PLANNING OF FOREST RECREATION SERVICES AT PROVINCIAL SCALE WITH A MULTI-CRITERIA APPROACH : A CASE OF TÜRKIYE

PLANIRANJE ŠUMSKIH REKREACIJSKIH USLUGA NA RAZINI PROVINCIJE S VIŠEKRITERIJSKIM PRISTUPOM : SLUČAJ TURSKE

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SUMMARY

The planning of forest services is becoming more crucial day by day, depending on the people's tendency to the services provided by forests. For this reason, this study focused on planning of recreation service, which is one of the non-wood forest products and services offered in forests in Türkiye. The distribution of national parks, nature parks, and A-, B-, C-, and D-type recreational areas, which are all types of recreational areas in forests, were evaluated by weighted overlay analysis at the provincial level in Türkiye. The criteria that can express the distribution of people in the country and the forest assets and existing recreational areas (Gross Domestic Product (GDP) per capita, number of people per km², population growth rate, ratio of forest area to the overall area, and total forest recreation areas) were used. The criteria data of the provinces were rasterized and a reclassify analysis was performed with the obtained raster, dividing data into five categories. Weighted overlay analysis was carried out using the reclass maps. As a result of the analysis, in terms of planning recreational areas, the provinces were divided into three priority categories. The provinces, included in the first priority province category in the study, are those located in the south, east and southeast of Türkiye (where asylum seekers and irregular migrants enter Türkiye), those located along the line extending from the northwest to the interior provinces (important centers of both internal immigration and industrialization) and those located in the middle of Türkiye (the ones that are poor in terms of forest assets). In this study, it was emphasized that the recreational areas of the provinces are planned to depend on the changing provincial populations with both internal and external migrations and economy. In addition, a different approach is presented to planners to manage of utilization of forest recreation services according to different needs, by evaluating forests and the changing characteristics of society structure altogether.

KEY WORDS: social and economic criteria, forest services, multi-criteria approach, national parks, nature parks

INDRODUCTION
UVOD

The existence of forests and human relationship with them is constantly evolving depending on the changing needs in different times and locations. Forests are a limited resource, and unlimited human needs make economic evaluation and planning a necessity in forest–human relationship management. In this context, according to the 2020 Global Forest Resources Assessment (GFRA) Report, the management of forest assets is evaluated within six main categories: production, soil and water conservation, biodiversity conservation, social services, multiple use, and other uses (FAO, 2020). This classification can also be considered to define the management of the products and services offered in forests. However, due to insufficient data on the collection and use of non-

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wood forest products and services, forest management and policies often remain in the background (Lovric et al., 2020). In relation to the changing social and economic structure, the orientation toward environmental, biological, and recreational aspects of forest assets, also known as non-wood products and services, is constantly increasing (Getzner & Meyerhoff, 2020; Janse & Ottitsch, 2005; Lovric et al., 2020; Weiss et al. 2020). Therefore, the identification, inventory, planning, and management of non-wood products and services is an important issue for today's forestry (Grilli & Sacchelli, 2020; Kumar et al., 2020, Taye et al., 2021).

There is a wide range of non-wood forest products and services, but they are in close relationship with each other. It is not always possible to clearly separate a product or a service from other products or services. However, it may be possible to distinguish a product, service, or value from others through a specific focus. The focus of this study is the value of recreational services in forests. One of the regional meetings held after the 1992 Rio Conference, the Pan-European Ministerial Conferences on the Protection of Forests in Europe (MCPFE), was the Vienna Living Forest Summit in 2003. The conference emphasized the importance of forest assets for urbanizing societies with the statement that "*it is necessary to provide environmental, protective, social and recreational services in the light of an increasingly urbanized society*" (MCPFE, 2003). Indeed, Sievänen et al. (2008) stated that the tendency towards recreational value of forests has increased due to the aging of Europe's population and the consequent dwindling of problems related to the lack of time and money. In addition, important studies have been carried out in recent years that reveal the benefits of the recreational value of forests for people (Bielinis et al., 2019; Rathmann et al., 2020; Shin et al., 2017). At the same time, it has been determined that the recreational value of forests in the world affects human emotions, and time spent in recreational areas has a positive contribution to both emotional wellbeing and health (Bielinis et al., 2019; Chen et al., 2018; Hegetschweiler et al., 2017; Jiang, 2020; Rathmann et al., 2020a; Shin et al., 2017; Taye et al., 2019). In addition, regarding the utilization of forest recreational value in the world, the studies by Wilkes-Allemann et al. (2017), Meyer et al. (2019), Agimass et al. (2018), and Rathmann et al. (2020b) focus on shaping the use of the facilities by taking visitor expectations into account.

Studies on the management and planning of recreational value of forests (Eggers et al., 2018; Gundersen et al., 2020; Lopes & Amaral, 2021; Pang et al., 2017; Rasch et al., 2018; Tyrväinen et al., 2017; Voda et al., 2017) focused on ensuring the optimal and sustainable use of forests. At the same time, it is necessary to determine, monitor, and evaluate the criteria related to forest recreational value for management and planning.

Türkiye is striving to increase the amount of forest assets every year, and approximately 29% of its surface area is covered by forests (general directorate of forestry [GDF], 2020a). Türkiye's forest assets can also be defined as an important recreational service supply for the country. The process of utilizing the recreational services of forest assets could be planned based on a certain basis. In this way, it could be ensured that people benefit from forest recreational services more effectively. In the planning process, it is very important to determine the factors that may affect the planning objectives and the characteristics of the planning unit. In this respect, in addition to Türkiye's forest assets and the existing al areas, especially the criteria representing human population, movements and economic structure at the provincial level have been discussed in this study. In addition, while determining the criteria of the provinces in the planning of forest recreation services, the problems that have occurred in Türkiye's neighboring countries in recent years have been taken into account. Due to the political problems of Türkiye's neighbors (2011 Syria civil conflict/war), Türkiye has faced an influx of asylum seekers and irregular migrants (Balcilar & Nugent 2019; Düvell, 2019), causing a significant increase in the population. It was believed that it would be useful to evaluate the recreational value and services of Türkiye's forest assets, faced with asylum seekers and irregular migrants on the one hand and differences in the economic distribution of provinces on the other, on a macro scale with a multi-criteria approach. In fact, the aim is to plan the use of forest recreational services for people at the provincial level with the macro-scale criteria related to the social, economic and ecological structure of the country. For this purpose, the provinces were divided into categories according to the macro-scale criteria of the provinces and a weighed overlay analysis was made. In addition, the process of benefiting from the recreational value of forests in Türkiye has been evaluated on a spatial level.

MATERIALS AND METHODS
MATERIJALI I METODE

Türkiye consists of 81 provincial centers (Figure 1), and in the study, recreation areas and the distribution of these areas at the provincial level were revealed by using various parameters related to these provinces. In this study, the focus was put on national parks, nature parks, and A-, B-, C- and D-type recreational areas. The definitions of these are as follows.

National parks "*In terms of science and aesthetics, they are parts of nature with national and international rare natural and cultural resource values and protection, recreation, and tourism areas*" (National Parks Act [NPA] 1983).

Nature parks are "*parts of nature that have vegetation and wildlife characteristics and are suitable for the rest and entertainment of the people in the integrity of the landscape*" (NPA, 1983).

Figure 1. Map showing the borders of the provinces
Slika 1. Karta koja prikazuje granice pokrajina

A-type recreational areas *"It is a recreation area with a high visitor potential in order to meet the various recreational and sports needs of the society, to contribute to the beauty of the country and to allow touristic activities, and non-multi-storey structures and facilities, which are compatible with nature and provide opportunities for overnight use (such as tents, caravans, motor-caravans and country houses, country restaurants, country cafes), as well as local products exhibitions and sales places, and picnic units; they are promenade places that contain gazebos and other recreational structures and facilities."* (Recreation Areas Regulation (RAR) 2013).

B-type recreational areas *"They are promenade places located around the settlements in order to meet the various resting, entertainment and sports needs of the society, to contribute to the beauty of the country and to allow touristic activities, or other recreational structures and facilities (rural restaurants, country cafes, local products exhibitions and sales places, picnic units, etc.)"* (RAR, 2013).

C-type recreational areas *"Their aim is to meet the various recreational and sports needs of the society, to contribute to the beauty of the country, and allow touristic activities, with medium and low density of resource value and visitor potential, and in order to meet daily local needs; they include picnic units, local products exhibitions and sales places, arbors, and other recreational structures and facilities included in these recreational areas."* (RAR, 2013).

D-type recreational areas *"Their aim is to put the health, sports, aesthetic, cultural and social functions of forests at the service of the public, at the same time contribute to the beauty of the country, meet various sports and recreational needs of the society, and allow touristic activities; they include places in the provinces and districts, where scouting, trekking, cycling, horse riding and similar activities are carried out in order to introduce the flora and fauna, and to instill love and awareness of the forest, especially to children and young people, and where country restaurants, country cafes, culture houses, local product exhibitions, sales places, amphitheaters, various mini sports fields and other recreational structures and facilities are located."* (RAR, 2013).

A-, B-, C-, and D-type recreational areas are differentiated by minor nuances but are similar in terms of their typical characteristics, *"in the forest regime or allocated for this purpose, with different and rich features in terms of recreation and ecosystem"* (RAR, 2013).

The distribution of Türkiye's recreational areas (A-type promenade, B-type promenade, C-type promenade, D-type promenade, national parks, and nature parks) at the provincial level is given on the spatial plane. For this purpose, the categories tool was used in the ArcGIS 10.6 software.

In the study, weighted overlay analysis was carried out using macro-scale criteria in order to make a general assessment at the national level. The analysis aimed to evaluate the rest and recreational areas in the forests in different provinces in terms of various criteria and to categorize the provinces to accurately reveal the distribution of the recreational areas in forests. In addition, the study could identify more rational and needs-oriented areas for long-term planning. For this purpose, the criteria (which can represent ecological, economic, and social criteria) of the per capita GDP values of the provinces, the number of people per km^2, the population growth rate, the ratio of forest area to the overall area, and the total recreational areas in forests were used in the analysis.

Among the criteria, the per capita GDP values of the provinces, the number of people per km^2, and the population

growth rate were taken from the official website of TURK-STAT (TUIK, 2020). The ratio of the forest area to the overall area was taken from the forest asset list of the provinces on GDF's official website (GDF, 2020b), and the ratio of the total forest area to the overall area was used in the analysis. Total forest recreational area data were taken from GDF's official website (GDFSTAT 2020) and obtained from the Ministry of Agriculture and Forestry of the Republic of Türkiye (RTMAF, 2020). The arithmetic averages of GDP per capita values of the provinces for the years 2015–2019 were used in the analysis. The arithmetic averages of the number of people per km² were taken for the years 2016–2020 for the provinces. The arithmetic averages of the population growth rates of the provinces for the years 2018–2019 and 2019–2020 were used in the analysis. In the study, the data was first brought to the provincial polygon level on the digital map.

Each criterion map of the provinces was rasterized using spatial analysis tools. Reclass analysis was applied with the obtained rasters, and the rasters were divided into five categories. The rasters obtained by the natural breaks (Jenks) method were subjected to reclassify analysis and divided into five categories. The natural breaks (Jenks) method was used as the classification method in reclass analysis. Weighted overlay analysis was applied to the new maps and their values. The process of this analysis is defined as "*overlaying of several rasters using a common measurement scale and weighting each according to its importance*" (ArcGIS

10.6, 2022). In the analysis, it is assumed that as the per capita GDP values of the provinces, the number of people per km², and the population growth rate increase, the working and general populations in that province increase, and that people will need more rest in the forested areas in response to the growing population and intensive working time. However, as the total forest recreational areas decrease at the provincial level, it is believed that more areas should be used as rest and recreational areas in those provinces. In addition, as the ratio of the forest area to the overall area in the provinces decreases, the forest area of the province is smaller than in other provinces, and as a result, the areas for rest and recreation around the living areas of the people should be increased. For this reason, in the weighted overlay analysis, while the GDP per capita, the number of people per km², and the population growth rate are given in the same direction, the ratio of the forest area to the overall area and the total forest recreational areas criteria are given reverse values compared to the other criteria.

RESULTS
REZULTATI

Reclass Analysis and Results – *Ponovno klasificirana analiza i rezultati*

In order to evaluate forest recreational areas in Türkiye in terms of the determined criteria, the data of the provinces were rasterized (Figure 2).
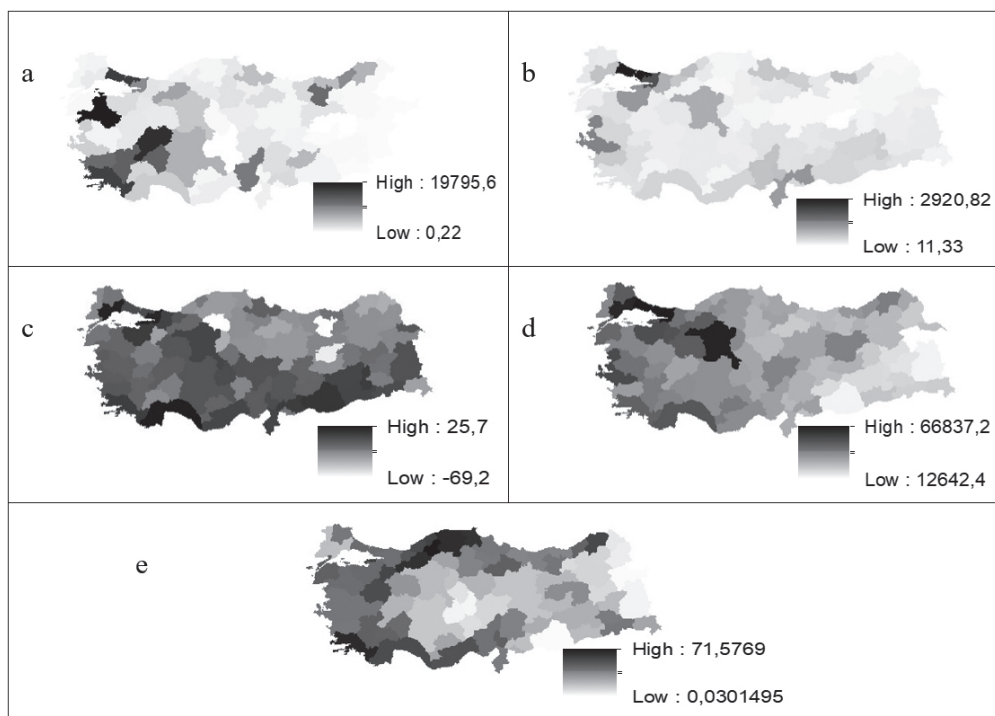

Figure 2. Raster of data at the provincial level (a. Total forest recreational areas (hectare) b. Average number of people per km2 between 2016 and 2020 (person); c. Average population growth rate between 2018 and 2020; d. GDP per capita (TL); e. Ratio of forest area to the overall area (hectare).
Slika 2. Rasteri podataka na razini pokrajine (a. Ukupna šumska rekreacijska područja (hektar); b. Prosječan broj ljudi po km2 između 2016. i 2020 (osoba).; c. Prosječna stopa rasta stanovništva između 2018. i 2020.; d. BDP po stanovniku (TL); e. Omjer šumske površine prema ukupnoj površini (hektar).

Figure 3. The result of the reclass analysis of the recreational areas in the forest at the provincial level in Türkiye
Slika 3. Rezultat analize ponovne klase rekreacijskih područja u šumi na razini pokrajine u Turskoj

Reclassify analysis was performed with the obtained rasters, which were divided into five categories. The natural breaks (Jenks) method was used as a classification method in reclass analysis. The criteria divided into five categories are: total recreational areas in the forest (Figure 3), the ratio of forest area to the overall area (Figure 4), the GDP per capita of the provinces (Figure 5), the population growth rate (Figure 6), and the number of people per km² (Figure 7).

The minimum value in the reclass analysis of the recreational areas in the forest at the provincial level in Türkiye is 0.22, the maximum value is 19,795.60, the mean is 1,883.54, and the standard deviation is 3,310.33. The distribution of recreational areas within the forest, which covers all of the provinces' A-, B-, C-, and D-type recreational areas and nature parks, shows a heterogeneous structure. It can be seen that the recreational areas in the forests are more intensely distributed in the central and western regions of Türkiye and quite sparse in the eastern regions (Figure 3).

The minimum value of the ratio of forest areas to the overall areas in Türkiye at the provincial level in the reclass analysis is 0.030, the maximum value is 71.57, the mean is 29.15, and the standard deviation is 18.68. Considering the ratio of the forest areas of the provinces to the overall areas, it

can be seen that the densest forest areas are in neighboring regions on the northern, western, and southern coasts of Türkiye (Figure 4).

In the reclass analysis of the per capita GDP value at the provincial level in Türkiye, the minimum value is 12,642.40, the maximum value is 66,837.20, the mean is 30,189.34, and the standard deviation is 10,294.79. The regions located along a line running from the northwest of Türkiye toward the interior and in the southwest part of Türkiye generally have high GDP per capita values. Besides, the GDPs of the provinces in the southeast of Türkiye are quite low. In general, it can be said that while the GDP per capita is high in port cities in the Marmara Region and Ankara province and in the Mediterranean and Aegean Regions, the provinces close to the border in the southeast have the lowest GDP per capita (Figure 5).

In the reclass analysis, the minimum value of the average population growth rate in Türkiye between 2018 and 2020 is -69.19, the maximum value is 25.70, the mean is 3.33, and the standard deviation is 13.63. It is seen that the population growth rate in the northern and northeastern parts of Türkiye is quite low compared to other provinces. On the other hand, it is seen that the population is increasing in
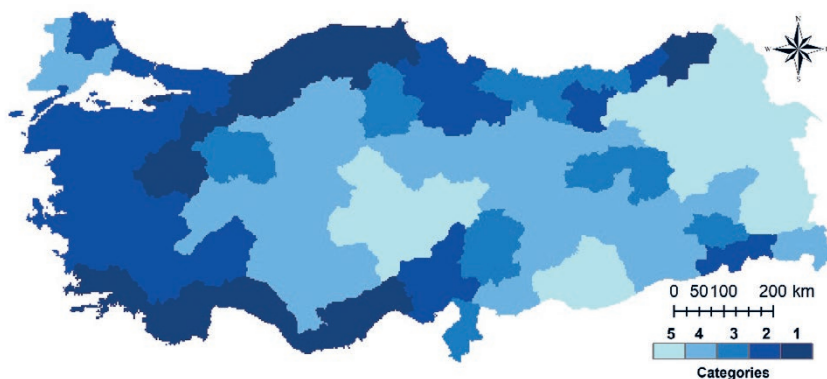

Figure 4. Reclass analysis of the ratio of forest areas to the overall areas in Türkiye at the provincial level
Slika 4. Analiza ponovne klasifikacije omjera šumskih površina i ukupnih površina u Turskoj na razini pokrajine
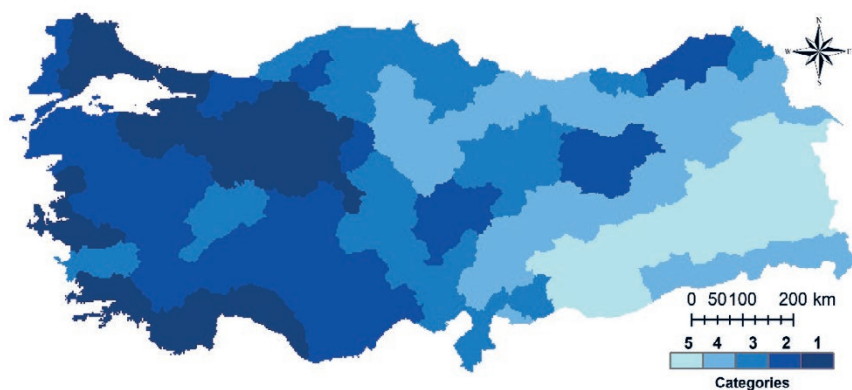
Figure 5. The result of the reclass analysis of the per capita GDP value at the provincial level in Türkiye
Slika 5. Rezultat analize ponovne klasifikacije vrijednosti BDP-a po glavi stanovnika na razini pokrajine u Turskoj

Figure 6. The result of the reclass analysis of the average population growth rate at the provincial level between 2018 and 2020 in Türkiye
Slika 6. Rezultat analize ponovne klasifikacije prosječne stope rasta stanovništva na razini pokrajine između 2018. i 2020. u Turskoj

the region between Türkiye's southern and southeastern provinces and Istanbul–Ankara (Figure 6).

The minimum value in the reclass analysis at the provincial level of the average number of people per km² in Türkiye between 2016 and 2020 is -11.33, the maximum value is 2,920.81, the mean is 106.11, and the standard deviation is 242.85. It can be seen that the number of people per km² is high in Istanbul and in Kocaeli, the province bordering Istanbul, in Izmir in the west, and in the southern provinces neighboring Syria. In addition, the number of people per km² in the central and northern parts of Türkiye is at its lowest level (Figure 7).

Weighted Overlay Analysis – *Ponderirana analiza preklapanja*

Weighted overlay analysis was carried out using the maps obtained via the reclass analysis. The total forest recreational areas included in the analysis, the average number of people

Figure 7. The result of the reclass analysis at the provincial level of the average number of people per km2 between 2016 and 2020 in Türkiye
Slika 7. Rezultat analize ponovne klasifikacije na razini pokrajine prosječnog broja ljudi po km2 između 2016. i 2020. u Turskoj

Figure 8. Weighted overlay analysis result
Slika 8. Rezultat analize ponderiranog sloja

per km² between 2016 and 2020, the average population growth rate between 2018 and 2020, the GDP per capita, and the ratio of forest area to the overall area have the same effect. It is accepted that the recreational areas criterion has an adverse effect compared to the other criteria. The criteria subjected to analysis were evaluated with five scores. The map obtained through the analysis is given in Figure 8.

When the map obtained through the weighted overlay analysis is examined (Figure 8), provinces in Türkiye are divided into three categories in terms of recreational areas and other economic and social criteria. Group 1 provinces are considered as first priority provinces where recreational areas in forests should be established. When the spatial distribution of the groups is examined, there are 20 provinces in the first group and these provinces amount to 24.69% of the provinces of Türkiye. The provinces in the first priority provinces category in the study are located in the south and southeast of Türkiye and along the line extending from the northwest to the interior provinces, as well as in the middle of Türkiye.

Group 2 provinces can be defined as provinces with second priority where recreational areas in forests should be established. It is seen that there are 54 provinces in the second group. In general, approximately 66.66% of Türkiye's provinces fall into this category.

Group 3 provinces can be defined as provinces that can be included in the planning after other provinces in terms of establishing/planning forest recreation areas. There are 7 provinces in the third group. Generally, these provinces are located in the north and northwest of Türkiye. The provinces in this group constitute approximately 8.64% of Türkiye.

DISCUSSION AND CONCLUSION
RASPRAVA I ZAKLJUČAK

In this study, a multi-criteria analysis is presented to bring a new approach to the process of regulation and planning of the forest–human relationship, defining the need of people for forest recreational services with the macro-scale criteria related to human communities. Building on studies of the positive contributions of the recreational service of

forests to human health in recent years (Kil et al., 2021; Norman et al., 2010; Stoltz et al., 2016), this study was carried out on the regulation and planning of the public use of forest recreational services in Türkiye.

As a result of the analysis carried out on the selected macro-scale criteria (GDP per capita values of the provinces, the number of people per km², the population growth rate, the ratio of forest area to the overall area, and the total recreational areas in forests) regarding the ecological, economic, and social situation of Türkiye, the planning of recreational areas in the forests of the provinces of Türkiye is divided into three categories in terms of their priority order. In the study, it has been determined that Türkiye has 20 provinces with first priority (Group 1), 54 provinces with second priority (Group 2) and 7 provinces with third priority (Group 3) in the planning and arrangement of recreational services in the forest. It was found out that the first priority provinces and third priority provinces are scattered throughout the country in clusters.

When the category of provinces that be prioritized in the planning process of recreational areas within the forest is examined; the first priority provinces (Group 1) are located in the south and southeast of Türkiye and along the line extending from the northwest to the interior, as well as in the middle of Türkiye. The change in the demographic structure of the provinces located in the south and southeast of the Group 1 is higher than the other provinces, which may be the reason for this result. Besides, these provinces are in the south and southeast of Türkiye, where asylum seekers and irregular migrants enter Türkiye for the first time and where they are mostly concentrated (Tunca & Karadağ, 2018; van Uden & Jongerden, 2021). In addition, it can be seen that the provinces in Group 1 and those located along the line extending from the northwest to the interior have a priority need for forest recreational areas. The provinces in this area are important centers of both immigration and industrialization (Gençer et al. 2023). The fact that the provinces with the higher GDP values at the provincial level are in the priority areas category is related to the immigration phenomenon Türkiye faces. It can be

concluded that people have migrated to provinces with high GDP values due to the job opportunities there (Özdemir & Doğan, 2022; Taştekin & Çağatay, 2022). Furthermore, the provinces in Group 1, located in the east, southeast and middle of Türkiye and in the first priority in forest recreational areas, are poor in terms of forest land (GDF, 2020a). The third priority provinces (Group 3) in terms of the planning recreational areas within the forest are, in general, the northern provinces of Türkiye where the forest area is high (GDF, 2020a) or the population is low.

Overall, a need has emerged to take into account the economic and social parameters related to human beings, as well as the characteristics of forest assets, in order to regulate the use of recreational services as part of the cultural and ecosystem services of Türkiye's forests. In this process, an alternative perspective has been presented for work to meet the social needs and to prevent the number of visitors going above the carrying capacity in the recreational areas. In this study, it can be seen that in the eastern provinces of Türkiye, where there is the least forest coverage, there are very few recreational areas in the forest. This result can be supported by the projects previously carried out in Türkiye (State Planning Organization [SPO] 2000), such as the "green belt project" realized around some provincial centers with low forest assets. Also, in Türkiye's development plans, it is stated that such projects should be supported in line with social forestry purposes (SPO,1989; SPO 2000).

The limitations of this study are related to the process of determining the criteria. When determining criteria, the criteria in relation to the current issues affecting the agenda of Türkiye were selected. Analyzes that took into account expert opinions in the selection of criteria could be used. In addition, the study can be carried out at the district level, depending on the availability of data regarding the determined criteria. The results obtained according to the economic, social, and ecological criteria used in the determination of priority recreation areas in the study reveal that considering a single phenomenon or event will be insufficient in planning, and that the most effective planning will be made by applying different scenarios and multi-criteria approaches. At the same time, in future studies, criteria can be diversified, and it is believed that the most appropriate planning can be made by using different analysis methods.

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SAŽETAK

Planiranje korištenja šuma iz dana u dan postaje sve važnije, ovisno o sklonosti ljudi prema koristima koje šuma pruža. Iz tog razloga, ova se studija usredotočila na planiranje rekreacijskih usluga, što je jedan od nedrvnih šumskih proizvoda i usluga koje se nude u šumama u Turskoj. Distribucija nacionalnih parkova, parkova prirode i rekreacijskih područja tipa A, B, C i D, koja pripadaju rekreacijskim područjima u šumama, analizirana je ponderiranom analizom preklapanja na pokrajinskoj razini u Turskoj. Korišteni su kriteriji kojima se može izraziti raspored stanovništva u zemlji te šumska dobra i postojeća rekreacijska područja (bruto domaći proizvod (BDP) po stanovniku, broj ljudi po km², stopa rasta stanovništva, omjer šumske površine prema ukupnoj površini i ukupne šumske rekreacijske površine). Kriterijski podaci pokrajina su rasterizirani i izvršena je reklasifikacijska analiza s dobivenim rasterom, koji je podijeljen u pet kategorija. Analiza ponderiranog preklapanja provedena je korištenjem mapa ponovne klase. Kao rezultat analize u smislu planiranja rekreacijskih područja, pokrajine su podijeljene u tri prioritetne kategorije. Provincije uključene u prvu kategoriju pokrajina prioriteta u studiji nalaze se na jugu, istoku i jugoistoku Turske (gdje tražitelji azila i neregularni migranti ulaze u Tursku) i smještene su duž linije koja se proteže od sjeverozapada prema unutrašnjosti (važna središta unutarnje imigracije i industrijalizacije) te u središtu Turske (loše u pogledu šumskih dobara). U ovoj studiji je naglašeno da se rekreacijska područja provincija planiraju ovisno o promjeni provincijalnog stanovništva s unutarnjim i vanjskim migracijama i gospodarstvom. Osim toga, planerima je predstavljen drugačiji pristup, procjenjujući šume i promjenjive karakteristike društvene strukture zajedno, kako bi se upravljalo korištenjem šumskih rekreacijskih usluga prema potrebama stanovništva.

KLJUČNE RIJEČI: društveni i ekonomski kriteriji, usluge šuma, višekriterijski pristup