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INVESTIGATING AND PLANNING ECOTOURISM AREA FOCUSED ON FOREST VILLAGERS VIA THE ANALYTICAL HIERARCHY PROCESS

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Abstract: *Ecotourism has emerged as an alternative form of tourism that brings together urban dwellers and forest villagers, while also promoting the sustainability of forest resources. This study aimed to identify the key factors influencing ecotourism in forest villages and to determine the most suitable areas based on these factors. Giresun province served as the study area, where we collected data through interviews with stakeholders and industry professionals. The collected data were analysed using the SPSS23 program and the AHP analysis, which resulted in the identification of influential factors and the mapping of suitable ecotourism areas using ArcGIS 10.8. As a result of the Kolmogorov-Smirnov and Shapiro-Wilk tests, it was observed that the data showed a normal distribution and there was a significant relationship between the variables (p > 0,05). The findings from the interviews revealed that ecotourism can serve as a significant source of income and be pursued as a full-time occupation. Furthermore, it was determined that 50 forest villages in Giresun are situated within the most suitable ecotourism area. Based on the comprehensive analyses conducted, this study will establish an economically viable access road to the forest village, facilitating optimal land-use planning in the designated areas.*

Key words: *ecotourism, forest villagers, planning, GIS, AHP.*

1. Introduction

Growing environmental awareness worldwide has influenced the tourism market. This shift has emphasized the need for educating local communities and tourists about the value of natural resources. Ecotourism, which is defined as nature-based tourism, is considered a sustainable development tool in the tourism market. Its core aims encompass sustainable resource management, economic growth, environmental preservation, and cultural renewal [41].

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When carried out in line with these objectives and proper planning, ecotourism can effectively protect sensitive ecosystems, ensure sustainable use, and contribute to the social and economic development of local communities [14]. Unlike seasonal mass tourism, ecotourism spreads tourism throughout the year, reduces pressure on the natural environment, and focuses on long-term economic interests and planning to prevent destruction [29]. However, the development of ecotourism also comes with its challenges, such as the diversity of activities, the protection of natural resources, finding suitable entrepreneurs, and engaging the local community. To ensure the successful development and implementation of ecotourism, it is crucial to conduct a thorough situation analysis to identify a destination's potential and initiate studies to develop it [47]. Once the potential is evaluated, gaining the support of the local community, promoting the destination, and completing the planning process are essential steps [30]. This type of tourism offers various activities, including botanical studies, nature photography, wildlife watching, flora discovery walks, forest product expeditions, arboretums, mushroom picking, lavender harvesting, and eco-gastronomy [46]. Due to its diverse nature-based tourism offerings, ecotourism is being studied in various disciplines. There is an increasing focus on forest-based tourism, as it was found that it significantly benefits local communities, especially those living in mountain and forest areas that operate hostels [28].

This study aims to determine and map the most suitable ecotourism areas for forest villagers in Giresun province, as well as to develop forest villager-oriented planning opportunities in ecotourism areas. By involving the forest villagers in the planning process, this research aims to address the challenges faced by forest villagers, including their limited economic opportunities and the need for better understanding and acceptance of the concept of ecotourism. Based on the literature review, ecotourism occurs in forest areas both with and without forest villages. This study hypothesis was formulated based on the established correlation between forest village locations and sustainability. Research indicates a notable relationship between sustainable ecotourism development and the strategic planning of ecotourism zones centered around forest village communities

2. Literature Review

Forests are considered as a natural and renewable resource that serves various functions, including the harvesting of goods and services, as well as meeting the needs of society. Forestry, tourism and recreation, agriculture and livestock, drinking water and hunting sectors benefit from ecosystem products and services (provider, regulatory, cultural and supportive) provided by forests [8].

Forest resources are defined as wood and by-products other than wood obtained from forests. In such a way, forest resources are produced in two forms: primary and secondary forest products. Primary forest products include timber, pulp, industrial wood, logs, and firewood. Secondary forest products include both plant products (flowers, mushrooms, berries, fruits, resin, mastic oil, leaves, etc.) and elements such as rocks, animals, drinking water, minerals, aquatic products

(fish), and stone quarries found in forests and within them [25]. People use forest resources for medicine, food, feed, fuel, timber, agricultural tools, and various other purposes. Considering the importance of these resources for people's livelihoods and ecological security, efforts should be made to explore and conserve them [2].

Forest villagers play a significant role in Turkish forestry and constitute the segment with the lowest income group living in the countryside. Forest villagers have both benefited from the forest and formed an important workforce by participating in production activities [19, 48].

Ecotourism (eco [logical+nomic] tourism) is terminologically composed of the combination of terms eco and tourism. Although the suffix eco is used as an abbreviation of the word ecological [9, 51], it also expresses economic development [1, 7, 16]. On the other hand, according to Genç [18], ecotourism emerged as a reaction to the negative increase of touristic and recreational activities against the environment. Ecotourism benefits stakeholders in various ways. It serves as a marketing tool for tour operators, a nature conservation tool for environmental groups, a source of employment for economists, an economic strategy for governments, and a social opportunity for local communities [45].

Current tourism trends indicate that forestry organizations need to develop forest-based tourism offerings like ecotourism to meet the growing tourist demand and better connect with the tourism sector. When it comes to the use of forest resources for ecotourism purposes, protected areas such as national parks and nature parks are at the forefront, followed by other areas with conservation status such as natural sites, special environmental protection areas, wetlands, nature monuments, and nature conservation areas. In addition to protected areas, forest recreation or recreational areas within forests, along with water coasts inside or near forests, picnic areas, urban forests, etc. are also used for ecotourism. Apart from these areas, wildlife, old forests, endemic plant species, monumental trees, and landscape features are utilized for ecotourism as well. Furthermore, forest resources such as virgin forest areas, large urban parks, nature/forest reserves, biosphere reserves, and privately-owned nature reserves are used for ecotourism purposes too [6, 51]. When examining the types of ecotourism activities originating from forests, the following can be listed; archeotourism, equestrian trekking, balloon tourism, bicycle tourism, botanical tourism, bungalow tourism, mountaineering, trekking, transformational tourism, solidarity tourism, festival tourism, film tourism, flora tourism, photo safari, glamping tourism, eco-gastronomy tourism, blues tourism, faith tourism/votive tourism, monitoring geomorphological formations, camping/caravan tourism, canoeing, ski tourism, bird watching, cave tourism, angling, rafting, health tourism (from plants), myth tourism, wine tourism, agriculture/farm tourism, historical and archaeological field trip, wildlife watching, paragliding tourism, highland tourism, and yoga tourism are among the activities that can be done within the scope of ecotourism [18, 46].

The literature on ecotourism and forest villager-oriented planning is limited, but several studies have been conducted in this

field. Rahemtulla and Wellstead [35] created a table categorizing vacation and leisure activities as relevant, not relevant, or neutral in relation to ecotourism. This study identified activities such as wildlife watching, hiking, local and Aboriginal visits, botanical studies, canoeing, and photography as ecotourism-related. Non-ecotourism-related activities included fishing, snowmobiling, hunting, and ice fishing. Ecotourism-neutral activities included tours, boating, horseback riding, swimming, holiday farm activities, dog sledding, cycling, rafting, fossil hunting, and catch-and-release fishing. Hoşcan [21] conducted a survey to measure the ecotourism potential of forest villages in Mudurnu district, Türkiye, and local people's approach to ecotourism. The research revealed that forest villagers expressed a desire to earn income by selling their products and opening their houses for pensions. Animal husbandry and poultry were among the top development proposals presented by the local people, while tourism ranked third. Perera [33] aimed to examine the behavioural and motivational profiles of visitors to forest-based ecotourism attractions in Sri Lanka. The study identified four different types of tourists: picnickers, ecotourists, egoistic tourists, and adventure tourists.

Mbatiany [24] conducted a study on the impact of ecotourism on the sustainable development of forest villagers living around Kakamega forest in Kenya. The study found that 70% of the participants earned income from ecotourism, leading to improved living standards in the community. Açıksöz et al. [1] presented ecotourism proposals for Ahatlar Village in Amasra district, Türkiye. They highlighted the art of wood carving conducted in workshops under the houses of the local people and the processing of raw materials into different products. Gültekin [20] examined the welfare status of Güzeldere forest village in Gölyaka district, Türkiye, after ecotourism-oriented rural development activities. The research revealed that forestry income before ecotourism activities was unsatisfactory for forest villagers, and other agricultural incomes were insufficient. However, hidden unemployment improved after the implementation of ecotourism activities.

Using the GIS-based CRITIC technique, Roy et al. [36] determined that the northern, northwestern, and northeastern parts of the Darjeeling Himalayan region are the most suitable areas for ecotourism. In addition, the temperature, distance to the river, precipitation and altitude criteria were determined as the main factors for the development of ecotourism. Similarly, Prasandya and Satria [34] found that many villages in Bali have ecotourism potential through their AHP and SPPK analysis. They identified six key criteria for determining suitable villages: environmental, social-cultural, community participation, educational, economic, and institutional factors. On the other hand, Cvetković et al. [12] used the AHP and SWOT methods for the Suva Planina Special Nature Reserve and Strara Planina Nature Park areas and concluded that local products, geographical location, and biodiversity are the criteria with the highest weight. In another study, Das et al. [13] created and mapped potential ecotourism regions using the AHP and GIS methods with the tourist hotspot, protected area proximity, village proximity, surface water, road proximity, slope, and elevation criteria, respectively.

This research integrates methodologies

from both tourism studies and forestry science to provide a comprehensive analysis. This structure has revealed the need to evaluate many factors together. In this context, the AHP (Analytic Hierarchy Process) method has been applied in order to evaluate ecotourism using multi-criteria support systems. AHP provides a structural approach in determining weights and scores by making pairwise comparisons on how to derive relative scales using data from a standard scale and how to perform arithmetic operations in such scales by avoiding unnecessary number fragmentation [38, 50].

3. Materials and Methods

The research area was determined as the forest villagers living within and adjacent to the Giresun provincial borders and forest villages of Giresun. The snowball sampling technique was used in the research. First, the villages and stakeholders where ecotourism activities are carried out were identified by establishing a connection with the Giresun Forest Regional Directorate, and the Giresun Directorate of Nature Conservation and National Parks. Then, the sample size was increased through acquaintances.

Within the scope of the research, the interviews started with the question "Who is the person who has the most knowledge about this subject?" addressed to the individual who was considered to have the most information in the population. The second individual is reached through the first individual, and the third individual was reached through the second individual. In this way, just like a snowball, the sample size also expanded [4]. The individuals identified through snowball sampling increased the validity of the research (the ability to measure the intended criteria correctly) because they have knowledge of ecotourism and the willingness to preserve the area.

Primary data were first collected from literature reviews, field studies, and interviews through verbal communication. In the second stage, the important criteria for ecotourism focused on forest villagers were determined by taking into account the previous research, surveys, and expert opinions (forest management chiefs, forest engineers, tourism stakeholders, academics, sworn translators, etc.). Then, the GIS database was created, and the weights of the factors determined in the AHP method were combined for the final suitability classification of the study area. As a result, the most suitable area for ecotourism was determined.

Field studies were carried out in the villages of Kümbet, Uzundere, Pınarlar/Süllü, Güneyköy, and Şeyhli in the Dereli and Piraziz districts of Giresun province. Interviews were conducted through verbal communication by observing 35 forest villagers and four sector actors engaged in ecotourism residing in these villages (Figure 1).

In the survey, the First question part regarded demographic information etc., the Second question part used the Likert scale (strongly agree-strongly disagree), in the third part categorical scales (yes/no) were used, in the fourth part open-ended questions were included (unstructured) and the last part was comprised of AHP importance values questions (9, 7, 5, 3, 1). Before the interview questions were addressed to the participants, a pilot application was made to experts in the field. The distribution of the initial results was examined using both the Kolmogorov–Smirnov and the Shapiro–Wilk tests ($p >$

0.05), indicating that the data were normally distributed. To analyse forest villagers' ecotourism knowledge and perspectives, we designated "I have knowledge about ecotourism" as the dependent variable, with the remaining survey questions serving as independent factors. The study applied the AHP (Analytic Hierarchy Process) method to evaluate multiple factors together in the interdisciplinary evaluation of tourism and forestry disciplines, as shown in Table 1.

Fig. 1. *Pınarlar-Süllü land study*

Factors and criteria determined within the scope of forest village-focused ecotourism areas Table 1

Factors	Criteria	Factor Suitability Rating*					AHP Severity Rating	Source
		5	**4**	**3**	**2**	**1**		
Village settlement	Village in the forest	5					9	Expert opinion received
	Forest edge village			3				
	Other villages					1		
Vegetation	Other areas (pasture, agriculture, meadowland)					1	8	Dhami et al. [15]
	Shrublands				2			
	Coniferous forests			3				
	Deciduous forests		4					
	Mixed forests	5						
Access to nature tourism areas	First buffer zone (0-5 km)	5					8	Çorbacı [11]
	Second buffer zone (5-20 km)			3				
Accessibility (m)	Distance to forest roads	<1,000	1,000 - 2,000	2,000 - 3,000	-	>3,000	7	Nino et al. [26]
Water sources [m]	Distance from surface waters	<700	700 - 1,400	1,400 - 2,100	2,100 - 2,800	>2,800	7	Aşılıoğlu [3]
Slope	Low slope (<10^{o})					1	6	Dhami et al. [15]
	Medium slope			3				

	(10 – 25°)							
	High slope (>25°)	5						
Forest industry (km)	Active production area (<1.61 km)					1	5	Dhami et al. [15]
	Production area planned in the future (1.61-4.83 km)			3				
	Areas that will not be subject to production (>4.83 km)	5						
Wildlife existence	Wildlife	5	4	3	2	1	4	Bunruamkaew and Murayama [10], Dhami et al. [15], Ullah and Hafiz [49], Salahi and Naghizadeh [39]
Distance to mining (km)	Area inside active or abandoned mine sites (<1.61 km)					1	3	Dhami et al. [15]
	Area near active or abandoned mine sites (1.61-4.83 km)			3				
	Area without mining activities or outside active or abandoned mining sites (>4.83 km)	5						

Note: * 5 – high; 4 – medium; 3 – marginal; 2 – low; 1 – very low.

In the first part, the criteria that were considered applicable in Giresun province by examining the research in the literature were determined and classified under nine main headings. Then, the suitability classes of the sub-factors that are effective in the research were determined. This classification was evaluated as completely suitable (5), suitable (4), slightly suitable (3), unsuitable (1) and definitely unsuitable (1).

In the study's last step, Geographic Information System (GIS) was used to analyse the data obtained and to make it usable through mapping. GIS is a digital information system that collects, stores, and processes location-related data and transforms and displays it accordingly [4]. GIS provides the planner with the capacity to map or locate and track events in the development process. In addition, information can be organized and displayed geographically using maps [17]. To conduct this analysis, ArcGIS 10.8 software was used. Maps were created based on the weights of each criterion. In the last step, the most suitable areas were identified by overlapping the maps.

4. Results

4.1. Statistical analysis results

Firstly, the Kolmogorov-Smirnov and the Shapiro-Wilk tests were conducted. We examined whether the data obtained from 35 stakeholders who participated in the interviews via verbal communication showed normal distribution, and the Pearson Correlation test analysis was performed to determine the relationships (Table 2).

The correlation coefficient values can be interpreted as follows: 0.00-0.10 indicates a negligible or neutral relationship; 0.10-0.39 shows a weak relationship; 0.40-0.69 represents a moderate relationship; 0.70-0.89 indicates a strong relationship; and 0.90-1.00 signifies a very strong or perfect relationship [23, 42]. In the questions showing a strong relationship, Section A spans questions 9 through 12. This reveals that participants who have bordering houses in the forest area usually have their own gardens as well. In this planning, they can also generate economic income through the products they produce in their own private areas (0.755).

For Section B, question 3: "Do you obtain non-timber forest products from the forest?" Section A, question 9: "Is your house bordering the forest?", the meaningful relationship reveals that individuals whose houses are bordering the forest obtain non-timber forest products and have the opportunity to make it a profession. This result indicates that individuals who own houses bordering the forest benefit from forest products and perceive it as a business sector.

4.2. Analytic Hierarchy Process Results

By taking the previous literature research and expert opinions within the scope of this study, nine factors were determined: featured settlements, vegetation cover, access to nature tourism areas, distance from the road, presence of wildlife, slope, distance from logging, distance from surface waters, and distance from mining. Decision matrices were created by using the AHP method according to the interview data through verbal communication, including pairwise comparisons (Table 3).

A binary decision matrix was created to find the weights of the nine criteria with each other. A normalized decision matrix was formed by dividing each column by the column sum. Then, row sums were taken.

Pearson correlation analysis of pairwise comparison results for variables Table 2

		Part C Question 1	Part A Question 9	Part A Question 10	Part A Question 12	Part B Question 1	Part B Question 3	Part A Question 1	Part B Question 2	Part A Question 2	Part A Question 3	Part A Question 4	Part A Question 5
Part C Question 1	Pearson Correlation	1	-0.244	-0.099	-0.280	0.384*	-0.110	-0.478**	-0.017	0.090	0.235	0.345*	-0.237
	Sig. (2-tailed)		0.157	0.572	0.104	0.023	0.530	0.004	0.921	0.608	0.174	0.042	0.171
	N	35	35	35	35	35	35	35	35	35	35	35	35
Part A Question 9	Pearson Correlation	-0.244	1.000	-0.187	0.755**	0.096	0.629**	-0.138	0.317	0.333	-0.595**	-0.278	-0.232
	Sig. (2-tailed)	0.157		0.282	0.000	0.585	0.000	0.428	0.064	0.051	0.000	0.106	0.180
	N	35	35	35	35	35	35	35	35	35	35	35	35
Part A Question 10	Pearson Correlation	-0.099	-0.187	1.000	0.024	-0.211	-0.093	0.207	0.006	0.140	-0.063	-0.021	0.002
	Sig. (2-tailed)	0.572	.282		0.891	0.224	0.594	0.232	0.972	0.422	0.719	0.905	0.990
	N	35	35	35	35	35	35	35	35	35	35	35	35
Part A Question 12	Pearson Correlation	-0.280	0.755**	0.024	1.000	-0.090	0.629**	-0.138	0.192	0.333	-0.595**	-0.231	-0.338*
	Sig. (2-tailed)	0.104	0.000	0.891		0.606	0.000	0.428	0.269	0.051	0.000	0.182	0.047
	N	35	35	35	35	35	35	35	35	35	35	35	35
Part B Question 1	Pearson Correlation	0.384*	0.096	-0.211	-0.090	1.000	0.169	-0.243	0.497**	0.233	0.124	0.168	-0.186
	Sig. (2-tailed)	0.023	0.585	0.224	0.606		0.331	0.159	0.002	0.177	0.479	0.334	0.285
	N	35	35	35	35	35	35	35	35	35	35	35	35
Part B Question 3	Pearson Correlation	-0.110	0.629**	-0.093	0.629**	0.169	1.000	-0.081	0.461**	0.230	-0.358*	-0.249	-0.168
	Sig. (2-tailed)	0.530	0.000	0.594	0.000	0.331		0.644	0.005	0.183	0.035	0.148	0.335

	N	35	35	35	35	35	35	35	35	35	35	35	35
Part A Question 1	Pearson Correlation	-0.478**	-0.138	0.207	-0.138	-0.243	-0.081	1.000	0.030	-0.016	0.207	0.194	0.435**
	Sig. (2-tailed)	0.004	0.428	0.232	0.428	0.159	0.644		0.866	0.927	0.232	0.264	0.009
	N	35	35	35	35	35	35	35	35	35	35	35	35
Part B Question 2	Pearson Correlation	-0.017	0.317	0.006	0.192	0.497**	0.461**	0.030	1.000	0.346*	-0.251	0.194	0.010
	Sig. (2-tailed)	0.921	0.064	0.972	0.269	0.002	0.005	0.866		0.042	00.145	.264	0.954
	N	35	35	35	35	35	35	35	35	35	35	35	35
Part A Question 2	Pearson Correlation	0.090	0.333	0.140	0.333	0.233	0.230	-0.016	0.346*	1	-0.154	0.195	-0.522**
	Sig. (2-tailed)	0.608	0.051	0.422	0.051	0.177	0.183	0.927	0.042		0.378	0.262	0.001
	N	35	35	35	35	35	35	35	35	35	35	35	35
Part A Question 3	Pearson Correlation	0.235	-0.595**	-00.063	-0.595**	0.124	-0.358*	0.207	-0.251	-0.154	1.000	0.176	0.066
	Sig. (2-tailed)	0.174	0.000	0.719	0.000	0.479	0.035	0.232	0.145	0.378		0.313	0.706
	N	35	35	35	35	35	35	35	35	35	35	35	35
Part A Question 4	Pearson Correlation	0.345*	-0.278	-0.021	-0.231	0.168	-0.249	0.194	0.194	0.195	0.176	1.000	0.170
	Sig. (2-tailed)	0.042	0.106	0.905	0.182	0.334	0.148	0.264	0.264	0.262	0.313		0.330
	N	35	35	35	35	35	35	35	35	35	35	35	35
Part A Question 5	Pearson Correlation	-0.237	-0.232	0.002	-0.338*	-0.186	-0.168	0.435**	0.010	-0.522**	0.066	0.170	1.000
	Sig. (2-tailed)	0.171	0.180	0.990	0.047	0.285	0.335	0.009	0.954	0.001	0.706	0.330	
	N	35	35	35	35	35	35	35	35	35	35	35	35

Note: * Correlation is significant at the 0.05 level (2-tailed); ** Correlation is significant at the 0.01 level (2-tailed).

Binary comparison matrix Table 3

Decision variables	Village settlement	Vegetation	Access to nature tourism areas	Distance to forest roads	Water sources	Slope	Forest industry	Wildlife existence	Distance to mining
Village settlement	1.000	1.125	1.125	1.285	1.285	1.500	1.800	2.250	3
Vegetation	0.888	1.000	1.000	1.142	1.142	1.333	1.600	2.000	2.666
Access to nature tourism areas	0.888	1.000	1.000	1.142	1.142	1.333	1.600	2.000	2.666
Distance to forest roads	0.777	0.875	0.875	1.000	1.000	1.166	1.400	1.75	2.333
Water sources	0.777	0.875	0.875	1.000	1.000	1.166	1.400	1.75	2.333
Slope	0.666	0.750	0.750	0.857	0.857	1.000	1.200	1.500	2
Forest industry	0.555	0.625	0.625	0.714	0.714	0.833	1.000	1.250	1.666
Wildlife existence	0.444	0.500	0.500	0.571	0.571	0.666	0.800	1.000	1.333
Distance to mining	0.333	0.375	0.375	0.428	0.428	0.500	0.600	0.750	1.000
Total	6.328	7.125	7.125	8.139	8.139	9.497	11.400	14.250	18.997

At this stage, the average of the matrix weights was taken and reduced to a single column (Table 4).

In this direction, while the village settlement criterion was more important than the other criteria, it was followed by the vegetation, access to nature tourism areas, distance to forest roads, water sources, slope, forest industry, wildlife existence, and distance to mining.

At this stage, the *RI* (Random Index) value was obtained according to the dimensions of the comparison matrices (Table 5). Since nine criteria were used within the scope of the research, it was divided into 1.45. Then the *CR* (Consistency Ratio) value was determined as 0,091. In this case, since the *CR* value was lower than 0.10 (*CR* < 0.10 [37]), it was decided that the comparison matrix was consistent.

Calculating the eigenvector Table 4

Decision variables	Eigenvector			Importance level
Village settlement	1.414/9	0.158	15.8%	1
Vegetation	1.260/9	0.141	14.1%	2
Access to nature tourism areas	1.260/9	0.141	14.1%	2
Distance to forest roads	1.098/9	0.122	12.2%	3
Water sources	1.098/9	0.122	12.2%	3
Slope	0.945/9	0.105	10.8%	4
Forest industry	0.783/9	0.087	8.7%	5
Wildlife existence	0.630/9	0.071	7.1%	6
Distance to mining	0.468/9	0.053	5.3%	7
Column sum		1.00	100%	

Calculating the maximum eigenvalue Table 5

Decision variables	Largest eigenvalue	
Village settlement	2.268/0.158	14.354
Vegetation	1.798/0.141	12.751
Access to nature tourism areas	1.798/0.141	12.751
Distance to forest roads	1.359/0.122	11.139
Water sources	1.359/0.122	11.139
Slope	1.001/0.105	9.533
Forest industry	0.691/0.087	7.942
Wildlife existence	0.449/0.071	6.323
Distance to mining	0.248/0.053	4.679
Column sum		90.611

As a result of overlapping the areas suitable for ecotourism focused on forest villagers in Giresun province, 50 villages within the forest (*VIF*) and 21 villages adjacent to the forest (*VAF*) were obtained within the scope of the “Most Appropriate”

areas in the suitability map. The forest villages in the forest were (Figure 2): Yeşilpınar, Tamdere, Alancık, Çalköy, Yüce, Saplıca, Sınır, Pınarlar, Yeşilvadi, Sarıyakup, Seydiköy, Yukarıboynuyoğun, Uzundere, Avluca, Ezeltere, Konuklu, Boncukçukur, Bayındır, Kümbet, Eğrianbar, Aksu, Düzçukur, Güzyurdu, Yavuzkemal, Aslanşah, Akkaya, Düzköy, Güdül, Çamlıköy, Fırınlı, Güllüce, Tandır, Tepeköy, Güzelyurt, Sarıyar, Aşağıboynuyoğun, Tokmaden, Çatak, Yeniköy, Yuva, Kamışlı, Ambaralan, Dereköy, Yıldız, Asarcık, Doludere, Fevziçakmak, Deregözü, Gökçetaş, Meşeliyatak (Figure 3).

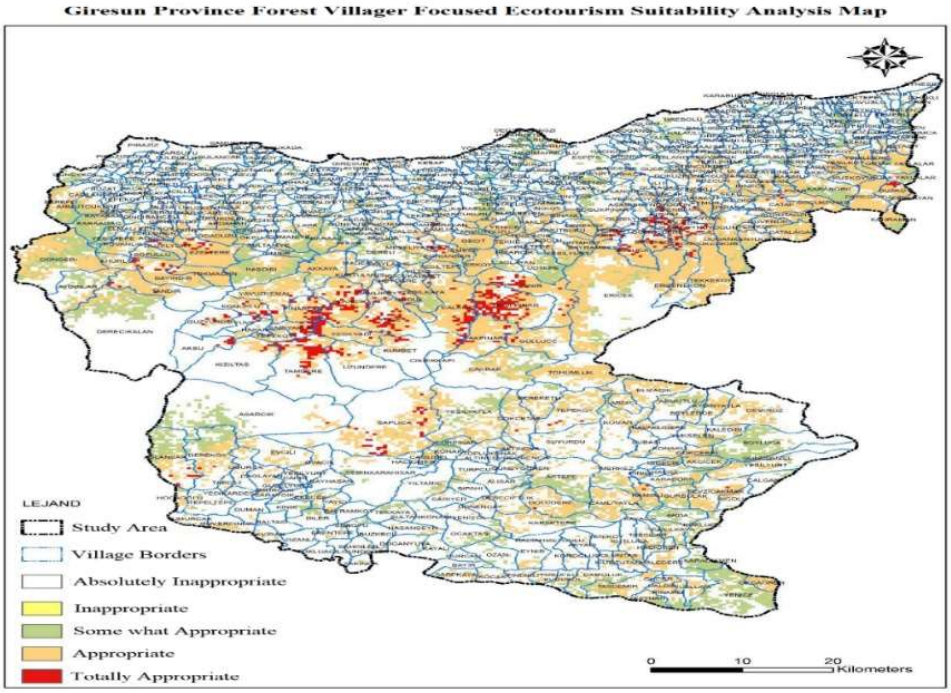

Fig. 3. *Giresun Province forest villages and ecotourism areas suitability map*

Within the scope of Table 6, Dereli district (77,712,473.370) has the most suitable area based on its land size. Furthermore, out of the total of 71 forest villages identified, 25 forest villages are located in Dereli district. Additionally, the villages adjacent to the largest area are Akpınar (Yağlıdere – 26,731,888.880) and Akkaya (Dereli – 22,108,912.400). Following these villages are Yeşilpınar (Yağlıdere – 16,849,550.720), Tamdere (Dereli – 95,88,824.479), Alancık (Dereli – 8,837,071.125), Çalköy (Dereli - 6,365,822.512), Yüce (Dereli – 6,082,548.189), and others, which are forest villages. On the other hand, suitable areas for ecotourism were not identified in the forest villages of Çamoluk, Eynesil, Görele, and Piraziz districts.

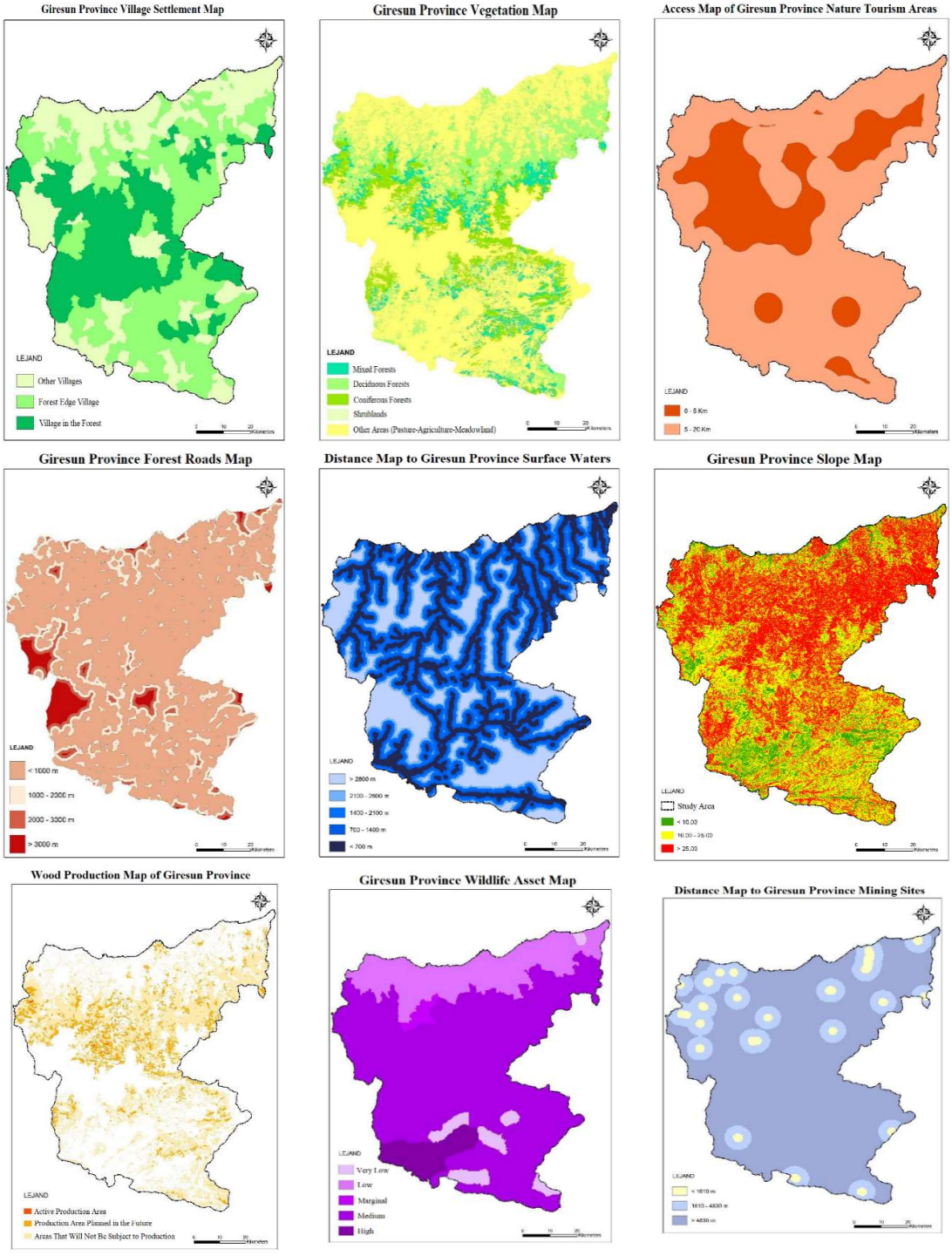

Fig. 2. *Nine maps created based on criteria through Giresun Province GIS*

Ranking of the forest villages of Giresun by area size in the scope of the most appropriate area Table 6

District of the village	Qualification	Entire area of the villages [m^2]	Proper area of the villages [m^2]
Alucra	Village in the forest	38,029,128,022	1,093,843.912
Bulancak	Village in the forest	97,395,663.740	5,514,562.357
Bulancak	Forest edge village	11,659,862.340	59,375.343
Çamoluk	-	0.000	0.000
Çanakçı	Village in the forest	8,314,762.018	1,065,625.000
Dereli	Village in the forest	265,684,928.100	55,441,170.160
Dereli	Forest edge village	38,804,509.270	22,271,303.210
Doğankent	Village in the forest	12,477,001.510	428,497.157
Espiye	Village in the forest	29,863,117.380	6,515,966.712
Espiye	Forest edge village	105,402,600.200	198,628.031
Eynesil	-	0.000	0.000
Giresun city centre	Village in the forest	921,601.533	340,803.368
Görele	-	0.000	0.000
Güce	Village in the forest	22,618,145.250	7,064,222.116
Güce	Forest edge village	44,113,790.770	142,919.428
Keşap	Forest edge village	4,493,914.506	5,145.757
Piraziz	-	0.000	0.000
Şebinkarahisar	Village in the forest	145,535,723.700	6,949,447.594
Tirebolu	Village in the forest	2,025,599.687	467,234.933
Tirebolu	Forest edge village	12,142,696.110	9,745.131
Yağlıdere	Forest edge village	1,703,039.424	26,731,888.880

5. Discussion

In the study, it was concluded that there is a significant impact on determining and planning ecotourism areas focused on forest villagers, supporting the hypothesis. As a result of the interviews via verbal communication, and of the SPSS, AHP, and GIS methods used in the research, important results were obtained.

The interviews revealed that ecotourism can be done full-time and is a main source

of livelihood. It has been determined that Giresun has especially high Eco-Gastronomy potential and the villagers prepare various dishes from local plants and create menus and present these dishes to ecotourists.

Berkdemir and Sezer [5] and Paslı and Paslı Çelikkanat [32] have obtained research results on the recreational and ecotourism potential of Giresun province, similar to this research. They concluded that various recreational activities and ecotourism events can be carried out in Giresun province [32]. According to Junead et al. [22], creative ecotourism activities (such as natural landscape activities, waterfall visits, camping, nature photography, spelunking, biking, climbing/hiking, and bird watching) are actively carried out in Giresun province. Tekin and Kasalak [44] have found in their research on ecotourism entrepreneurship that the concept of staying with local families has gained popularity, which aligns with these research findings. Notably, while numerous local groups have formed to provide authentic cuisine to tourists, Giresun has successfully implemented cooperative initiatives that have received strong support from the community. The study conducted by Ormbsby et al. [27] has identified mushrooms as the most frequently collected non-timber forest product. However, the understanding of using non-timber forest products in cultural ceremonies and prayers is not valid for Giresun.

In the study by Arya and Tewari [2], leaves collected from forests are used for food, and the waste collected from forests is predominantly used for packaging fruits to be sold in markets. Although these activities are not carried out in Giresun province, it is believed that directing forest villagers to these areas would be beneficial. It is believed that tea leaves, which serve as tape to tie baskets and construction materials [40], can also be used in Giresun province, which has similar climatic conditions.

To examine the linear relationship between two variables, the Pearson Product-Moment Correlation Coefficient (*r*) is most commonly employed. In order to compute the Pearson correlation coefficient, both variables under investigation must be continuous (measured on an interval or ratio scale), and the relationship between them must be linear [43]. According to the results of this study, it was found that there is a significant relationship between the use of forests as a border and the increase in household income. A number of results were also obtained from the findings of the correlation analysis. Accordingly, the fact that the villagers had knowledge about ecotourism showed that their education level was high. According to Table 2, the fact that the garden of the villager whose house is bordered by the forest area is also bordered to the forest area has a strong relationship ($r = 0.755$). The second highest value ($r = 0.629$) is a moderate relationship that the villager whose house is bordered by the forest area obtains non-wood forest products from the forest. Therefore, an increase in the number of border villagers in the forest area will increase the non-wood forest product obtained from the forest. When previous studies were examined, similar findings were obtained as in the research of Ormbsby et al. [27] and Park and Yeo-Chang [31], where non-timber forest products contribute to poverty reduction and increasing household income from the perspective of forest dwellers.

As a result of the suitability analysis carried out within the scope of determination and planning of forest villager-oriented ecotourism areas, an area of 522.722 hectares was determined at the most appropriate level. In this direction, it was concluded that 50 forest villages among 416 forest villages in Giresun province are the most suitable forest villages for ecotourism activities. Akpınar, the village adjacent to the forest, has the most suitable area. The village within the forest was identified as Yeşilpınar. On the other hand, Ayvat/Gölyanı Obası, which has tourism value, is connected to Yeşilpınar forest village, so that there are nature walking routes and cycling routes in this area. Moreover, while ecotourism activities are currently carried out in the villages of Kümbet, Uzundere, Tamdere, Pınarlar, and Yavuzkemal, it is known that ecotourism activities are not carried out in Yeşilpınar, Çalköy, Yüce, Saplıca, Sınır, Yeşilvadi, Sarıyakup, Seydiköy, Yukarıboynuyoğun, Avluca, Ezeltere, Konuklu, Boncukçukur, Bayındır, Eğrianbar, Aksu, Düzçukur, Güzyurdu, Aslanşah, Akkaya, Düzköy, Güdül, Çamlıköy, Fırınlı, Güllüce, Tandır, Tepeköy, Güzelyurt, Sarıyar, Aşağıboynuyoğun, Tokmaden, Çatak, Yeniköy, Yuva, Kamışlı, Ambaralan, Dereköy, Yıldız, Asarcık, Doludere, Fevziçakmak, Deregözü, Gökçetaş, and Meşeliyatak villages.

6. Conclusions

Forest resources, which are the main component of the natural environment, are a natural centre of attraction for tourists/ecotourists and have an important role between tourism and the environment. So much so that the gradual increase in both ecotourism activities and recreational use in forest areas in Türkiye necessitates the determination and planning of forest areas where ecotourism is conducted. In this direction, research was carried out with the aim of determining and planning ecotourism areas especially for forest villages and forest villagers who make their living by residing there. This research is important in terms of being the first study conducted on the determination of suitability maps with GIS in Giresun for forest villagers, forest villages, and ecotourism.

Forest village-oriented planning is considered to have a positive impact on increasing the income of the forest village, as well as contributing significantly to forest conservation. According to the information obtained during the research, it is believed that the idea of generating income and the concept of environmental protection both increase the desire to take ownership of the area. Therefore, it is considered important to include the forest village in the planning process, as it can contribute to development and can have a significant impact on environmental protection. In this context, investigating the contribution of different types of plans to environmental conservation is also important in future studies.

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