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Socio-economic factors influencing household dependency on forests: an empirical evidence from Turkey.

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FOREST MANAGEMENT

ABSTRACT

Background: Although forest villages in Turkey do not differ from other villages in the country in terms of administrative divisions, the job possibilities of their residents are limited due to the location of the villages in areas with rugged terrain. Forest villages have the poorest economic status of all types of communities in the country in terms of per capita national income and socio-economic structure; limited agricultural land; inadequate transportation and infrastructure; and, most importantly, weak educational, health, and cultural services.

Results: This study explains forest dependency and its relation to certain characteristics of householders by a case study. Data were collected from 150 households and were analyzed using the logistic regression model.

Conclusion: The results showed that a householder's age, duration of residence, and employment variables had a significant effect on the forest whereas other variables, gender, educational level, and household size, did not have a statistically significant effect on forest dependence.

Keywords: Forest; forest villager; dependency; sustainability

HIGHLIGHTS

Forest dependency can alter sustainable forest management.
Income generations should be adjusted considering age groups Forest villagers should be considered as a formal stakeholder.

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INTRODUCTION

Most forests, by definition, are in remote areas in the countryside. This means that such areas are relatively underdeveloped in terms of infrastructure, government services, markets, and jobs (Shackleton et al., 2007). Forests continue to be an important resource for hunting and livestock, as well as timber and firewood, building materials, and industrial resources, just as they have been in the past (Ali and Rahut, 2018; Hooke, 2011). In addition to these features, forests also provide services on a local, regional, and global scale (Newton et al., 2016; Pagiola et al., 2002). In this context, forests are a necessary component for people living in rural areas adjacent to forests with diverse materials and intangible benefits (Khaine et al., 2014; Langat et al., 2016; Lepetu et al., 2009; Teshwar, 2016). Three hundred and fifty million of the poorest people worldwide are totally dependent on forests for their livelihoods and survival, and 1.6 billion rural people are dependent to some degree on forests (Abdullah et al., 2016; Chao, 2012; Hlaing et al., 2017; Moe and Liu, 2016).

People's dependence on forests is a multifaceted phenomenon due to the various benefits that forests provide (Adam and El Tayeb, 2014; Beckley, 1998), especially when it comes to individuals living in poverty (Garekae et al., 2017). People living in forest areas for a very long time have a tradition of using and making products from trees and other plants growing in forests. Their livelihoods are completely dependent on forests and forest usage. They depend on forests for forest products, materials, and food (Somsoulivong, 2016). There are three categories of usage by people who depend on forests: direct use, income and employment, and subsistence needs of households, such as food, medicinal plants, animals, and other household supplies (Arnold, 1987). There is a widespread understanding among policymakers and development practitioners that rural households in developing countries depend on environmental resources (Mamo et al., 2007). In this regard, there has been an increasing interest in the contribution of natural forests to rural employment and income generation in recent years (Arnold and Townson, 1998; Saifullah et al., 2018). Because Turkey is a developing country, its leaders and researchers are paying attention to this issue, as well.

Approximately 8,23% of the population in Turkey (6.970.077 people) live in 22.941 villages in or adjacent to forests (GDF, 2021b). Forest villages are generally in rough terrain and have harsh climates because they are at a high altitude. These villages are not usually suitable for agriculture. They tend to have an appearance of deprivation, and the economic activities of the residents tend to be focused on acquiring what is needed for daily living. Access to markets and cities may be problematic (Alkan and Toksoy, 2008; Geray, 1974). Thus, forest villagers represent an important segment of the poor rural population in Turkey. According to data calculated with the help of the National Poverty Guidelines in 2016, the average monthly wage of a forest villager in Turkey was 319$ (WorldBank, 2017).

In Turkey, forest villagers living adjacent to forestlands use forests to meet different kinds of daily needs, such as cultivating the limited agricultural crops that can grow in these areas and letting their animals graze within the forests (Durkaya et al., 2015). In some ways, forest villagers have more advantages than other rural settlers because they have legal rights that allow them to benefit from forest resources (Güler and Korkmaz, 2015). Despite the opportunities granted to forest villagers by the Forest Law, which gives them the right to use and purchase forest products at lower costs (TBMM, 2003). Forest development strategies in Turkey put an emphasis on long-term sustainable forest management, as well as anti-poverty initiatives among forest dwellers. These objectives are backed up by the Forest Law and, at first, by the Constitution of 1982. The Constitution of 1982 has two provisions (169 and 170) that deal specifically with the general management and development of Turkey's forest resources. Article 169 focuses on the conservation of forests, while Article 170 emphasizes the importance of successful cooperation between the state and forest village residents through suitable measures to enhance their living conditions. The main idea is founded on the belief that by supporting livelihood and providing additional income options, relationships between villagers and the sector would encourage more effective forest conservation and improved living conditions for forest-dependent people. Forest villagers are likewise accorded preferential status under the Forest Law. Villagers have the right to work in the GDF's harvesting, thinning, afforestation, maintenance, and transportation activities under Article 40 (WorldBank, 2017). However, the villagers, with their poor economic status,constitute one of the groups that put pressure on forest resources (Solmaz, 2007). In this case study, we examine the social and economic factors that affect forest villagers, who make up a significant share of both the general population and the rural population, as well as their use of forests and their dependence on forests.

MATERIAL AND METHOD

Study area

The study area is in an area that is above Turkey's average in terms of both forestlands and forest villager population (GDF, 2021a). At the same time, population movements take place in the region through the migration from the village to the city. The province is in a structure that gives net immigration in 2019-2020 (TÜİK, 2021). Since wood production is intense in the region, the diversity of job opportunities and income level distributions of forest villagers are the main reasons for the selection of the area (Figure 1).

The field study was carried out in six villages within the boundaries of three different Forest Subdistrict Directorates, the Gökırmak, Çatalçam, and Hanönü Directorates, which are affiliated with the Hanönü Forest District Directorate of the Kastamonu Regional Directorates of Forestry. They are located within the borders of Kastamonu Province in the Western Black Sea Region. As of 2020, according to formal data of the General Directorate of Forestry (GDF),

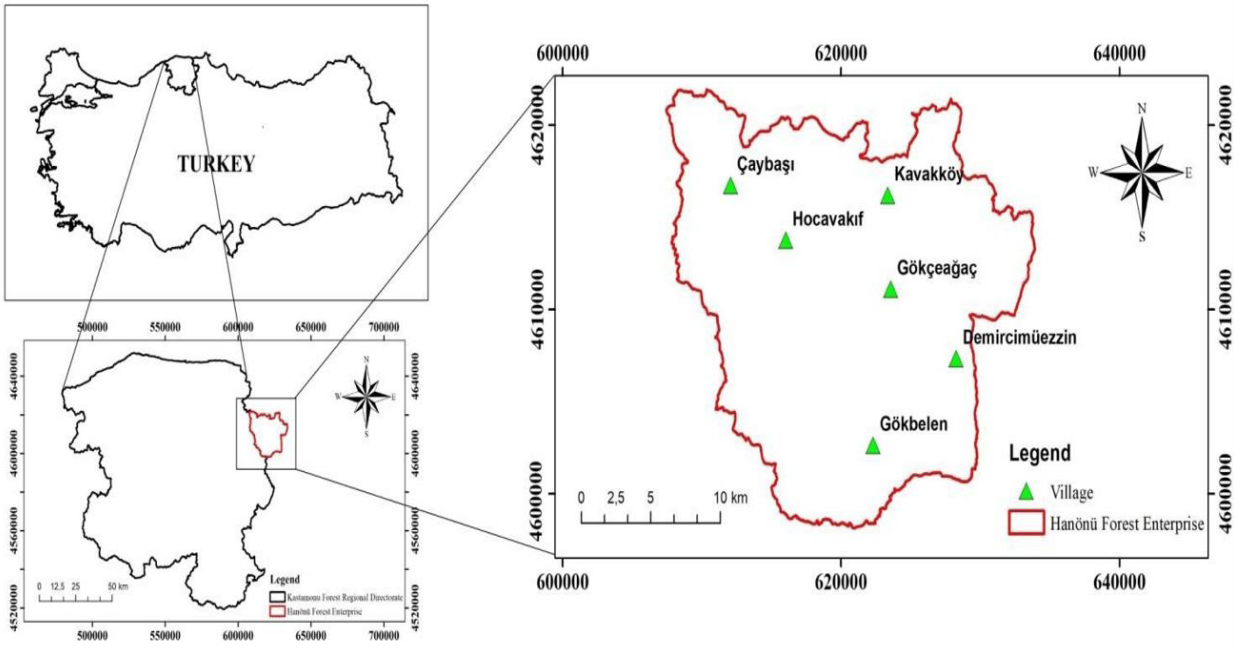

Figure1. Study area.

the Gökırmak Forest Sub-district Directorate has 3.806 ha of productive forests and 1.374 ha of nonproductive forests; the Çatalçam Sub-district Directorate has 3.819 ha of productive forests and 2.141 ha of nonproductive forests; and the Hanönü Sub-district Directorate has 2.889 ha of productive forests and 2.480 ha of nonproductive forests. The general livelihood of the people in and adjacent to the forests comes from agriculture and forestry. Villagers benefit from the forest in terms of transportation, cutting down trees, and using forestlands for bee keeping and grazing animals. From time to time, illegal cutting and usage occurs. Livestock was transformed into farm livestock breeding by the pressure of the forestry organization. Forest villagers have been given the legal right to gather wood, including firewood, from forests and also have the right to buy forest products at prices lower than the market prices. Since 1937, when the first Forest Law No 3116 was implemented, Turkey has been consistently combating forest crimes. Turkey, at present, fights forest crimes and regulates forest offenses by using the Forest Law No. 6831, which went into effect in 1956 (Elvan, 2014). Illegal logging, illegal use of forests, smuggling and transportation in the forest arson, and fire are the four primary categories of forest crime listed in the Forest Law (Ünal et al., 2021). Under Turkish law, forest offenses are not entitled to any type of remission (i.e., no general or special amnesty can be granted). Article 169, third paragraph of the Turkish Constitution specifies that no general or individual remission would be allowed for all forms of forest offenses (Elvan et al., 2021). Migration of forest residents from villages to cities continues. Even though the negative effects of forest villagers' dependence on forests have tended to decrease as a result of efforts to increase environmental awareness by the GDF, the negative pressure on forests continues (Ünal et al., 2021)

Sampling techniques and data collection

The sampling frame was a list of all households that could be reached in six forest villages within the Hanönü, Gökırmak, and Çatalçam Forest Sub-district Directorates. A total of 150 households were randomly selected from the six forest villages. The collection of primary data was based mainly on a detailed four-page questionnaire, which included sections on household demographics, household livelihoods, and major sources of income from both forest resources and other economic activities. Secondary data were obtained through relevant government agencies and literature reviews.

A great majority of the questions on the questionnaire were semi structured, and the rest were open ended. The questionnaire was used in face-to-face interviews at the interviewees' homes. The aim was to determine whether agriculture was sufficient to provide a livelihood for the people living in forest villages and to gather information about the importance of forests for these people's livelihoods. The unit of analysis was the head of the household; in cases where there was no clear head of household, any household member who was 18 years or older was accepted as the head of household.

Data analysis

Data were compiled and managed using the Statistical Package for Social Sciences (SPSS) version 24. Descriptive statistics in the form of frequency and distribution were used to summarize sociodemographic data. We used the logistic regression model to evaluate how the demographic and socio-economic characteristics of the households affected their dependence on forest

resources. Adam and El Tayeb (2014), Baiyegunhi et al. (2016), Hussain et al. (2019), Jain and Sajjad (2016), Lepetu et al. (2009), Masozera and Alavalapati (2004) and Tieguhong and Nkamgnia (2012) used a logistic regression model to analyze the impacts of demographic and economic variables. Age, residence duration, household size, gender, educational level, and employment variables were used to explain households' forest dependence. In our study, measurements were made of the relationship between the dependent variable of forest dependency and the explanatory variables of age, residence duration, household size, gender, educational level, and employment level. Based on this, the binary logistic regression model was used to determine the socio-economic factors affecting the forest dependency of the households. The dependent variable of forest dependence was given a score of 1, which indicated a high forest dependency, or 0, which indicated a low forest dependency. We used 0.5 as a cutoff point. Therefore, a value of less than 0.5 indicated a low dependency and a value of more than 0.5 indicated a high dependency.

RESULTS

Household profiles

Tables 1 and 2 outlines the general characteristics of the households. According to the data, the proportion of men was 89.3% (n = 134) for the gender distribution in the total sample population. The average age of household heads was in the middle-age range (M = 49.42 years, SD = 12.29). In terms of educational levels, 70% of the household heads did not have any formal education (33.4%, n = 50) or were primary school graduates (36.7%, n = 55). Only three household heads (2%) had a higher educational level. Approximately 77% of household heads (n = 115) stated that they were self- employed; the percentage of full-time workers was 10.7% (n = 16), and 8.7% (n = 13) stated that they were unemployed. The average household size in the villages included in the sample was 3.62 persons (SD = 1.21), and the percentage of those who stated that their monthly income was more than 428$ was 89% (n = 134). The vast majority of the participating household heads had been living in the villages since the day they were born, and their average length of residence was 45.40 years (SD = 15.41).

Table1. Characteristics of Household's.

Variable	Items	N	M (SD)	%	n
Gender	Male			89.3	134
	Female			10.7	16
Age (years)			49.42 (12.29)		150
Education	None			33.4	50
	Primary			36.7	55
	Secondary			28	42
	Tertiary			2	3
Employment	Full time employed			10.7	16
	Part-time employed			4	6
	Self-employed			76.7	115
	Unemployed			8,7	13
Averageincome (montly)	< 170 USD			0.7	1
	171-355 USD			3.3	5
	356-532 USD			6.7	10
	>532 USD			89.3	134
Household size			3.62 (1.21)		150
Duration of residency (years)			45.40 (15.41)		

N: Total sample size, M: Mean, SD: Standart deviation, n: Subset of the sample

Table2. The description of explanatory variables.

Variable	Measurement/value	Expected sign
Gender	1 if male, 0 if female	+
Age	Age of household head in years	+
Education	Household heads' level of education (0=none, 1=primary, 2= secondary, 3=tertiary)	-
Employment	Household heads' employment status (0=unemployment, 1=employed, 2=others)	-
Household size	Number of family members	+
Duration of residency (years)	Number of years residing in the study areas	+

Income levels and sources

Forestry was the most important source of income in the villages chosen for the study. Among the participating household heads, 27.3% (n = 41) specified forestry as the activity that generated the most income for them. It is noteworthy that other income- generating economic activities did not contribute as much income to households as forestry. The percentage of those who said that livestock was their only source of income was only 2%, and the percentage of those who specified agriculture as the only source was 2.7%. The proportion of respondents who stated that they earned income from livestock and agriculture plus forestry was 20.7% (n = 31). Others stated that forestry and animal husbandry (8%; n = 12) and forestry and agricultural activities (6.7%; n = 10) were dominant sources of income. The ratio of household heads who had farm animals was 40% (n = 60). Milk, yogurt, and eggs were mostly produced for the villagers' own consumption but were also sold in the market. Milk was a product for 91.7% (n = 55) of the villagers, yogurt for 86.7% (n = 52), and eggs for 66% (n = 33). Although it is forbidden to benefit from forests without obtaining legal permission, both economic activities and animal grazing were carried out widely in forests by the villagers. Half of the household heads who had farm animals stated that they grazed their animals in the forests. The ratio of household heads who owned land was 81% (n = 120). The proportion of people planting crops on their land was 52% (n = 62). It was observed that the vast majority of these households used their harvested crops for their own consumption (82%, n = 51). Household heads were asked about their monthly income, and 89.3% of the participants (n = 134) stated that it was 428$ or more.

Household forest dependency

The research was carried out in forest villages in or adjacent to forests. Therefore, the participants were asked a 5-point Likert-type question to learn about their relationship with the forest and the resources it contained and their degree of dependence on them. Participants were asked to choose the appropriate answer from 1 to 5, with 1 signifying no dependence and 5 signifying extreme dependence. The vast majority of household heads (71%, n = 107) stated that they were highly dependent on forest resources for their livelihoods, whereas 13% (n = 20) of them were highly dependent on forest resources. Only 14% (n = 21) of household heads stated that they were partially dependent on forest resources.

For those who lived in forest villages, forestry work was among the most important sources of income. Participants were asked what work they did that involved forestry, and the answers showed that most households engaged in more than one type of forestry work. Twenty-one percent (n = 32) of household heads stated that they worked at cutting, stacking, peeling, and loading tasks, and 13% (n = 20) generated income through cutting, stacking, area cleaning, peeling, and loading tasks. Income was also generated by household members who engaged in cutting and peeling tasks (8.7%, n = 13); cutting, area cleaning, and peeling tasks (8%, n = 12); and cutting, stacking, area cleaning, and peeling tasks (8%, n = 12).

Socio-economic factors influencing household dependence on forests

We used the binary logistic regression model to evaluate the predictive ability of selected socio-economic factors on a household's forest dependency. Our model as a whole explained between 18% (Cox–Snell R^2) and 31.3% (Nagelkerke R^2) of the variance in forest dependency. Overall, our predictions were correct 129 out of 150 times, for an overall success rate of 86%. It was 84% for the model with intercept only.

Table 3 shows the logistic regression coefficient, Wald test results, significance, and odds ratio for each of the predictors. Making use of a 0.05 criterion of statistical significance, age, length of residency, employment, and one of the employment dummy variables (1) had a significant partial effect on predicting forest dependency. According to Table 3, if the coefficient of age was negative, the odds ratio of high forest dependency decreased with age (OR=0.92). This value represented a decrease in forest dependence by a factor of 0.92 owing to the increase in the household head, with all other factors equal. Our findings showed that young and middle-aged household heads had more opportunities to benefit from forest resources than elderly ones. The reason was that these younger individuals had sufficient physical strength for heavy forest work and needed the work in order to earn a living. Other predictors that made a statistically significant contribution were the duration of residence and employment. The odds ratio for length of residence indicated that when all other variables were constant, an increase in the length of residence resulted in an increase in forest dependency by a factor of 1.07. On the other hand, gender, educational level, and household size were not statistically significant.

DISCUSSION

The theory and empirical evidence for socio-economic factors affecting forest dependence received little attention in the social science literature until recent years. Therefore, there was limited information about the socio-economic determinants of forest dependence and the nature of its effects (Somsoulivong, 2002).

A villager's (1) age, (2) gender, (3) educational level, (4) household size, (5) duration of residence, and (6) employment activities were assumed to be factors affecting the degree of the dependent variable of forest dependence. Logistic regression analysis was applied to test these hypotheses and examine the effect of independent variables on the dependent variable. The results of this study on forest use and dependence support the findings from many other studies. In particular, the study supports the idea that many forest village populations are heavily dependent on forest resources for their livelihood.

Table3. Logistic regression predicting decision from factors influencing household forest dependency.

Predictor	B	Wald	Sig.	Exp(B)	95% CI for Exp(B)	
					Lower	Upper
Age	-0.074	4.52	0.034	0.929	0.867	0.994
Gender(1)	1.029	1.879	0.17	2.798	0.642	12.19
Education		0.821	0.845			
education(1)	-18.739	0	0.999	0	0	.
education(2)	-19.463	0	0.999	0	0	.
education(3)	-19.312	0	0.999	0	0	.
Household size	0.145	0.323	0.57	1.156	0.701	1.905
Length of residency	0.068	7.429	0.006	1.07	1.019	1.124
Employment		13.592	0.001			
employment(1)	-2.152	4.831	0.028	0.116	0.017	0.792
employment(2)	0.675	0.935	0.334	1.964	0.5	7.71
Constant	20.055	0	0.999	5.12E+08		

Determinants of forest dependency Age

In our study, one of the explanatory variables chosen to estimate the degree of dependence on forest resources was age. In the analysis, the age factor had a

statistically significant effect in predicting forest dependence (Table 3). However, its coefficient was found to be negative. Therefore, there was a decrease in forest dependence with increasing age. Findings showed that young and middle-aged householders had more opportunities than older people to benefit from forest resources. This was because younger individuals had sufficient physical strength to do heavy forest work and needed it for their livelihood, whereas old people had less strength and less opportunity to work. Garekae et al. (2017), Hussain et al. (2019), and Lepetu et al. (2009) similarly concluded that the age factor was inversely correlated with forest dependence. Young people were more likely to be more dependent on forest products than older people. Köhlin et al. (2001) revealed that individuals of all ages could be dependent on the forest, but young people would be even more dependent than older people due to their ability to work in different ways in forests and to rely on their physical strength. A study by Adam and El Tayeb (2014) also supported our age findings. They found an inverse relationship between age and dependence on the forest, so that younger individuals were more dependent on forest resources. They also stated that the forest activities in their area of study were illegal, and that young people took more risks in pursuing them than did elderly people.

Age-related findings of Masozera and Alavalapati (2004) were similar to our findings. In their study, the average age of the respondents was 45 years (in our study, the average age was 49 years). They stated that the age factor had a negative effect on forest dependence because of the labor-intensive work and risks in forestry. However, some studies achieved different results than ours. Jain and Sajjad (2016) and Bhandari and Jianhua (2017) concluded that the young people residing in rural areas were generally oriented toward cities for job opportunities and had less dependence on forests. Güler and Korkmaz (2015) similarly concluded that due to the bad economic conditions, which is the main dynamic of migration in the forest villages, primarily young men migrate from the villages in the hope of finding a job, which causes the population to turn towards women in terms of gender and towards the elderly in terms of age groups.

Gender

In our study, one of the factors explaining forest dependence was gender. It had been observed that the gender factor had no statistically significant effect on forest dependence. In our study, it was seen that villagers depended on forests and their resources, such as some wood and nonwood forest products used for household consumption. In terms of gender, it was found that although the collection and transportation of firewood and roundwood was mainly done by men (Bhandari and Jianhua, 2017), men and women acted jointly in the collection of mushrooms and fruits for food and other plants for medicinal treatment. Alkan and Toksoy (2009) concluded that since the income from agriculture and animal husbandry is not enough for the household, men have to work outside the village. Long-term separation of men from the household imposes new duties and responsibilities on women. In addition to the domestic work, women also perform a large part of the work outside the household, and women's labor is quite high in all products produced and sold.

According to Campbell (1991) and Lepetu et al. (2009), men and women collected firewood and plants jointly but only women collected wild fruits and herbs. In their studies, Adam and El Tayeb (2014), Gunatilake (1998), and Lepetu et al. (2009) concluded that dependence on forests was greater in households where men were household heads than in households where women were household heads. Although this result did not have a statistically significant effect in the analyses performed in our study, the same levels of dependence were evident from the answers to the question about the degree of dependence on the forest.

Garekae et al. (2017) found a negative relationship between forest dependency and gender. Our findings and the findings of Masozera and Alavalapati (2004) were similar: The gender factor was not statistically significant. It was concluded that male household heads were more forest dependent than female household heads. The reason was that although cultivation and firewood collection were common activities for both genders, men were more likely to collect forest products from protected areas because the needed workforce was larger, and the risks were greater.

Educational level

In our study, one of the factors investigated was the educational level of the household head. The effect of this factor on forest dependence was not statistically significant (Adam and El Tayeb, 2014; Masozera and Alavalapati, 2004). Seventy percent of the participants who stated that they were very dependent on the forest in our study were uneducated or had had only a primary school education. Twenty-eight percent were graduates of a secondary school or high school, and only 2% were graduates of a university. Other studies supported our findings. Toksoy et al. (2008) states that when forest villages in Turkey are examined, it is seen that these villages cannot benefit enough from services such as health, education, communication, and transportation. On average, 10% of the forest villagers have no education and are illiterate, while 64.5% are only primary school graduates. Families living in forest villages are thinking of emigrating in order to provide their children with good education opportunities (Alkan, 2014). Also, according to Adhikari et al. (2004), Baiyegunhi et al. (2016), and Hegde and Enters (2000), an increase in educational level caused a person to be less likely to remove forest resources and led a person to choose activities other than agricultural and other subsistence activities. Several studies: Godoy et al. (1996), Hegde and Enters (2000), Jain and Sajjad (2016), Lepetu et al. (2009), Soe and Yeo-Chang (2019), Bhandari and Jianhua (2017) stated that people understood that having broader educational opportunities in the future would make them less dependent on forest resources. It was assumed that there was an inverse relationship between having a formal education and being dependent on forest resources. Garekae et al. (2017) and Tieguhong and Nkamgnia (2012) revealed a statistically significant and positive relationship between the household educational level and forest dependence. Yang (1997), with a different approach, stated that education was one of the main determinants of salary and could be used as an explanatory variable in modeling forest dependence.

Household size

In our study, our explanatory variable of household size did not show a statistically significant effect on forest dependence. The average household size in the villages sampled for the study was 3.62. In a study by Okutucu et al. (2016) household size mentioned as 4.6 and shows conjugal family structure. Coşgun (2005) also supports that finding with the average 4.5 household size.

Because forestry activities were the most important income-generating activity, it was expected that an increase in the size of the household would increase the demand for forest resources in terms of both income generation and nutritional needs. In other words, there was a positive relationship between the household size variable and forest dependence. The reason for this was that large families tended to be more dependent on forest resources because of limited income opportunities and higher unemployment in rural areas (Adam and El Tayeb, 2014; Gunatilake, 1998; Hegde and Enters, 2000; Hussain et al., 2019; Jain and Sajjad, 2016; Lepetu et al., 2009; Mamo et al., 2007; Masozera and Alavalapati, 2004; Soe and Yeo-Chang, 2019). Garekae et al. (2017) concluded that there was a negative relationship between household size and forest dependence.

Duration of residency

The explanatory variable of duration of residence had a statistically significant effect (Table 3). In our study, a positive correlation was found between forest dependency and residence duration. Other studies had similar findings. Long-term residents were likely to learn more about the ecological structure, composition, and seasonal patterns of forests and were therefore more skillful at collecting forest products. For this reason, the residence duration was directly related to forest dependency (Garekae et al., 2017; Kartoolinejad et al., 2007; Lepetu et al., 2009; Pattanayak et al., 2003).

Employment

In our study, the explanatory variable of employment had a statistically significant effect on forest dependency (Table 3). Because the coefficient of employment (1) was negative, the effect of this factor on forest dependence was negative. This shows that working households were less dependent on forest products. Employment opportunities could offer better income-generating options than forest labor. Gradually shrinking agricultural lands through inheritance and the decrease in income and expectations from these lands cause economic poverty and increase unemployment (Güreşçi, 2010). Unemployment due to landlessness is among the reasons for migration as high as 62% (Okutucu et al., 2016). Especially the young population's reluctance to live in village conditions and their migration to cities in order to find a job cause difficulty

in finding labor force to process agricultural lands in forest villages (Alkan, 2014). The most important livelihoods of forest villagers are agricultural incomes, trade incomes and pensions. Among the income sources, the ratio of those with the income from forestry in the first place is only 1%. Those who have any income from forestry are only at the level of 6% (Toksoy et al., 2008). Therefore, the dependence on forests and forest resources decreased with the ability to buy alternative products from markets because of better employment opportunities. In many other studies, it was concluded that income from employment and other paid activities had a statistically significant and adverse effect on the forest dependence of households. It was stated that collecting nonwood forest products, which was not a regular activity, was on the spot during periods when there were no job opportunities (Hegde and Enters, 2000; Mamo et al., 2007; Tieguhong and Nkamgnia, 2012). Many local communities were dependent on protected areas for energy, employment, medicine, and other needs, especially in developing countries (Bahuguna, 2000). Sapkota and Odén (2008) found that unemployed householders collected more wood from forests than employed householders. Masozera and Alavalapati (2004) found that rural poverty greatly affected forest dependence in the Nyungwe National Park in Rwanda.

There are other studies in which different explanatory variables were selected to investigate for forest dependency: Agricultural income (Adam and El Tayeb, 2014; Bahuguna, 2000; Bhandari and Jianhua, 2017; Gunatilake, 1998; Gunatilake et al., 1993; Liu et al., 2016); livestock income (Fikir et al., 2016; Fisher, 2004; Jain and Sajjad, 2016; Lepetu et al., 2009; Takasaki et al., 2000); distance to a forest (Ali and Rahut, 2018; Bhandari and Jianhua, 2017; Gunatilake, 1998; Hussain et al., 2019; Mamo et al., 2007); and land owning (Adam and El Tayeb, 2014; Bhandari and Jianhua, 2017; Masozera and Alavalapati, 2004; Reardon and Vosti, 1995).

CONCLUSION

Forestry has been of great social importance both for forest villagers and to whole public in Turkey (Birben and Gençay, 2018). Forests are the main sources of goods, raw materials, and products for people who have lived in some rural settlements for hundreds of years. Forest villagers, who occupy a unique niche in rural areas of Turkey because of their population size and inadequate socio-economic opportunities, make their living largely from the forests in or near which they live. In addition to that even there is the forest legislation which has details and provisions for the rights of forest villagers to benefit from forests (Gençay et al., 2018). Forest crimes were committed mainly due to the need for wood, a lack of income, or the activities recklessly committed (Gençay and Mercimek, 2019). At this point, the following determination must be made: "Forest villagers need the forest ecosystem to make aliving. Activities that are classified as forest crimes are not regarded crimes in the local culture, and locals are not afraid to engage in them" (Durkaya et al., 2017).

The results of our study showed that forests play an important role in the livelihood of rural residents and are the main source of primary income for rural households. For this reason, forests are critically important in providing diverse livelihoods involving raw materials, mainly wood and nonwood products, and other types of jobs for these settlements. The population of the villages is declining day by day, despite the fact that their basic facilities and socioe-conomic situations are improving (Alkan and Toksoy, 2008). In our study, we found that socio-economic factors such as age, residence duration, and employment significantly affect the household dependency on forests. The adverse relationship between age and forest dependence reveals that young individuals are important stakeholders in terms of sustainable forest management. This situation can be seen as an advantage. It can ensure that people become socially aware of the importance of forests and engaged in activities that will protect, effectively use, and sustain forest resources. Members of the younger generation may be more open to change due to their nature. In addition, encouraging the participation of local people in designing policies for governing the land and creating more alternative opportunities for earning a living than a dependence on forests will also be effective in protecting and developing forests. Without better employment opportunities, young adults are more likely to engage in risky illegal activities in forests.

It is of great importance to understand the dependency of households on forests in designing strategies for forest protection. Rural poverty, with its social and economic issues, increases the need for forest resources. Therefore, policy measures are needed to increase household incomes and create nonagricultural employment opportunities for rural communities to reduce forest dependence and increase forest protection. Government policies and regulations that are already in force and those stillto be developed for forest management will help to improve the economic circumstances of people living in and near forests so that forests can be protected for years to come.

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