résumé

Il est attendu que les régions riches en ressources naturelles exploitent leurs richesses naturelles afin de développer des avantages comparatifs; cependant, l'abondance des ressources pourrait être inutile si elle est mal gérée. Pourtant, les changements des économies régionales et des valeurs sociales impliquent une approche plus holistique concernant comment, où et pourquoi les décisions relatives à la gestion des ressources naturelles sont prises. Cet article examine les perceptions publiques relatives à l'importance des ressources naturelles et le rôle qu'elles peuvent jouer dans le développement régional et rural. Les données principales ont été recueillies à travers des entretiens personnels à un échantillon de 255 citoyens, qui ont été analysées par une combinaison de facteurs, de groupes et d'analyses discriminantes. Les résultats révèlent trois groupes distincts de citoyens: les "motivés", les "modérés" et les "passifs". Les résultats mettent en évidence les secteurs et les ressources éligibles pour soutenir et renforcer le chemin du développement régional et rural.

**Mots clés:** Ressources naturelles, développement rural, perceptions régionales, publiques.

involvement in social networks (Burnstein, 2003). Accordingly, to assess the aforementioned factors and to incorporate them in the decision-making process, social risk assessment techniques, focusing on the exploration of public perceptions, have also been developed (Eduljee, 2000).

The interconnections between public and natural resources have been widely researched in the literature focusing primarily on the impact that the social factors, either citizens' characteristics or community characteristics, have on the natural resources management (e.g Brechin et al., 2007). Public perceptions about environmental issues and participation in decision-making about natural resources management is vital and recommended as benefits accrued to all the parties involved in such decisions (Chambers and

Beckley, 2003; Rowe and Frewer, 2005), while they can provide opportunities for a mutual understanding and joint action (Carmedia and Stagl, 2010). Key information leading to effective natural resources management is dispersed among different groups of people and organizations (from local communities to state decision makers) and thus, close participation and communication is inevitable and fundamental for integrated resources exploitation, policy implementation success and long-term program viability (Berkes, 2009).

Effective natural resources management generates the mitigation of regional disparities within a state that exist due to the natural or technical advantages, which differ be-

tween regions and create different levels of development. In the Greek economy, the contribution of natural resources is indisputable, forming the main action playground for agricultural and rural activities and offering a wide range of valuable goods and services, for instance apiculture, recreation, agro-tourism, etc. Nevertheless, the lack of an integrated management program has brought about the degradation of the country's natural resources, mainly due to their predatory exploitation caused by intense agricultural activities and practices (Petraikos and Psicharis, 2005). Thus, it seems imperative to implement a national management strategy that could reinforce the collaboration among different social groups, stakeholders and the public by the foremost, bearing in mind the diversity of their needs, perspectives and goals.

In view of the abovementioned considerations, the present research aims to investigate public perceptions about the significance of natural resources and the role that they may play in regional and rural development. Specifically, the main objective is to profile the citizens of a typical low-income and remote Greek prefecture regarding their perceptions about the importance of common-pooled natural resources (i.e meadows, herbs, lakes and rivers) and how they can contribute to the development of their region. This clustering procedure will subsequently offer a clear insight into potential policy action priorities for an effective management of natural resources and public welfare.

The paper proceeds in the following section by providing an overview of the implemented rural development policies in Greece, along with a short justification of the importance of public participation in decision-making. The third section describes the data collection and the methodological approach employed, while the results are discussed in the fourth section. Conclusions are presented in the final section.

## 1. Rural Development Policies and Public Participation

European rural policy programs, mainly within the context of the second Pillar of the CAP, are oriented towards rural planning and they were composed in each EU Member State in accordance with specific outlines for the funding period of 2007-2013. These policies that promote the sustainable exploitation of natural resources, contribute to a transformation and diversification of the current production system, reduce regional inequalities while enhancing the multi-functional role of agriculture (Polyzos and Arampatzis, 2008). In Greece, the activities pertaining to the natural resources management give senior priority to the spatial balance regarding the development of regions, through the enhancement of competitiveness, economic and rural development, regional and rural employment (Efstratoglou et al., 2001).

Being primarily a rural country, the conservation and development of the rural areas are a key policy priority and a means to confront the economic downturn effectively. In addition, as an EU member, Greece has to comply with the

EU regional policy and has received support within the context of the Community Support Framework (CSF). The notion of the CSF has shifted from a single-dimensional interaction with the agricultural sector to an integrated multi-dimensional approach, including programs that require the convergence of top-down and bottom-up initiatives. The Regional Development Program (RDP) comprises the basic program that has been implemented to improve agricultural competitiveness, whilst safeguarding the environment and promoting sustainable and integrated rural development (Hellenic Ministry of Rural Development and Food, 2010). A key strategic axis of the RDP is the LEADER program that promotes the development of private initiatives and public participation in rural development. It has contributed to farmer's multi-activity and integrated rural development, on the grounds of a local participatory corporate structure, which created/developed a unique and strong identity for every region (Arampatzis et al., 2010). Particularly, the LEADER program brings together different types of stakeholders and of public, at each stage of decision-making preceding policy implementation, along with strategic development and management of natural, cultural and agricultural resources. It focuses on the consolidation of the link between stakeholders, the public and the private sector, so as to support new forms of local governance and to generate alternative activities for regional and local development.

Undoubtedly, the CAP's rationale has moved beyond sectoral policy schemes to a more comprehensive development of rural areas to improve rural population welfare through the effective exploitation of local natural resources in close connection with human and social capital (Risku-Norja et al., 2010; Bryden, 2003). Agriculture, forestry and fishing are intimately related to rural development while the CAP's measures for natural resource management stresses their importance as the key component in regional economies.

The configuration of the natural resources policy measures is also affected by social factors involving public participation, which has a key role in policy development and implementation through the deliverance of public opinions (Parsons, 2001; Burnstein, 2003). Such participation is supported for its potential to deliver low-cost sources of information to public authorities and policy makers, along with enhanced acceptance of and confidence in policy resolutions (Irvin and Stansbury, 2004; Shepard and Bowler, 1997). Participatory rural policy decisions are more effective and unbiased, while they are greatly supported by the affected parties (Reed, 2008). Subsequently, this fact highlights the need for a decentralized policy making and implementation responsibilities, as well as the increased importance to identify public perceptions about the significance of natural resources and their potential role in regional and rural development. Ultimately, these perceptions at the policy-making level, at the front-end, are the most effective in the long-term clearance (Prizzia, 2005).

## 2. Methodology

### 2.1. Research Area

The specific research area was selected, firstly, because Greece is considered as a country with significantly inefficient environmental policies, along with very low levels of public participation, activation and awareness of environmental issues (Jones, 2010; Koutalakis, 2004), and secondly, because when compared to other European countries, Greece has low levels of social capital (van Oorschot et al., 2006).

The Prefecture of Grevena occupies the southwestern part of Western Macedonia and covers an area of 2.291 km<sup>2</sup> being entirely mountainous and semi-mountainous (about 85%). The region comprises a significant part of the Pindos mountain range, with key characteristics being the immensely productive forests of conifers and broadleaves and the abundant waters. The rich fauna of the region includes the presence of big mammals, such as wolf, bear, wild boar, deer and wild goat, whilst the region of Vasilitsa constitutes one of the protected regions in the national list of the network Natura 2000. Land use incorporates forests (57.38%), plain fields (26.18%), pasture land (12.16%), forest land (1.86%), infertile land (1.75%) and settlements (0.67%).

Administratively, the prefecture of Grevena consists of eight municipalities and seven communities. In 2001, the prefecture had a population of 37.947 (corresponding to 0.36% of the population in Greece) which is at present the least densely populated region of Greece, with a population density of 16 persons/km<sup>2</sup>, and the third-least populous prefecture. The active population is 24%, employed in the primary (29.8%), secondary (19.5%) and tertiary sectors (50.7%). Grevena is primarily a rural prefecture that actually formed its development path as opposed to urbanism and migration, since it encompasses mostly agricultural and livestock breeding areas.

### 2.2. Data analysis

In order to identify public perceptions regarding the significance of natural resources to the regional and rural development, a quantitative survey on 255 citizens in the Greek prefecture of Grevena was conducted by a structured questionnaire, consisting mainly of close-ended questions, administered during face-to-face interviews. The sampling method chosen was the simple random sampling due to its simplicity and the fact that it requires relative less knowledge about the population comparing to other sampling methods. The population sample consisted of the sum of the Grevena households, whilst for the sampling frame the lists of electricity consumers were selected as the most appropriate, because nearly 100% of the households are electricity consumers. The sample size was calculated with the following equation:

$$n = \frac{t^2 p(1-p)}{e^2}$$

where  $p$  is the ratio evaluation,  $t$  is the value of the STUDENT distribution for  $(1-\alpha) = 95\%$  and  $n-1$  degrees of freedom,  $e$  is the maximum accepted difference between the random mean and the unknown mean of the population.

Accordingly, the sample size for the intent and purposes of the study was 255 ( $n=255$ ), significantly enough for the statistical analysis performed. The general socio-economic characteristics of the sample are illustrated in the following Table 1.

The questionnaire was developed based on the literature review and objectives of the study. Some questions were modified in order to serve the objective of analysis (i.e., scaling). The survey instrument comprised eleven Likert-type (5-scaled) questions subdivided into five parts that involved: the current state of regional and rural development, the contribution of meadows to regional and rural development, the contribution of herbs to regional and rural development, the contribution of lakes and rivers to regional and rural development and ten questions that were used to gather demographic information. A pilot phase with 50 respondents preceded the main fieldwork in order to purify the items included in the questionnaire, to improve wording purposes and to ensure content and face validity (Tabachnic and Fidell, 2007).

The initial analysis procedure involved the application of statistical tests of exploratory factor analysis (EFA) using the principal components extraction method (Varimax rotation) and Cronbach's alpha so as to cope with issues of construct dimensionality, validity and reliability. Subsequently, the resulting 26 scales were further evaluated and refined through confirmatory factor analysis (CFA), using Lisrel 8.54, ultimately confirming that the empirical measures (indicators) tapped facets of the intended constructs (convergent validity), the constructs were distinct from each other (discriminant validity) and homogenous (convergent validity) (Jöreskog and Sörbom, 1993). Most factor loadings were well above 0.7 that is representative of a well-defined construct, which is additionally the purpose for any factor analysis (Hair, 2010). Furthermore, most of the scales had alpha values exceeding 0.6, which is considered as "very good" for internal consistency reliability (Tabachnic and Fidell, 2007). With respect to CFA results, all goodness-of-fit indices were consistent with the acceptable limits indicating a good fit of the data (Kline, 2005). Results from the above-mentioned analyses are illustrated in Table 2.

Subsequently, cluster analysis was performed in order to form similar groups of citizens using as variables the previously extracted factors that underlie their perceptions about the significance of natural resources to regional and rural development. First, a hierarchical partitioning algorithm (Ward's method, Squared Euclidean measure of distance) was employed to generate the range of cluster solutions and

<sup>1</sup> Simple random sampling presupposes the existence of a complete list (sampling frame) of the population data without deficits or repetitions (Hair et al., 2010).



Table 1 - *Socio-economic characteristics of the sample.*

Demographic Variable	No of citizens	% of total sample	Demographic Variable	No of citizens	% of total sample
<b>Sex</b>			<b>Profession</b>		
Male	122	47.8	Farmer	19	7.4
Female	133	52.2	Domestic	27	10.5
<b>Age</b>			Private sector employee	32	12.5
Less than 18 years old	1	0.4	Public sector employee	80	31.3
19-35 years old	129	50.6	Free agent	44	17.2
36-49 years old	79	31	Businessman	13	5.0
50-64 years old	41	16.1	Student	15	5.8
Over 65 years old	5	1.9	Unemployed	25	9.8
<b>Marital Status</b>			<b>Farming is my primary or secondary activity</b>		
Single	87	34.1	Yes	73	28.6
Married	144	56.4	No	182	71.4
Divorced	20	7.8	<b>Member of Environmental Group (e.g WWF)</b>		
Widowed	4	1.5	Yes	213	83.5
<b>Income</b>			No	42	16.5
Less than 5000 euros/year	47	18.4	<b>Education</b>		
5001-10000 euros/year	37	13.3	Primary education	19	7.4
10001-15000 euros/year	44	17.2	Secondary education	102	40.0
15001-20000 euros/year	74	29	Higher education	115	45.1
20001-25000 euros/year	35	13.7	MSc, PhD.	19	7.45
25001-30000 euros/year	12	4.7			
More than 30000 euros/year	6	2.3			

estimate their centroids. Eventually, the optimal number of clusters was three based on the examination of the revealed agglomeration schedule. Random and initial derived centroids were subsequently used in K-clustering for refining the results from hierarchical clustering. This clustering algorithm splits the sample into a pre-defined number of clusters to maximize, using grouping variables, the ratio between external variance (between groups) and internal variance (in groups). The 3-cluster solution exhibited the easiest facility of interpretation and showed the highest number of statistically significant constructs' differences among the clusters (Table 3).

The three demarcated clusters (cluster 1, n= 125; cluster 2, n=90; cluster 3, n=40) are clearly distinct considering the public perceptions. In addition, the univariate *F* ratios for the three-cluster solution show that group means for the selected variables exhibit significant differences. The information relating to the firm's cluster membership in the form of a nominal cluster identity variable (Cluster 1 to Cluster 3) was saved for subsequent validation and profile analysis.

Discriminant analysis was then applied to validate the cluster analysis' results including the derivation of a linear combination of independent variables that will discriminate best between a priori defined groups (Hair et al., 2010). The method presupposes that the ratio of sample size to the number of predictor variables must be at least five observations per independent variable, and that the sample size of

each group must exceed the number of independent variables (Quazi et al., 2001). Since both of these criteria were met in the present study, the stepwise procedure was used employing an *F*-value of 1.00 (default value) for entry. The results indicate that the selected variables entered in the model were significant discriminators. Specifically, the *Chi-square* statistic indicates highly significant discriminant functions, whereas the small and significant value of *Wilk's* Lamda represents a high level of discriminating power (Table 3). Ultimately, a classification matrix was constructed (Table 4) to determine the predictive ability of the discriminating functions. The *hit-ratio* (percentage correctly classified) was utilized that uncovered how well the discriminant function classified the objects. The classification matrix for the observations was developed, indicating that 98.6% of the citizens in the prefecture of Grevena were correctly classified.

## Results and Discussion

### Results

Results indicated three distinct clusters of citizens based on their perceptions about the significance of natural resources and the role that they may play in regional and rural development. The profile for each of the three clusters was developed by cross-tabulating the cluster membership variable and the set of socio-demographic variables included in the questionnaire. These variables involved the public

Table 2 - Factor and Confirmatory factor analyses results: standardized loadings, measured reliabilities.

Code	Name of construct – items tapping each construct <sup>a</sup>	Factor loading	Eigenvalue	Variance (%)	Goodness-of-fit measures	Standardized path coefficients <sup>b</sup>
NR1	<b>Developed recreation services</b>		2.103	21.03	$\chi^2$ : 77.2, df: 30, p: 0.24, CFI: 0.90, RMSEA: 0.079 Reliability a: 0.713	
	Many opportunities for recreation	.775				0.59
	Many forrests	.719				0.55
	Many opportunities for sports	.662				0.82
	Improved level of provided services	.557			1.00	
NR2	<b>Intense development</b>		2.024	41.27	$\chi^2$ : 77.2, df: 30, p: 0.24, CFI: 0.90, RMSEA: 0.079, Reliability a: 0.623	
	Increased industrial development	.790				0.54
	Increased crime	.739				0.59
	Increased construction activity	.541				1.00
	Large number of visitors_tourists	.501			0.59	
NR3	<b>Active citizens</b>		1.632	57.95	$\chi^2$ : 77.2, df: 30, p: 0.24, CFI: 0.90, RMSEA: 0.079, Reliability a: 0.676	
	Opportunities for employment	.887				1.00
	Public participation to the development of the region	.806			0.84	
NR4	<b>Support to tertiary sector</b>		1.926	24.08	$\chi^2$ : 7.13, df: 8, p: 0.032691, CFI: 0.93, RMSEA: 0.048, Reliability a: 0.713	
	Tourism	.867				1.00
	Construction activities	.825				0.63
	Trade	.631			0.87	
NR5	<b>Support to primary sector</b>		1.861	47.34	$\chi^2$ : 7.13, df: 8, p: 0.032691, CFI: 0.93, RMSEA: 0.048, Reliability a: 0.671	
	Livestock	.847				1.00
	Agriculture	.813				0.80
	Forestry	.658			0.71	
NR6	<b>Support to secondary sector</b>		1.644	67.90	$\chi^2$ : 7.13, df: 8, p: 0.032691, CFI: 0.93, RMSEA: 0.048, Reliability a: 0.676	
	Cottage industry	.819				1.00
	Industry	.805			0.84	
NR7	<b>Future support to services</b>		2.803	35.04	$\chi^2$ : 12.72, df: 9, p: 0.175, CFI: 0.98, RMSEA: 0.040, Reliability a: 0.795	
	Trade	.762				1.00
	Industry	.748				0.55
	Construction activities	.740				0.78
	Tourism	.706				0.74
	Cottage industry	.602			0.59	
NR8	<b>Future support to agriculture</b>		1.910	58.91	$\chi^2$ : 12.72, df: 9, p: 0.175, CFI: 0.98, RMSEA: 0.040, Reliability a: 0.665	
	Agriculture	.836				1.00
	Livestock	.782				0.85
	Forrestry	.579			0.71	
NR9	<b>Meadows: Improve welfare</b>		1.979	24.43	$\chi^2$ : 38.54, df: 24, p: 0.03053, CFI: 0.97, RMSEA: 0.049, Reliability a: 0.641	
	They have significant cultural and historical heritage	.766				1.00
	Provide adequate income to local population	.681				0.86
	Protection significance (from floods etc.)	.673				0.84
	Improved people's accomodation	.539			0.88	
NR10	<b>Meadows: Improve primary activity</b>		1.697		$\chi^2$ : 38.54, df: 24, p: 0.03053, CFI: 0.97, RMSEA: 0.049, Reliability a: 0.613	
	Improved livestock activity	.826				1.00
	Improved agricultural activity	.787			0.58	
NR11	<b>Meadows: Improve landscape</b>		1.652	24.43	$\chi^2$ : 38.54, df: 24, p: 0.03053, CFI: 0.97, RMSEA: 0.049, Reliability a: 0.639	
	Have a rich variety of animals and plants	.813				1.00
	Improve landscape beauty	.811			0.86	
NR12	<b>Meadows and alternative tourism</b>		1.611		$\chi^2$ : 38.54, df: 24, p: 0.03053, CFI: 0.97, RMSEA: 0.049, Reliability a: 0.597	
	Contribute to alternative activities	.807				0.90
	Offer possibility to develop biological livetock	.782			1.00	
NR13	<b>Meadows threat from development</b>		2.738	39.116	$\chi^2$ : 18.24, df: 14, p: 0.03717, CFI: 0.96, RMSEA: 0.051, Reliability a: 0.665	
	Increased number of visitors	.779				1.00
	Residential development	.764				0.64
	Industrial development	.760				0.71
	Hunting	.711				0.68
	Agriculture					
NR14	<b>Meadows threat from desertification</b>		1.275	67.328	$\chi^2$ : 18.24, df: 14, p: 0.03717, CFI: 0.96, RMSEA: 0.051, Reliability a: 0.792	
	Abandonment	.838				0.76
	Fires	.684			0.54	
NR15	<b>Herbs contribution to quality of life</b>		2.278	24.43	$\chi^2$ : 122 df: 62, p: 0.02086, CFI: 0.93, RMSEA: 0.062, Reliability a: 0.693	
	Employment increases	.842				1.00
	Provide adequate income to local population	.750				0.88
	Contribute to natural environment preservation	.650				0.92
	Contribute to the touristic development of the region	.525			0.41	
NR16	<b>Herbs contribution to health</b>		2.240		$\chi^2$ : 122, df: 62, p: 0.02086, CFI: 0.93, RMSEA: 0.062, Reliability a: 0.667	
	Contribute to the good functioning of human body	.817				1.00
	May be used to prevent diseases	.778				0.67
	They are biological products of increased nutrition value	.587				0.76
	Their use is known only to local people	.559			0.33	
NR17	<b>Herbs as alternative nutrition</b>		1.689	24.43	$\chi^2$ : 122, df: 62, p: 0.02086, CFI: 0.93, RMSEA: 0.062, Reliability a: 0.578	

	They are used alternative to industrial cosmetics	.691				1.00
	Their collection and frequent use is a sign of low income	.601				0.66
	They are used as food in everyday nutrition	.524				0.44
<b>NR18</b>	<b>Herbs for alternative medicine</b>		1.672		$X^2: 122, df: 62, p: 0.02086, CFI: 0.93, RMSEA: 0.062, Reliability a: 0.580$	
	Their use may be dangerous	.735				1
	May cause allergies	.730				0.33
	They create false hopes for curing incurable diseases	.691				0.60
<b>NR19</b>	<b>Herbs threat from development</b>		1.652	28.70	$X^2: 37.14, df: 15, p: 0.0121, CFI: 0.96, RMSEA: 0.076, Reliability a: 0.741$	
	Industrial development	.800				0.66
	Residential development	.764				0.77
	Lack of management for their habitat	.748				0.62
	Increased number of visitors/tourists	.640				1.00
<b>NR20</b>	<b>Herbs threat from intensive agriculture</b>		1.611	50.61	$X^2: 37.14, df: 15, p: 0.0121, CFI: 0.96, RMSEA: 0.076, Reliability a: 0.600$	
	Agriculture	.796				0.53
	Livestock	.720				0.52
	Intense collection	.613				1.00
<b>NR21</b>	<b>Herbs threat from fires</b>		1.652	75.76	$X^2: 37.14, df: 15, p: 0.0121, CFI: 0.96, RMSEA: 0.076, Reliability a: 0.905$	
	Fires	.905				1.00
<b>NR22</b>	<b>Lake/river contribution to rural development</b>		2.603	28.91	$X^2: 36.30, df: 19, p: 0.0089, CFI: 0.98, RMSEA: 0.060, Reliability a: 0.711$	
	Increased protection significance	.722				1.00
	They have significant cultural and historical value	.654				0.59
	They increase livestock activity	.641				0.57
	They improve local people accomodation	.639				0.61
	They increase agricultural activity	.626				0.54
<b>NR23</b>	<b>Lake/river contribution to quality of life</b>		1.321	43.59	$X^2: 36.30, df: 19, p: 0.0089, CFI: 0.98, RMSEA: 0.060, Reliability a: 0.629$	
	They improve landscape beauty	.705				1.00
	They provide adequate income to local people	.659				0.59
<b>NR24</b>	<b>Lake/river contribution to recreation</b>		1.281	57.82	$X^2: 36.30, df: 19, p: 0.0089, CFI: 0.98, RMSEA: 0.060, Reliability a: 0.647$	
	They offer many opportunities for recreation and sports	.797				1.00
	They have a large variety of fish, plants and animals	.753				0.60
<b>NR25</b>	<b>Lake/River threat from over exploitation</b>		2.480	27.59	$X^2: 20.28, df: 19, p: 0.37811, CFI: 0.99, RMSEA: 0.016, Reliability a: 0.740$	
	Poaching or overfishing	.739				1.00
	Amateur fishing and hunting	.732				0.62
	Disasters for environmental reasons	.695				0.53
	Pollution due to agriculture	.684				0.64
	Pollution	.596				0.62
<b>NR26</b>	<b>Lake/River threat from over development</b>		2.260	62.67	$X^2: 20.28, df: 19, p: 0.37811, CFI: 0.99, RMSEA: 0.016, Reliability a: 0.728$	
	Industrial development	.832				1.00
	Residential development	.745				0.77
	Inadequate management of minerals and underground	.689				0.54
	Increased number of visitors/tourists	.656				0.43

<sup>a</sup> All measurement scales are 5-point Likert-type scales anchored (1) completely disagree (5) completely agree,

<sup>b</sup> standardized first order loadings,

<sup>c</sup> Item fixed to set the scale/not tested for significance.

demographics namely sex, family status, age, education, profession, membership in an ecological organization and their involvement with agriculture as a secondary activity. Chi-square, Duncan and Scheffe post-hoc ANOVA tests substantiated statistically significant differences among the three clusters.

*Cluster 1* (49.2% of the sample) was the largest of all clusters containing more women than the sample average, mainly young, highly educated, who work in the public or private sector. Respondents in this cluster have more positive perceptions regarding the significance of natural resources to regional and rural development. They acknowledge the increased level of development in their prefecture and that more support is given to the primary and the secondary sector. They argue that meadows – despite their increased threat from desertification – may improve citizens' quality of living and welfare, given that they can serve as the main source for rural development and alternative tourism. As concerns the existence of herbs, lakes and rivers in the prefecture, citizens in this cluster point out

their contribution to quality of life and health along with specific threats from development, intense agriculture and over-exploitation. Based on the above described characteristics, cluster 1 was termed the “*active-conscious*” citizens.

*Cluster 2* (35.4% of the sample) comprises men and women working in the public services, with medium or high education. The specific group of citizens is characterized by passive views regarding the significance of natural resources to regional and rural development. Intriguingly, this group perceives that there is no intensive rural development in their region - despite the growth and the strong support that the primary sector receives - and that the public does not have an active participation in regional development. Moreover, they argue that meadows are not affected by any kind of development and that the herbs may be a key ingredient to alternative medicine. As regards lakes and rivers in the region, cluster 2 significantly points to their contribution to rural development and public recreation, inquisitively stressing that these resources are not threatened by over-exploitation and development. Based on the afore-

Table 3 - *K-means cluster analysis results (three cluster solution).*

Final Cluster Centres	Cluster							
	Codes	1	2	3	Cluster Mean Square	Error Mean Square	F	Sig*
		(N=125)	(N=90)	(N=40)				
Developed recreation services	NR1	3.56	3.60	3.17	.767	.427	1.794	.168
Intense development	NR2	3.28	2.04	2.82	8.455	.440	19.224	.000
Active citizens	NR3	3.07	2.18	3.76	17.959	.660	27.198	.000
Support to tertiary sector	NR4	2.51	2.13	2.89	4.923	.426	11.544	.000
Support to primary sector	NR5	3.16	3.74	2.19	2.843	.367	7.750	.001
Support to secondary sector	NR6	2.78	2.27	2.01	3.427	.471	7.277	.001
Future support to services	NR7	3.03	3.08	3.16	.248	.459	.540	.584
Future support to agriculture	NR8	3.37	3.38	3.45	.111	.354	.312	.732
Meadows: Improve welfare	NR9	3.58	3.10	3.26	6.337	.312	20.342	.000
Meadows: Improve primary activity	NR10	3.41	3.16	3.91	7.946	.492	16.153	.000
Meadows: Improve landscape	NR11	3.57	3.47	3.80	1.488	.672	2.216	.111
Meadows and alternative tourism	NR12	3.43	3.11	3.28	2.697	.470	5.744	.004
Meadows threat from development	NR13	3.70	2.93	2.21	14.510	.371	39.104	.000
Meadows threat from desertification	NR14	3.21	3.07	3.00	.908	.363	2.504	.084
Herb's contribution to quality of life	NR15	3.59	2.94	3.28	10.997	.416	26.441	.000
Herb's contribution to health	NR16	3.46	2.85	3.43	10.711	.446	24.007	.000
Herbs as alternative nutrition	NR17	3.27	3.41	3.25	.662	.474	1.397	.249
Herbs for alternative medicine	NR18	2.43	3.44	3.72	1.338	.499	2.683	.070
Herb's threat from development	NR19	3.72	2.55	1.91	16.373	.367	44.596	.000
Herb's threat from intensive agriculture	NR20	3.80	1.59	2.66	1.208	.355	3.405	.035
Herb's threat from fires	NR21	2.49	1.95	3.73	5.919	.371	15.958	.000
Lake/river contribution to rural development	NR22	3.07	1.90	3.66	4.551	.337	13.497	.000
Lake/river contribution to quality of life	NR23	3.14	2.64	2.04	11.165	.541	20.642	.000
Lake/river contribution to recreation	NR24	3.66	2.58	3.16	22.694	.559	40.574	.000
Lake/River threat from over exploitation	NR25	3.05	2.11	2.92	3.166	.311	10.192	.000
Lake/River threat from over development	NR26	2.80	2.16	1.83	15.164	.387	39.233	.000

\* Statistically significant at  $p < 0.01$ .

Table 4 - *Multivariate validation of the three clusters.*

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation	Wilk's Lambda	Chi-square	Sig.
1	1.494 <sup>a</sup>	66.5	66.5	.774	.229	353.105	.000
2	.752 <sup>a</sup>	33.5	100.0	.655	.571	134.248	.000

<sup>a</sup> First 2 canonical discriminant functions were used in the analysis.

Table 5 - *Correctly classified citizens in the three clusters.*

Actual group membership Classification results	Predicted Group Membership			Total
	Cluster 1 (n=125)	Cluster 2 (n=90)	Cluster 3 (n=40)	
Cluster 1 (n=125)	95.6	6.4	8.0	100.0
Cluster 2 (n=90)	0	100	0	100.0
Cluster 3 (n=40)	0	0	100	100.0

98.6% of original grouped cases correctly classified.

mentioned characteristics, cluster 2 was defined as “*environmentally passive*” citizens.

Cluster 3 (15.4% of the sample) consists of more men than the sample average, mainly married, working in the public sector and having secondary education. This cluster may be placed between the previously described clusters as it is characterized by strong positive views concerning public participation in regional development. The same also holds for meadows that are perceived as determinants for the enhance-

ment of primary activities and the improvement of the landscape. As for the herbs, it is believed that they can significantly contribute to health and may evolve as a key source for alternative medicine, bearing in mind that fires are their main threat. Finally, lakes and rivers are perceived as critical contributors to rural development and public recreation, still threatened by over-exploitation. Based on the above description, cluster 2 can be termed as “*environmentally moderate*” citizens. It is worth mentioning that the majority of the citizens pertaining to the three clusters did not belong to a specific ecological organization, whilst very few of them are involved in agriculture as a secondary activity.

### 3.2. Discussion

The results presented above, at both the overall sample level and the specific cluster level, provide some interesting insights into the significance of natural resources and their potential role in regional and rural development. The majority of positive views along the three clusters imply that the respondents realize the role of natural resources in the prefecture's development and quality of life. In a general sense, the results indicate that meadows can improve the natural landscape and constitute a fundamental source for alternative tourism and rural tourism. The herbs are perceived as having a significant and positive effect on quality of life and healthy living; they increase the public welfare and can be used as ingredients for alternative medicine. As for the lakes and rivers, they constitute a crucial determinant of rural development and reflect an essential natural source for the growth of human recreation activities. Still, possible threats to natural resources utilization pertain mainly to fires and over-exploitation for rural activities.

Citizens in the three clusters acknowledge the quality characteristics of the prefecture and a commonly held view is that more attention should be paid to other development goals, namely health quality, infrastructure and social welfare. The study results highlight the importance of rural activities (agriculture, livestock, forestry) as fixed fundamental factors for regional development, which is not limited even by the strong presence of tourism. Indeed, tourism forms an integral part of the regional economy, given that a sizeable number of tourists pay visit to the prefecture in order to enjoy the natural beauties of the region and the landscape. Nevertheless, public perceptions unveil that tourism alone does not have an influential role in regional or rural development, contrary to *rural* tourism that is amalgamated with effective natural resources utilization.



Certainly, the spatial characteristics of the region (i.e. most of the territory is mountainous or semi-mountainous) are essential factors and citizens acknowledge that any development constraints may be offset by the benefits accrued for both the region and the public due to the integrated and viable exploitation of forests and other natural resources. The same also holds for lakes and rivers, since the respondents are well informed and conscious about their significance to regional and rural development. The region is rich in surface and underground waters and an ample amount of benefits are obtained from their use (irrigation, water, tourism). In addition, it is worth mentioning that citizens in clusters 2 and 3 are intriguingly aware of the existing threats that regional natural resources are confronted with and additionally concerned about the optimum and more effective ways for their exploitation.

Within this perspective, the public authorities should efficiently address any development inequalities within the region, through the currently implemented policy measures. EU-funded regional development policies have been applied systematically over the last two decades and the Regional Development Program constitutes an integral part and a driving force of the regional and rural changes that have been taking place. The objectives of the program are met through the implementation of certain priorities, which result directly or indirectly in changes in the exploitation of natural resources and the environment and, along with the current CAP reform, seem to affect the process of rural change in the area. Given that the region has a rural character, the primary sector constitutes the necessary foundation for a sustainable regional development: projected benefits exceed increases in agricultural production and agricultural incomes, creating also considerable opportunities for the development of processing activities for agricultural products. Within this context, the abundant and numerous natural resources (significant bodies of water, large areas of irrigated arable land, mineral resources, substantial geothermal energy, and extensive mountainous areas), have a crucial role.

Policy priorities in the region should be further developed, mainly in terms of infrastructure works (health, education), civil development to improve quality of life in urban and rural areas and the protection and exploitation of the region's natural and cultural environment. This may generate positive prospects for social coherence and preservation of the rural population, particularly in mountainous and less favoured areas. The attractiveness of such activities presumes, on the one hand, public participation since a *bottom-up* approach identifies key opportunities for integrated development that can be the backbone for more concentrated policy measures and may well be the most effective means of ensuring the success of management efforts (Tsantopoulos and Karamichas, 2009). On the other hand, it preconditions the development of the countryside through the promotion of the primary sector that will foster farm competitiveness and the promotion of the environmental

and economic importance of the mountainous and less favoured areas in the region.

## 4. Conclusions

The objective of this study was to profile citizens regarding their perceptions about the significance of natural resources and the role that they may play in regional and rural development. The main implication from the findings is that the public considers the preservation and sustainable exploitation of certain resources (meadows, herbs, lakes and rivers) as a fundamental parameter for regional and rural development. The consensus is that more needs to be done, because various regional problems remain and the particular regional peculiarities require more targeted and effective implementation of rural development policies. Certainly, regional growth leans on natural environment, but the natural environment has also an impact upon growth. It may be inferred that the sustainable management of natural resources should be at the core of policy measures and not just a stand-alone environmental policy. Changing patterns in regional and rural economies intimate a revision of the way decisions regarding natural resources management are taken (Bootha and Halseth, 2011). Within this context, public participation should have a clear and a greater say in natural resource allocation and land use planning.

The present study was confined to a single region with certain features and geographical characteristics that are not typical of other Greek regions, but is one of the most remote and least favored areas in Europe. The study provides an overview of the public perceptions about the value and significance of natural resources and their potential role in regional and rural development. Possible future research avenues to explore might include using quantitative research techniques to investigate a wider sample in different regions to obtain a more representative picture of the level of natural resources management and its impact upon regional economies, the willingness of the public to participate in natural resources management decision-making or to compare differences among regions with different levels of economic development, remoteness, etc.

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