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Modeling of the Relations between Pure Hair Goats (*Capra hircus* L.) and Forest Resources in the Geographic Regions of Turkey

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ABSTRACT

This study has detected the type, direction and power of the relations between the pure hair goat population and forest resources in different geographical regions of Turkey. Simple and multiple linear regression and correlation methods among parametric relation analysis techniques have been used as research methods. The following has been determined as a result of the research conducted: the power, direction and statistical functions of the relations between pure hair goats and forests in Turkey vary according to the geographical regions; the power direction and functions of these relations are affected by the type of forest administrations, their level of efficiency and the closure of the forest land; the relation which used to be very strong in the Aegean Region in the west of Turkey and in the Southeastern Anatolian and Eastern Anatolian Regions in the east of Turkey, is no longer so strong; the relation status which used to be very strong in the past in the Mediterranean Region still preserves its status ($|R| \cong 1$); the relation between pure hair goats and forests which were not considered important in the past in the Marmara and Black Sea regions have attained a significant importance today ($0.53 < |\text{correlation coefficients}| < 0.88$); unproductive high forest areas and coppice forest areas have come to the forefront in the relation between pure hair goats and forests; only in the Black Sea Region, the relations between pure hair goats and non-forest areas are statistically significant.

Key words: Pure hair goat, goat relationship with forest resources, goat production policy, geographic region of Turkey

INTRODUCTION

Forest villagers, which constitute the rural segment with the lowest income level in Turkey, have a different type and level of relation with forests in terms of subsistence and source of living (MARA, 2003a, b; MEFT, 2004). Moreover, the utilization of forests by forest villagers has been regulated by laws. However, their socio-economic and ecological conditions force them to utilize forests in an illegal manner. One of these necessities is to graze animals in public forests in an illegal manner (Tolunay and Alkan, 2008). The sanction of this behavior, which was characterized as a misdemeanor crime, is an administrative fine since 1983 (Ayanoglu and Gunes, 2003). However, in case this crime is committed, the amount of fine to be imposed by the authorized forest administrations is much higher than the level that may be paid by forest villagers. As the animals grazed in forests in an illegal manner are generally pure hair goats, the Ministry of Environment and Forestry has implemented its Action Plan for Reducing the Harms of Goats. The aim of this

plan is generate alternative sources of income for forest villagers and reduce the pure hair goat population by 50% in this country within a period of 5 years (2008-2013) (MEFT, 2008). In the assessment of this plan it was observed that the rate for reducing the pure hair goat population is 50% nationwide, while it is detected as 70% in 25 provinces located in the Aegean and Mediterranean Regions and that these reduction rates are not based on any objective criteria.

Grazing animals illegally harms forests. However, the thesis claiming that pure hair goats damage forests more than other animals has been accepted in our country like in other countries (Gulen, 1978; Rahmann, 2001). Due to reasons such as adaptation to challenging natural environments and the convenience in their nutrition compared to other animals and traditional lifestyle, the forest villagers in Turkey continue to raise pure hair goats as in the past (Gulen, 1978; Babalik and Fakir, 2007). Although, there is consensus on the harm brought by pure hair goats to forests, it is claimed that the reduction of pure hair goat population nationwide and at a regional level at a radical degree will give rise to irreparable harms in the socioeconomic life of forest villagers (Savas, 2008). On the other hand, it is also reported that grazing goats in forest areas is useful for forests upon considering the grazing capacity (Xanthopoulos, 2004; Xanthopoulos *et al*., 2006). Therefore, the fact that Turkey reduces the detected pure hair goat population without any scientific grounds and disregarding the difference between regions is criticized (Gokce, 2010).

The issue of protecting and developing forests is an ecological-economic system issue in the forest-villager-business axis. Within this system, pure hair goats form a component with ecological and economic importance, constituting the main source of nutrition and subsistence of poor forest villagers (Bassullu and Tolunay, 2010; Tolunay *et al*., 2009a). Therefore, the social, economic, cultural and biological dimensions of the relation between the forest-pure hair goats-forest villagers triad, should be known.

In literature, there are many studies concerning the relation between pure hair goats and forests, the harms of pure hair goats, raising and breeding of pure hair goats and the inventory of pure hair goats (Aldezabal and Garin, 2000; Boyazoglu and Morand-Fehr, 2001; Ainalis and Tsiouvaras, 2004; Ainalis *et al*., 2006; Zarovali *et al*., 2007; Tolunay *et al*., 2009b, c). However, we have not found any research detecting the relations between pure hair goat population and the existence of forests through statistical methods. Thus, it is utmost important to analyze the relation between the pure hair goat population and the existence of forests from a statistical perspective.

This study has detected the type, direction and power of the relations between the pure hair goat population and forest resources in different geographical regions of Turkey upon considering the management of forests as high forest and coppice forest, the level of efficiency of forest resources and the coverage of canopy. This has thus provided the possibility to the administrators of forest resources to make appropriate estimates and policies regarding pure hair goat population.

MATERIALS AND METHODS

Study area: Turkey lies at the intersection of the Old World continents, namely Asia, Africa and Europe. It covers a total land area of 76.960.000 ha. Its population approaches 72 million inhabitants and it has a density of 90-95 people per km^2. Turkey's northern area is delineated by the Black Sea and its southern area by the Mediterranean Sea. Three climactic zones are observed within the country. The Mediterranean climate, influenced by the Mediterranean and Aegean seas, is very hot and dry in the summer months (May-October) whereas it is warm and rainy during the winter months (November-April). The Black Sea climate, influenced by the Black and Marmara seas, is characterized by a rainy and warm summer followed by a rainy and cold winter. Central and Eastern Anatolia is influenced by the Continental climate, characterized by very hot and dry summers and very cold and rainy winters.

Fig. 1: Geographical regions in Turkey

Turkey has 20.7 million ha of forests areas. Twenty seven percent of the country is covered by forests. Thirty-five percent of the population lives in rural areas of the country, whereas 7.7 million rural people are living in and around the forests in 20 293 forest villages (TSI, 2010).

There are 7 geographical regions and 81 provinces in Turkey and the research has been conducted on the basis of these geographical regions and provinces (Fig. 1).

Eighty-one provinces in the country are distributed as follows: 11 provinces in the Marmara Region, 8 in the Aegean Region, 8 provinces in the Mediterranean Region, 13 provinces in the Central Anatolian Region, 9 provinces in the Southeastern Anatolian Region, 18 provinces in the Black Sea Region and 14 provinces in the Eastern Anatolian Region. The populations of forest villagers, pure hair goat population and the rate of productive and unproductive forests in these regions which differ in terms of their characteristics such as seas, mountains, climate, transportation and flora as well as their socioeconomic structure have been presented in Fig. 2.

The socio-economic development level is above the average in Turkey in the Marmara, Aegean, Mediterranean and Central Anatolian regions while it is below average in the Southeastern Anatolian, Eastern Anatolian and Black Sea regions (Albayrak *et al*., 2004).

Material: We have used 11 variables in this study regarding the pure hair goats and forest resources; X_1: pure hair goat population, X_2: productive high forest areas, X_3: unproductive high forest areas, X_4: total high forest areas, X_5: productive coppice forest areas, X_6: unproductive coppice forest areas, X_7: total coppice forest areas, X_8: total productive forest areas, X_9: total unproductive forest areas, X_{10}: total areas and X_{11}: non-forest areas. The 2005 values of these variables at a provincial level have constituted the research material. Our research data has been obtained from the sources named Our Forests (MEFT, 2006) and Action Plan for Reducing the Harms of Goats (MEFT, 2008). In 11 variable levels of the resources described above, those pertaining to 79 of Turkey's 81 provinces have been utilized.

Method: The type, direction and power of the relations between pure hair goat population and forest resources in 7 different geographical regions of Turkey have been designated with multiple

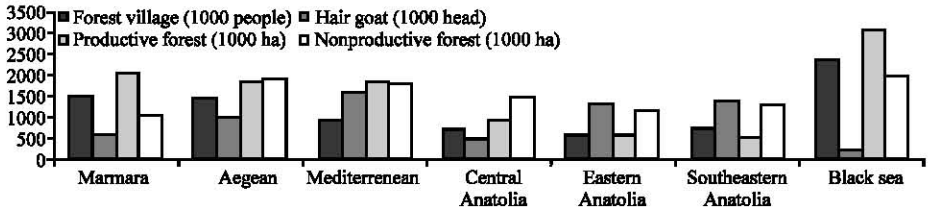

Fig. 2: Hair goats, forest villagers, productive and non-productive forest area levels according to geographical regions in Turkey

linear regression and correlation analyses. When there is an N number of observations and an i number of independent variables, the multivariable linear regression model is expressed as follows with a closed matrix program:

$$Y = XB+\varepsilon$$

Where:
Y : N×1 dimension dependent variable vector
X : N×i dimension independent variables matrix
B : N×i dimension parameters vector
ε : N×1 i dimension error terms vector

It has been primarily determined in the study whether variable data have a normal or almost normal distribution. Hence, the skewness values and the arithmetic average and standard deviation rates of variable data have been taken into consideration. The tests performed have demonstrated that the variable data for the geographic regions have a normal distribution but that the variable data reflect a positively skewed distribution when Turkey is regarded as a whole. Therefore, multiple linear regression and correlation analyses have been applied in 7 geographic regions.

In this study, 11 variables have been used regarding pure hair goats and forests. These variables and their values have been presented in Table 1.

The analyses have underwent the following phases in this study:

Phase 1: In order to determine the power and direction of the relations between the pure hair goat population (X_1) and variables X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10} and X_{11}, Pearson correlation coefficients have been calculated.

Phase 2: In order to determine the type of relations between the pure hair goat population and forest resources, 4 multiple linear regression models have been constituted. The referred regression models have been provided in Table 2.

The regression models in Table 1 have been applied to geographical regions while the analysis results have been used in phase 1 (independent variables with no significant relation with the dependent variable X_1 (X_i; i:2,..11) have been omitted from the models).

Table 1: Variables used for determining the relations between the pure hair goat population and forest resources in Turkey

		High forest areas			Coppice forest areas			Total forest areas			
	No. of pure hair goats	Productive high forests	Unproductive high forests	Total high forests	Productive coppice forests	Unproductive coppice forests	Total coppice forests	Productive forests	Unproductive forests	Total forests	Non-forest areas
		Ha	Ha	Ha	Ha	Ha	Ha	Ha	Ha	Ha	Ha
Variables	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}
Region											
Mediterranean	1 569 383	1 813 261	1 556 747	3 370 008	14 417	226 368	240 785	1 827 678	1 783 115	3 610 793	739 834
Aegean	971 016	1 772 904	1 373 006	3 145 910	57 836	548 455	606 291	1 830 740	1 921 461	3 752 201	971 289
Marmara	567 201	1 520 638	700 859	2 221 497	490 783	317 462	808 245	2 011 421	1 018 321	3 029 742	243 122
Central Anatolia	427 218	685 875	941 936	1 627 811	202 940	514 551	717 491	888 815	1 456 487	2 345 302	1 712 885
East Anatolia	1 287 246	200 848	260 616	461 464	313 033	867 334	1 180 367	513 881	1 127 950	1 641 831	3 043 708
Southern Anatolia	1 323 502	202 636	417 310	619 946	279 216	883 754	1 162 970	481 852	1 301 064	1 782 916	1 341 157
Black Sea	166 924	2 744 052	1 248 906	3 992 958	322 780	710 222	1 033 002	3 066 832	1 959 128	5 025 960	848 625
TOTAL	6 312 490	8 940 214	6 499 380	1 543 9594	1 681 005	4 068 146	5 749 151	1 0621 219	1 0567 526	21 188 745	8 900 620

Table 2: Regression models related to the pure hair goat population

Model name	Model equations
Model 1	$X_1 = B_0 + B_2X_2 + B_3X_3 + B_5X_5 + B_6X_6 + \varepsilon$
Model 2	$X_1 = B_0 + B_4X_4 + B_7X_7 + \varepsilon$
Model 3	$X_1 = B_0 + B_8X_8 + B_9X_9 + \varepsilon$
Model 4	$X_1 = B_0 + B_{10}X_{10} + B_{11}X_{11} + \varepsilon$
Dependent variable (X_1)	Independent variables ($X_{i\neq 2,11}$)

B_0: Refers to the regression constant; B_i: Refers to the regression coefficients; ε: Refers to the error of estimation

Table 3: Unproductive forest areas

Model name	Model equations
Model 5	$X_3 = B_0 + B_1X_1 + \varepsilon$ or $X_6 = B_0 + B_1X_1 + \varepsilon$
Model 6	$X_9 = B_0 + B_1X_1 + \varepsilon$
Model 7	$X_{11} = B_0 + B_1X_1 + \varepsilon$
Dependent variable (X_3, X_6, X_9, X_{11})	Independent variable (X_1)

B_0: Refers to the regression constant; B_i: Refers to the regression coefficients; ε: Refers to the error of estimation

Phase 3: In order to determine the type of relations between unproductive forest areas and the pure hair goat population, 3 simple linear regression models have been formed (Table 3). However, these models have been applied on regions a significant relation has been determined in phase 2 analyses between pure hair goat population and unproductive high forest areas, unproductive coppice forest areas and total unproductive forest areas.

Statistical analyses: The Statistical Package for the Social Science (SPSS) 11.0 package program has been used in the regression and correlation analyses. The regression and correlation coefficients which have been calculated, have been tested with t or F tests whereas the goodness of fit of the model have been tested with the F test at a level of 1-5% of significance. Moreover, the normality of the errors of estimation has been tested with the Shapiro-Wilks and Lilliefors tests, the homoscedasticity status has been tested with the Kendall's tau-b and Spearman tests and the absence of autocorrelation has been tested with the Durbin Watson statistics (N>15) or the Von

Neumann (N<15) rate. The multiple association problem between independent variables has been solved upon using the stepwise regression method (Newbold, 2000; Orhunbilge, 2002; Altunisik *et al*., 2005).

RESULTS

The correlation coefficients (analysis results of phase 1) between the pure hair goat population calculated with regional data (X_1) and forest areas ($X_{1; i:2,..11}$) have been compiled in Table 4.

According to the correlation coefficients in Table 4, the power and direction of the relations between pure hair goat population and forest areas in the geographical regions of Turkey are as follows:

There is a positively strong relation between the pure hair goat population and the productive high forest areas, unproductive high forest areas, unproductive coppice forest areas, while there is a negatively weak relation with the productive coppice forest areas; a positively strong relation with the total high forest areas but a positively weak relation with the total coppice forest areas; a positively strong relation with the total productive forest areas and the total unproductive forest areas and a positively strong relation with the total forest areas and non-forest areas in the Marmara region.

There is a negatively weak relation with the presence of pure hair goats and non-forest areas while there is a positively weak relation with the other variables in the Aegean region.

There is a positively very strong relation between the presence of pure hair goats and productive high forest areas and unproductive high forest areas, but a positively weak relation with productive coppice forest areas and a the unproductive coppice forest areas; a positively very strong relation with the total high forest areas and a negatively weak relation with the total coppice forest areas; a positively very strong relation with the total productive forest areas and the total unproductive forest areas; a positively very strong relation with the total forest areas and a positively strong relation with the non-forest areas in the Mediterranean region.

The relation between the presence of pure hair goats and all independent variables is positive in the Central Anatolian region. However, in the assessment of these relations in terms of their importance, it is observed that the relation between pure hair goats and unproductive high forest areas and unproductive coppice forest areas is strong, but that with productive high forest areas and productive coppice forest areas is weak; the relation with the total high forest areas is strong, but the relation with the total coppice forest areas is weak; the relation with productive forest areas is weak and that with unproductive forest areas is strong; the relation with the total forest areas is strong but the relation with non-forest areas is weak.

Table 4: Correlation coefficients ($R_{1i; i:2,..11}$) between variable X_1 and other variables

Region	$R_{1.2}$	$R_{1.3}$	$R_{1.4}$	$R_{1.5}$	$R_{1.6}$	$R_{1.7}$	$R_{1.8}$	$R_{1.9}$	$R_{1.10}$	$R_{1.11}$
Marmara	0,806**	0,872**	0,860**	-0,164	0,843**	0,529	0,713*	0,878**	0,845**	0,747**
Aegean	0,299	0,323	0,311	0,448	0,669	0,676	0,328	0,698	0,487	-0,082
Mediterranean	0,951**	0,951**	0,986**	0,141	-0,348	-0,333	0,949**	0,976**	0,976**	0,785*
Central Anat.	0,484	0,885**	0,773**	0,206	0,604*	0,486	0,489	0,866**	0,771**	0,067
Black Sea	0,242	0,485*	0,340	0,499*	0,818**	0,775**	0,360	0,698**	0,550*	0,572*
East Anatolian	- 0,359	-0,129	-0,233	0,140	0,282	0,267	-0,092	0,192	0,106	-0,160
Southeastern A.	0,202	0,201	0,202	0,462	0,608	0,579	0,510	0,670*	0,632	0,174

*Correlation is significant at level 0.05 (2-tailed); **Correlation is significant at level 0.01 (2-tailed)

There is a positive relation between pure hair goats and all independent variables in the Black Sea region. The degree of importance of these relations is strong with unproductive high forest areas, productive coppice forest areas, unproductive coppice forest areas, total coppice forest areas, total unproductive forest areas, total forest areas and non-forest areas is strong, but is weak with productive high forest areas, total high forest areas and productive forest areas.

It is observed that the relations between pure hair goats in the Eastern Anatolian region and all independent variables are weak. However, the direction of these relations is positive with productive coppice forest areas, unproductive coppice forest areas, total coppice forest areas, unproductive forest areas and total forest areas while it is negative with productive high forest areas, unproductive high forest areas, total high forest areas, total productive forest areas (the relation may be regarded as non-existent as the correlation coefficient is very close to 0) and non-forest areas.

There is a positive relation with pure hair goats and all independent variables in the Southeastern Anatolian region. When these relations are assessed in terms of their significance, it is observed that there is a strong relation only with the total unproductive forest areas, while there is a weak relation with the other variables.

The results of the regression analysis of geographical regions and the outputs of phase 2 and phase 3 regression analyses have been presented in Table 5.

Based on Table 5, the results obtained from regression analyses according to the regions have been provided are as follows:

Marmara region: According to Model 1, 2 and 4, an increase/decrease of one unit in the unproductive high forest areas, total high forest areas and total forest areas results in an increase/decrease of 0.64, 0.278 and 0.234 units, respectively, in the pure hair goat population. As the correlation coefficients of the regression equations of these models are less than 90%, they may only be used for designating policies. As regression equation models 3, 5 and 6 do not fulfill completely error terms estimations they are not practical

Mediterranean region: According to Models 1, 2, 3 and 4, one unit increase/decrease in unproductive high forest areas, total high forest areas, total unproductive forest areas and total forest areas has resulted in an increase/decrease of 0.924, 0.477, 0.945 and 0.481, respectively, in the pure hair goat population. According to Model 5, one unit increase/decrease in unproductive high forest areas, results in an increase of 1.053 units in pure hair goats; according to Model 6, one unit increase/decrease in total unproductive forest areas results in an increase of 1.008 units in pure hair goats. As the correlation coefficients of the equations of these models are greater than 90%, they may be used in estimations and policy designations.

Central anatolian region: According to Model 1, one unit increase/decrease in unproductive high forest areas results in an increase/decrease of 0.372 in pure hair goats. According to Model 5, one unit increase/decrease in unproductive high forest areas results in an increase/decrease of 2.106 units in pure hair goats and according to Model 6 one unit increase/decrease in total unproductive forest areas results in an increase/decrease of 2.712 units in pure hair goats. However, the regression equations of these models may only be used for policy designation, because 22-25% of variances in the dependent variables could not been explained by the relevant independent variables. Models 2, 3 and 4 are not practical for estimation and policy designation.

Table 5: Results of regression analysis in geographical regions (Regression equations obtained from phase 2 and phase 4 analyses and relevant coefficients)

Name of region	Model equations	R	R^2	N	F	p
Model 1						
Marmara	$X_1=0.64X_3+\varepsilon$	0.872	0.761	11	28.60	0.000
Mediterranean	$X_1=0.924X_3+\varepsilon$	0.986	0.973	8	217.49	0.000
Central Anatolian	$X_1=0.372X_3+\varepsilon$	0.885	0.783	13	39.65	0.000
Black Sea	$X_1=3710.32+0.141X_6+\varepsilon$	0.818	0.670	18	32.44	0.000
Model 2						
Marmara	$X_1=0.278\,X_4+\varepsilon$	0.860	0.740	11	25.58	0.000
Mediterranean	$X_1=0.477X_4+\varepsilon$	0.982	0.965	8	164.50	0.000
Central Anatolian*	-	0.773	0.598	13	16.38	0.000
Black Sea	$X_1=4361.113+0.085X_7+\varepsilon$	0.775	0.600	18	24.02	0.000
Model 3						
Marmara*	-	0.878	0.771	11	30.24	0.000
Mediterranean	$X_1=0.945X_9+\varepsilon$	0.976	0.953	8	121.56	0.000
Central Anatolian*	-	0.866	0.750	13	33.06	0.000
Black Sea	$X_1=0.057X_9+\varepsilon$	0.698	0.524	18	15.21	0.001
Southeastern Anatolian	$X_1=102114.9+0.311X_9+\varepsilon$	0.670	0.449	9	5.69	0.048
Model 4						
Marmara	$X_1=0.234\,X_{10}+\varepsilon$	0.845	0.713	11	22.38	0.000
Mediterranean	$X_1=0.481X_{10}+\varepsilon$	0.976	0.953	8	120.39	0.000
Central Anatolian*	-	0.771	0.594	13	16.11	0.000
Black Sea	$X_1=5257.596+0.085X_{11}+\varepsilon$	0.572	0.327	18	7.76	0.013
Model 5						
Marmara*	-	0.872	0.761	11	28.606	0.000
Mediterranean	$X_3=1.053X_1+\varepsilon$	0.986	0.973	8	217.44	0.000
Central Anatolian*	-	0.885	0.783	13	39.654	0.000
Black Sea	$X_3=2.106X_1+\varepsilon$	0.829	0.670	18	32.442	0.000
Model 6						
Marmara*	-	0.878	0.771	11	30.24	0.000
Mediterranean	$X_9=1.008X_1+\varepsilon$	0.976	0.953	8	121.56	0.000
Central Anatolian	$X_9=2.712X_1+\varepsilon$	0.866	0.750	13	33.06	0.000
Black Sea	$X_9=8.480X_1+\varepsilon$	0.698	0.487	18	15.21	0.000
Southeastern Anatolian	$X_9=1.443X_1+\varepsilon$	0.670	0.449	9	5.69	0.048
Model 7						
Black Sea	$X_{11}=3.385X_1+\varepsilon$	0.572	0.327	18	7.76	0.013

*Regression equations have not been written as the statistical assumptions are not fully met. R: Pearson's correlation coefficient; R^2: Coefficient of determination; N: Sample size; F: Statistics F; p: Probability value

Black sea region: According to models 1, 2, 3 and 4, one unit increase/decrease in total unproductive forest areas, total coppice forest areas, total unproductive forest areas and non-forest areas result in an increase/decrease of 0.141, 0.085, 0.057 and 0.08 unit increase/decrease, respectively, in the pure hair goat population. According to Model 6, one unit increase/decrease in the pure hair goat population results in an increase/decrease of 8.480 units in total unproductive forest areas, whereas in Model 7 it results in a increase/decrease of 3.385 units in non-forest areas. The equations of these models which fulfill the regression estimations completely, may only be used for policy designation. Model 5 is not suitable for estimations and policy designation.

Southeastern anatolian region: According to Model 3, one unit increase/decrease in pure hair goats results in an increase/decrease of 0.311 units in total unproductive forest areas. According

Model 6, one unit increase/decrease in total unproductive forest areas results in an increase/decrease of 1.443 units in pure hair goats. These two models which fulfill the regression estimations completely may only be used for policy designation. In Model 3 and Model 6, more than 50% of dependent variable variations could not be explained by independent variables. The regression analyses of models 1, 2, 4, 5 and 7 in these regions have not been applied as there was no significant linear relation between the dependent and independent variables of regression analyses.

As the significant variable of Model 4 in the Marmara, Mediterranean and Central Anatolian regions is total forest areas, Model 7 has not been tested.

DISCUSSION

The type and power of the relations between pure hair goats and classified forests in the geographical regions of Turkey are different. This result is in line with the relevant literature (Albayrak *et al*., 2004). Gulen (1978) reported that there is a close relation between pure hair goat raising and forests and that this relation is very strong especially in the Aegean, Mediterranean and Southeastern Anatolian regions. However, the relation between pure hair goats and forests has changed today in different regions. This change has reached significant levels in the Aegean and Southeastern Anatolian regions, because it has been determined that there is no statistically significant relation between pure hair goats and forests in the Aegean Region, whereas this relation has considerably weakened in the Southeastern Anatolian Region. While, designating policies about pure hair goat population, the following should be taken into account: total unproductive high forest areas, total high forest areas and total forest areas in the Marmara, Mediterranean and Central Anatolian regions; total unproductive coppice forest areas, total coppice forest areas, total forest areas and non-forest areas in the Black Sea region. Due to the relation of pure hair goat raising with unproductive coppice forest areas in the Southeastern region, especially coppice forests should be taken into account. Administrators of forest resources should primarily pay attention to pure goats when designating policies in the total unproductive forest areas of Marmara, Mediterranean, Central Anatolian, Black Sea and Southeastern regions. Furthermore, pure hair goats should also be taken into account in the management of non-forest areas in the Black Sea region.

In the literature, it is recorded that pure hair goats generally prefer to graze in forests with slerophyll oak trees and thus are mostly present in the Mediterranean and Southeastern Anatolian Regions (Pariset *et al*., 2009; Ainalis and Tsiouvaras, 2004; Gulen, 1978) and that as there as soft-leave trees in the Black Sea Region, the density of pure hair goats is low in this region (Gulen, 1978). This applies also today.

We have the possibility to make accurate projections and designate policies from the pure hair goat regression equations obtained only in the Mediterranean region. While, other factors need to be included into the regression analyses in the other four regions. As there is no significant relation between the pure hair goat population and forest resources in the Aegean and Eastern Anatolian regions, other socio-economic and ecological factors need to be included into the improvement of unproductive forest areas.

It is observed that the corporate policies designated so far with regard to the pure hair goat population are regarding the Aegean, Mediterranean and partially the Central Anatolian regions (MEFT, 2008). Yet, this study demonstrates that the impact of potential increases in the pure hair population over regional forests may be much more effective in the Black Sea, Central Anatolian

and Southeast Anatolian regions compared to the Mediterranean region. Furthermore, although 9% of pure hair goats in the country are is raised in the Aegean Region and 15% is raised in the Eastern Anatolian region, no significant relation has been detected between pure hair goats-forest resources in these regions, whereas a significant relation has been detected in the Black Sea region even though they are raised at a rate of 3%. Upon considering the fact that the sole option in the utilization of unproductive pastures is sheep and goats, the policy applied in the Aegean region, aiming to reduce the pure hair goat population by 70% is wrong (Ertugrul *et al*., 2009).

Although, there are some scientific and institutional circles that approve the policy banning the raising of goats in villages for protecting forests from the harms of grazing goats (Gulen, 1978; MEFT, 2008), the validity and feasibility of this policy is under discussion today (Gokce, 2010; Rahmann, 2001). As a result, the relations between pure hair goats and forest resources are impacted from ecological and socioeconomic conditions including the time dimension. Therefore, it would not be sufficient to consider only the relations between pure hair goat population and forest resources when designating the policies. Regional, national and global developments should be taken into account before reducing the pure hair goat population and the pure hair goat raising capacity of regions, provinces and even villages should be determined. Forest villagers should not be deprived of their right to produce pure hair goat products which are promising in the organic products market, without conducting a comprehensive survey.

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