






Original Article


Effects of stand types on recreational preferences of society in the Sub-Alpine Zone, northern Turkey

Tuğrul VAROL¹  <https://orcid.org/0000-0002-0499-2129>; e-mail: tvarol@bartin.edu.tr

Halil Barış ÖZEL¹  <https://orcid.org/0000-0001-9518-3281>; e-mail: halil@bartin.edu.tr

Ferhat KARA^{2*}  <https://orcid.org/0000-0001-7107-3176>;  e-mail: fkara@kastamonu.edu.tr

İlkim ÇAVUŞ KARA³  <https://orcid.org/0000-0002-3764-7938>; e-mail: ilkim_cavus@hotmail.com

Sezgin AYAN²  <https://orcid.org/0000-0001-8077-0512>; e-mail: sezginayan@kastamonu.edu.tr

*Corresponding author

¹ Bartın University, Faculty of Forestry, Department of Forest Engineering, Bartın 74100, Turkey

² Kastamonu University, Faculty of Forestry, Department of Forest Engineering, Kastamonu 37150, Turkey

³ Kastamonu-Ilgaz Mountain National Park Directorate, Kastamonu 37100, Turkey

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Abstract: The main objective of this study was to examine how different stand types influenced the tendency of visitors for varying recreational activities (i.e., hiking, trekking, camping and hunting) from 1993 to 2018 in the surrounding areas of Uluyayla Natural Recreation Site in Bartın, northern Turkey. A total of 627 visitors were selected on a voluntary basis, and questioned in the form of questionnaire. Most of the participants were in the age of 21-40 years old, and they were mostly (62.4%) male. Most of the participants (82.7%) lived in cities, while 62.8% of them were tourists when visiting the site. In determining the preferences of the visitors regarding the stand types for different recreational activities, several images of each stand were shared with them, and they were asked which stand type they would prefer for a given recreation activity (i.e., hiking, tracking, camping and hunting). A range of options from 1 to 5 in Likert's scale was used in evaluating the given responses. The degree of positive and negative effects was examined via trend analysis. It was found

that stand type had influence on the preferences of visitors regarding the recreational activities. In general, unmanaged and moderately treated stands were more preferred by visitors for the recreational purposes, compared to the previously managed stands. On the other hand, visitors' preference for the activities were different during two periods (i.e., 1993-2005 and 2006-2018). For each recreational activity, there was an increasing trend from 1993 to 2018. There had been a continuous increase for hunting since 1996, and for trekking and camping after 1999. The increases between 1993-1996 and 1996-1999 were likely due to the increasing awareness of the society as a result of the training and consciousness raising activities for nature conservation. The demand on the recreational activities continuously increased in unmanaged and moderately treated stands, while no significant changes were examined in the previously managed stands. The study points out that forest planning and management should consider different needs of visitors for recreational infrastructure.

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1 Introduction

As societies urbanize, the global urban population continues to grow (Cavus et al. 2019). Outdoor recreational activities seem to be a low-cost way to improve societies' health (Gundersen and Vistad 2016; Sinclair et al. 2020). In contemporary forest management approaches, forests are not considered as mere sources for timber harvesting, rather, these approaches aim to benefit from collective ecosystem services in order for protecting the community health and wealth (Aktürk et al. 2020). The importance of these services is becoming more widely recognized, particularly in relation to protected sites such as national parks (Cullinane and Koontz 2019; Spenceley et al. 2021). The quality of forests close to densely populated areas is of great importance to urban dwellers for daily recreations (Zhang et al. 2019). In this regard, planning and managing the forest resources in a way that could enable the utilization for multiple services has gained recognition (Thorn et al. 2020). For the continuity of multiple ecosystem services, timing, space and intensity of silvicultural disturbances could be adjusted through maintenance and regeneration of stands, due to the relationships between stand structure and ecosystem services (Sacher et al. 2022).

Recreation activity is one of the most preferred services of forest ecosystems by public (Wilkes–Allemann et al. 2017; Ebenberger and Arnberger 2019). These activities vary greatly in terms of aims and their benefits to public. Among these activities, hunting, hiking, rafting, trekking, camping, bird watching and recognizing nature have been quite common in the last decades (Casola et al. 2022). Whether landscape beauty and recreational events are influenced by current and previous silvicultural treatments has been a matter of debate, because these treatments may result in major changes in forest structure (Ribe 2009; Vítková et al. 2018). While some studies pointed out the negative effects of silvicultural treatments on the recreational quality of stands (Manning et al. 1999; Kara and Lhotka 2020), other researches stated that recreational activities would be compatible with the silvicultural treatments (Borrass et al. 2017; Rathmann et al. 2020). The inconsistency among previous studies highlights the remaining uncertainty in our knowledge of forest type-people preference for varying recreational activities.

The visual effects of silvicultural treatments may vary among themselves (Paletto et al. 2017). Intensive silvicultural disturbances such as clearcutting can impact the recreation activities, and cause the existing opportunities for recreation services to vanish by influencing stand structure, biological integrity and biodiversity (Seibold et al. 2019). Compared to clearcutting method, the visual effects following shelter-wood and selection methods are usually considered more favorable for recreational purposes (Lazdane et al. 2013). Moreover, the visual effects of trees left individually or in groups on silviculturally treated sites would be different (Arnberger et al. 2022). People who are interested in recreational activities in forested areas would usually prefer mature stands due to their aesthetic concerns (Galliano and Loeffler 2000; Zhou et al. 2019). Moreover, stands with greater amount of dead trees can also increase recreational values of forests, and highly preferred by public (Topaçoğlu et al. 2017; Kara and Lhotka 2020; Sacher et al. 2022). The understanding of the linkage between silvicultural prescriptions and recreation demands of society would help forest managers to develop better and more comprehensive management strategies which aim to enhance recreational values of stands while producing timber (Maier and Winkel 2017; Tudoran et al. 2022).

The linkages between stand structures and recreational demands gain a greater importance in the subalpine zones where extreme growth conditions prevail (Dudek 2017). The silvicultural applications carried out in the primary and secondary forests in subalpine zones aiming to protect their original structures and hosting a vast biodiversity have a direct and indirect impact on the quality and diversity of recreation activities (Shelby et al. 2005; Iqbal 2019). However, the knowledge of how people's recreational preference varies depending on stand structure following silvicultural disturbances, especially in recreational parks and city forests, is limited. This may result in difficulties in determining appropriate management strategies and organizational objectives in forests where recreational services are also present. Previous research commonly observed the people's preferences of recreation mostly in urban forests and parks, however, their preferences in high mountain forests such as Sub-Alpine Zone forests are not adequately studied and documented. Moreover, the knowledge about communities'

preferences in different forest types for varying recreation activities is limited. In this regard, the main objective of this study was to examine the effects of stand structure formed through previous silvicultural treatments on people's preference over varying recreational activities including hiking, trekking, camping and hunting in Uluyayla Natural Site, Bartın Province, northern Turkey. It was hypothesized that preference of visitors over the recreational activities would differ depending on stand type, and that more natural stands would be primarily preferred. Findings of this study would create a basis for future work that will aim to enhance and maintain recreational values of forests while producing timber.

2 Materials and Methods

2.1 Study Area

This study was conducted in Uluyayla Natural Recreation Site, located on the 63 km north of Karabük and to the east of Bartın. The site has an area of approximately 60 ha, and is reached from Abdipaşa on the 20th km of Bartın-Karabük highway, and from Ovacuma on the 25th km of the same highway (Fig. 1). Uluyayla Recreation Site is located in the Western Black Sea Sub-Euxin Forest Belt in terms of phytosociology (Mayer and Aksoy 1986).

The natural vegetation of Uluyayla Natural Recreation Site has been mainly protected for about 20 years. The study was conducted in the stands of the core area at 1480 m and higher parts that form the high sections of Kure Mountain National Park. The stands mainly lie in the high mountain zone. The dominant tree species within the study region is Oriental beech (*Fagus orientalis* Lipsky.), and some other species including several oak species (*Quercus* spp.), hornbeam (*Carpinus* spp.), mountain alder (*Alnus* spp.), black pine (*Pinus nigra* Arnold), Scots pine (*Pinus sylvestris* L.), fir (*Abies* spp.), elm (*Ulmus* spp.), lime (*Tilia* spp.), and yew tree (*Taxus baccata* L.) are also present. Black Sea climate with cool spring and hot summer is observed in the study region. Autumn is partly warm while winter is mainly cold. The coldest month is January with an average of 1°C, while the average warmest month is July (19°C). The average annual precipitation of the study area is 629 mm. Within the study site, which is located on a mainly rugged terrain of the Western Black Sea, lakes with varying sizes, high diversity of plants and wildlife, trouts in the lakes, routes for hiking and trekking, and picnicking areas make the site a valuable spot for recreational purposes. The geological structure of the area is mainly formed by serpentine and volcanic rocks. The lakes in the region are mostly landslide dams which are formed by the natural damming caused by mass movements placing sets in front of the valleys as a result of earth movements (URL1 2019).

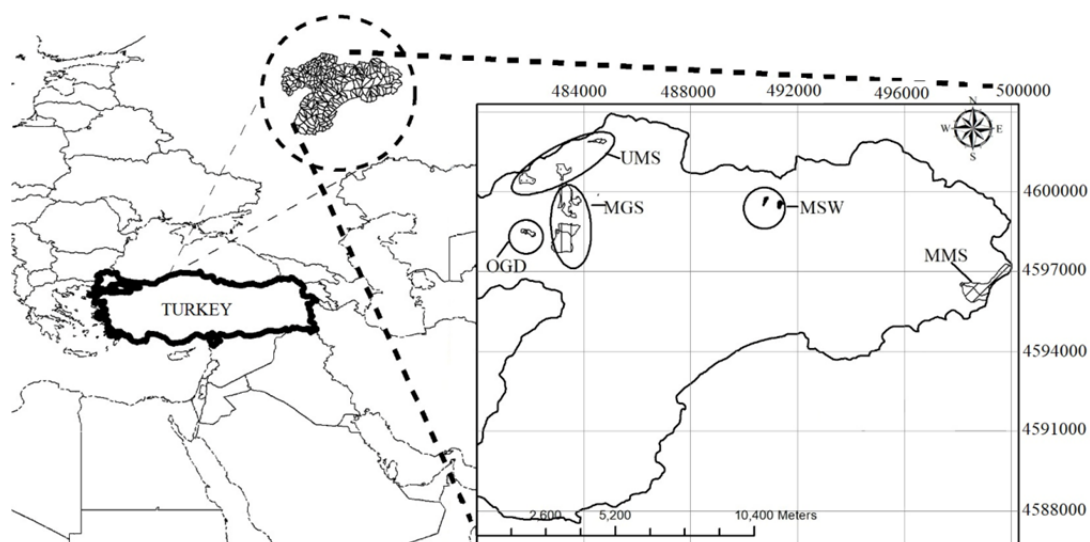


Fig. 1 Uluyayla Natural Recreation Site. UMS, Unmanaged Mature Stand; MMS, Managed Mature Stand; MGS, Managed Stand by Group Selection; OGD, Old-Growth Forest with Deadwoods; MSW, Managed Stand by Shelterwood Method.

2.2 Methods

As stated above, the effects of different stand types formed through previous silvicultural treatments on the preference of different recreation activities were observed in this study. Within this scope, five different stands, and four different recreation activities (i.e., hiking, trekking, camping and hunting) were selected (Table 1). It should be noted that the study area was declared as a national park in early 2000s, thus, no silvicultural interventions have been allowed for the purpose of maintenance and regeneration for about 20 years with the legislation. The differences of stands in regards to stand structure were mainly due to previous silvicultural treatments, long term conservation, stand ages, tree species diversity and species mixtures etc.. Table 1 shows the selected stand types as well as their descriptions. Study stands were included in the core area residing in high mountain zone of the national park.

The data from 1993 to 2018 were utilized for the study. Data collection was conducted through questionnaires conducted with the visitors. In total, 627 visitors were included in questionnaires. Participants of the questionnaires were selected on a

voluntary basis. Table 2 presents descriptive information about the participants of the questionnaires. Most visitors (48.3%) were within the age of 21-40 years old, and 62.4% of them were male. They commonly visited the park with companion (94.3%) (Table 2). Main education status of the visitors was primary school. Participants mostly work in private sector. Most of the participants (82.7%) live in cities, while 62.8% of them were tourists. Most of the participants (81.7%) had visited the park more than once (Table 2). In determining the preferences of the visitors regarding the stand types for different recreational activities, several images of each stand were shared with them, and they were asked which stand type they would prefer for a given recreation activity (i.e., hiking, tracking, camping and hunting). A range of options from 1 to 5 in Likert's scale was used in evaluating the responses given. Here "1" is of the lowest value as "less preferred" while 5 is the highest as "highly preferred".

It should be noted that the collected data were analyzed for two time-periods; one between 1993-2005 and the other between 2006-2018. The first reason of grouping the data into two periods was due to the sources of data collection. Data before 2005 were sporadically recorded by the officials of the

Table 1 Stands description of Uluyayla Natural Recreation Site in sub-alpine zone

Stand	Description
Unmanaged Mature Stand (UMS)	The stand has been unmanaged for decades, even before the site was declared as national park, and protected by local villagers for their own benefits. Oriental beech was dominantly seen and there existed mixtures of oak, hornbeam, alder, black pine, Scots pine, fir, elm, lime and yew trees ranging from 180 to 270 in ages. Multiple canopy layers existed due to existence of shade-tolerant tree species within the stand.
Managed Mature Stand (MMS)	The stand was single-layered and presented an even-aged structure with trees ranging from 130 to 200 years old. Before the site was declared as national park, focus for cuttings was mainly on damaged, decayed and broken trees occurred mostly due to bugs and fungus. Main aim of the cuttings was to enhance the stand quality. Oriental beech and Scotch pine were dominantly seen, and they were partly mixed with sessile oak (<i>Quercus petraea</i>).
Managed Stand by Group Selection (MGS)	Before the site was declared as national park, the stand was managed using group selection method. The stand presented an uneven-aged structure. Fir was the dominant species with breast height diameter (dbh) ranging between 60-85 cm, while beech partly joined the mixture, mostly in mid-story. In average, 40 individuals per ha existed in large diameter classes (i.e., >50 cm in dbh). Cuttings were mostly focused on firs, whose target diameters were reached, especially in circular groups of approximately 30-40 m in diameter.
Old-Growth Forest with Deadwoods (OGD)	The stand has been unmanaged for prolonged time period, and presented an even-aged old-growth conditions. Oriental beech was dominantly seen, and fir, Scots pine and other species were also observed. Tree ages in overstory ranged from 280 to 330, which is considered as biological age limit for the species. In average, eighteen standing and lying deadwoods existed per ha. Litter accumulation was intense across the stand.
Managed Stand by Shelterwood Method (MSW)	Before the site was declared as national park, the stand was managed using uniform shelterwood method. The natural stand was even-aged where beech was dominantly seen, and mixed with oak. Tree ages ranged from 50 to 80. Within the stand, about 80 individuals per ha were in their stem exclusion age, thus, the stand was subject to intermediate thinning. With the use of the method, advanced oriental beech seedlings and saplings existed in the understory of the stand.

Table 2 Descriptive information about the participants of the questionnaires

Attributes	Period	Percentage of each categorization
Age	1993-2005	1-20 yr (14.8%), 21-40 yr (45.9%), 41-60 yr (33.5%), 61-80 yr (5.8%)
	2006-2018	1-20 yr (10.6%), 21-40 yr (50.7%), 41-60 yr (31.3%), 61-80 yr (7.4%)
Gender	1993-2005	Male (61.8%), Female (38.2%)
	2006-2018	Male (63%), Female (37%)
Companion	1993-2005	Alone (6.8%), 2 persons (33.1%), 3 persons (33.1%), 4+persons (27%)
	2006-2018	Alone (4.6%), 2 persons (37.3%), 3 persons (36.9%), 4+persons (21.2%)
Education	1993-2005	Primary school (68.2%), high school (21.1%), university (10.7%)
	2006-2018	Primary school (71%), high school (19.5%), university (9.5%)
Occupation	1993-2005	Private sector (71.8%), government official (28.2%)
	2006-2018	Private sector (73%), government official (27%)
Income	1993-2005	Minimum wage (34%), fixed monthly (32%), variable income (34%)
	2006-2018	Minimum wage (36%), fixed monthly (33%), variable income (31%)
Dwelling Place	1993-2005	City (84.6%), Village (15.4%)
	2006-2018	City (80.8%), Village (19.2%)
Residential Status	1993-2005	Local (40.3%), tourist (59.7%)
	2006-2018	Local (34.1%), tourist (65.9%)
Visit time	1993-2005	First time (15.8%), second time (40.1%), third and more (44.1%)
	2006-2018	First time (20.8%), second time (37.7%), third and more (41.5%)

Table 3 Effects of stand types on visitors' preference for the recreation activities (Mean±SE).

Activity	Stand types					ANOVA	
	UMS	MMS	MGS	OGD	MSW	F	P
Hiking	46.88±7.08 ^a	47.42±7.59 ^a	4.11±1.20 ^b	16.50±3.19 ^b	6.31±1.37 ^b	18.94	0.000
Trekking	80.23±11.69 ^a	77.81±10.95 ^a	12.38±2.19 ^b	55.42±7.98 ^a	9.35±1.94 ^b	18.02	0.000
Camping	102.50±14.23 ^a	93.81±14.03 ^a	9.88±1.81 ^b	69.35±11.62 ^a	14.00±1.94 ^b	17.65	0.000
Hunting	229.50±26.55 ^a	189.50±24.94 ^{ab}	12.96±1.86 ^c	133.30±22.98 ^b	19.27±4.79 ^c	25.61	0.000

Notes: UMS, Unmanaged Mature Stand; MMS, Managed Mature Stand; MGS, Managed Stand by Group Selection; OGD, Old-Growth Forest with Deadwoods; MSW, Managed Stand by Shelterwood Method.

^{a,b,c}: Duncan multiple range test; SE: Standard error

national park for their own records, while the data after 2005 were annually collected within the context of this research for research purposes. Secondly, due to the increasing interest of public in recreational activities after early 2000s across the country, we decided to separate the data into two periods. From 2018 to 2021, no data was included due to covid-19 pandemic conditions. The numbers of participants were similar for two time periods. The questionnaire did not undergo any changes in its construction from first to second period. Due to broad time span of the sampling periods (12 years for each period), sampling was considered to be representative.

2.3 Statistical analysis

The two periods (i.e., 1993-2005 and 2006-2018) were compared in regards to the effect of different stand types on visitors' preference for recreational activities. After ensuring the normal distribution of the data on recreational preferences, the comparisons were tested through the variance analysis. The similarity of the effects was evaluated with the

Duncan test. In addition, the degree of positive and negative effects was examined via trend analysis. Moreover, between 1993 and 2018, linear regression models where time was treated as an independent variable and visitors' evaluations as dependent variable were developed. While five different stand types were taken into consideration in this study, the physiographic factors such as slope and aspect that could make difference for the visitors in terms of visual quality and activities were not included. Statistical analyses were conducted using R statistical software (R Development Core Team 2021).

3 Results

Table 3 represents statistical relationships between stand type and visitors' preferences for different recreational activities, while Table 4 compares data for two time periods. Different stand types for different recreational activities (i.e., hiking, tracking, camping and hunting) bear various results. The effect of Unmanaged Mature Stand (UMS) and

Table 4 Effects of different periods on recreation activities (Mean±SE).

Activity	Periods		ANOVA	
	1993-2005	2006-2018	F	P
Hiking	12.26±2.02 ^b	36.26±4.67 ^a	22.24	0.000
Trekking	23.78±2.99 ^b	70.29±7.42 ^a	33.74	0.000
Camping	35.52±5.35 ^b	80.45±9.36 ^a	17.35	0.000
Hunting	61.02±8.98 ^b	173.00±18.85 ^a	28.77	0.000

^{a,b}: Duncan multiple range test; SE: Standard error.

Managed Mature Stand (MMS) on each of four activities was similar, while Managed Stand by Group Selection (MGS) and Managed Stand by Shelterwood Method (MSW) had similar effects on hiking, tracking and camping. There were statistically significant relationships between stand type and visitors' preferences for the recreational activities ($p < 0.05$) (Table 3). In general, visitors mainly preferred unmanaged stands (i.e., UMS and Old-Growth Forest with Deadwoods (OGD)) or moderately treated stand (i.e., MMS) for trekking and camping, while mature stands (i.e., UMS and MMS) were primarily selected for hiking and hunting by the visitors (Table 3). The previously managed stands (i.e., MGS and MSW) were less preferred for the given activities during the study period.

In Table 4, the comparisons of the recreation

activities classified according to stand types in two different periods were given. Visitors' preferences over the selected recreational activities were statistically different between the two time periods (i.e., 1993-2005 and 2006-2018) ($p < 0.05$) (Table 3).

Given the trend analyses, there has been an overall increasing trend in each of four activities from 1993 to 2018 in the direction and degree of the relationship between the recreational activities and stand types (Fig. 2). In Fig. 2, the time where $u(t)$ and $u'(t)$ approaches each other refers to starting point of the change. Negative $u(t)$ means a decreasing trend while positive ones refer to an increasing trend. Therefore, the increase of trend started after 1996 for hiking and hunting, and after 1999 for trekking and camping (Fig. 2). The increase between 1993-1996 and 1996-1999 are likely due to the increasing awareness of the society as a result of the trainings and consciousness raising activities for nature conservation held by the central and provincial organizations of the Ministry of Forestry.

The increase in all the activities mainly shows that the people have been more interested in, and set time for such activities through time. Along with the extension of the protection zone within the national park, the exclusion of silvicultural treatments in the



Fig. 2 Visitors' preferences for recreation activities, (a) Hiking, (b) Camping, (c) Trekking and (d) Hunting in the period of 1993-2018.

area and the entrance fee corrections seemed to be effective for the increasing number of visitors (especially on camping areas) through the years. The greatest increase was seen in hunting in UMS, MMS, MGS and OGD stands. The continuous increase in trends of UMS and MMS stands for 25 years shows that people primarily prefer more natural stands for all the activities.

There was no or little change in 25 years in stands where relatively more intensive silvicultural disturbances were previously applied (i.e., MGS and MSW stands) (Fig. 3). The increase in all stands for hunting brings to mind that the community is not selective for this activity, rather, it is dependent on their habits. UMS had the highest point, and a continuously increasing trend (slope: 3.32, r^2 : 49%) for hiking while relatively lower points were examined for MGS and MSW (slope: -0.02 and -0.19, respectively, r^2 : 4%) across the study period (Fig. 3). The highest points and increasing trends for tracking were obtained from UMS and MMS stands (slope: 6.66 and 6.79, and r^2 : 73% and 87%, respectively), while MGS stand had the lowest one. While there was seen no significant change in MGS stand (slope: -0.01, r^2 : 0%) in 25 years, there was a decrease in the trend of MSW stand (slope: -0.5, r^2 : 15%) (Fig. 3). As for camping, UMS stand obtained the highest point, and

MGS and MSW stands had the lowest points. There was no change in MGS and MSW (slope: -0.02, r^2 : 0%) stands over study period, whereas and increases in UMS (slope: 7.73, r^2 : 66%), MMS (slope: 6.69, r^2 : 56%) and OGD (slope: 4.68, r^2 : 36%) stands (Fig. 3). Similar findings were observed for hunting: UMS (slope: 16.94, r^2 : 92%) and MMS (slope: 15.82, r^2 : 90%) stands again had the highest points and MGS was of the lowest (slope: -0.21, r^2 : 3%).

4 Discussion

Recently, in many places around the world, a portion of the total economic value of forests is usually associated with the use of forested lands for recreational purposes (Dudek 2017; Sinclair et al. 2020). Such kind of empirical research studies presenting the validity of landscape values of forests offer various informative results important from the point of administrative view (Shelby et al. 2005; van den Bosch and Sang 2017; Spenceley et al. 2021). At the same time, the findings belonging to such landscape characteristics are mostly intuitional. As can be seen from the results of this study, visitors mainly preferred unmanaged stands (i.e., UMS and OGD) or moderately treated stand (i.e., MMS) for the

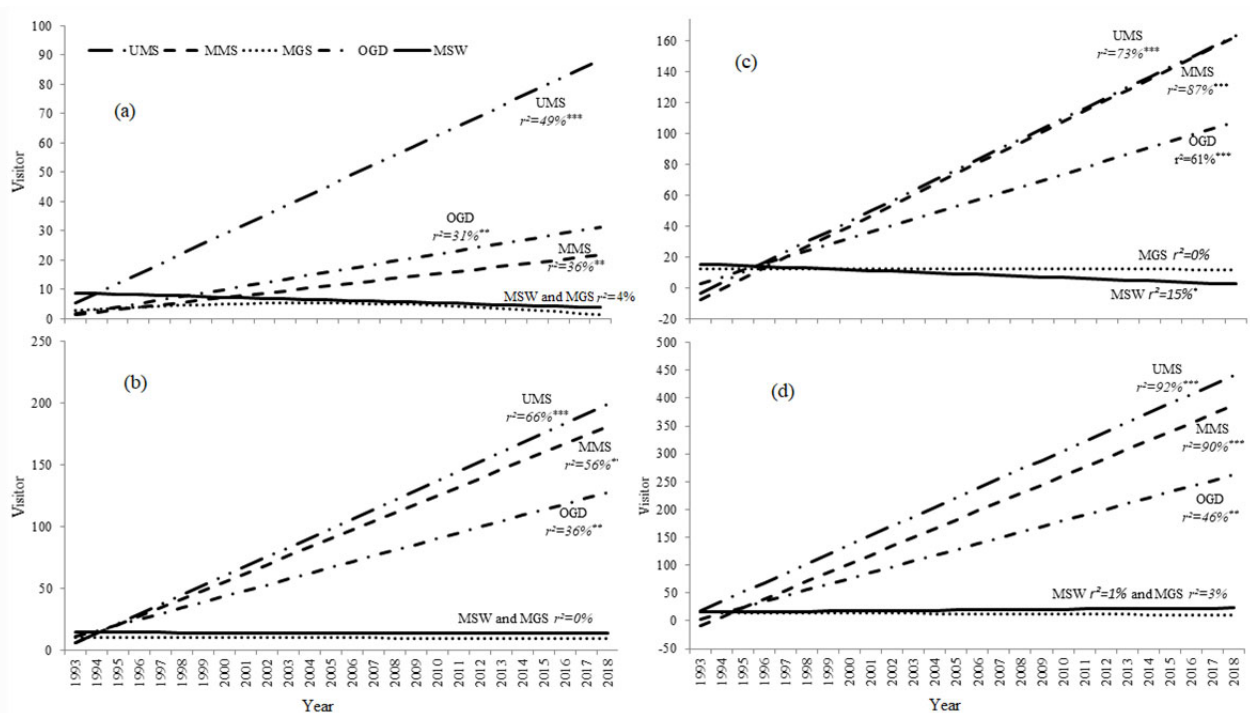


Fig. 3 Effects of stand types on the relationship between time and different recreation activities. (a) Hiking, (b) Camping, (c) Trekking and (d) Hunting.

recreational activities, in comparison to the previously managed stands (i.e., MGS and MSW). Similar results are described in previous research that found more natural areas are highly appreciated by people (Gundersen and Vistad 2016; Tudoran et al. 2022). People mostly believe that old trees, species composition, multi-layer canopy tiers, straightforward forest paths, and fewer signs following forestry operations should all contribute to the forest's natural appearance (Gundersen and Frivold 2008; Wang et al. 2022). In general, less canopy gaps are present in unmanaged forests compared to managed forests. Partial canopy in managed forests may result in denser brushy understory vegetation which create the feelings of insecurity for visitors and limit the visual access to distant areas, and consequently may result in less preferences for recreation (Skår 2010; Paletto and De Meo 2021).

While the basic perceptual admirations are expected to differ for four recreational activities in scientific aspect, the UMS and MMS stands preferred reveal how important the intuitional results of landscape characteristics are, and how necessary it is to give the administrators simpler and more enlightening information about the aesthetic values of the stands. Previous studies that evaluate landscape aesthetics, show that the decisions are made under the affective and cognitive effects, and people consider the environment according to how they feel and believe (Brunson and Reiter 1996; Fang et al. 2021). Although natural sites are more appreciated by society as a mental image, studies point out that many people who prefer natural sites may never visit such areas (Hallikainen 2000). This shows that knowing the existence of this area is also important for people, even if they do not visit them. Our findings regarding visitors' preferences of forest type for recreational activities coincide with recent research. In a similar study, Sacher et al. (2022) examined the forest structural diversity and recreational site preferences, and found that people desire structural variation in forest recreation areas. It should be noted that unmanaged and moderately treated stands exhibit a greater structural diversity (Kara and Lhotka 2020).

Cultural traditions can also influence people's preferences in forested lands. In general, visitors from urban areas are inspired by nature conservation, while forested lands for visitors from rural areas are mostly considered as source of timber or other

resources (Aasetre et al. 2016). It should be noted that most participants of the current study (83%) was from urban cities. Thus, their choice may have mostly been over more natural forests due to their conception about forested areas. Images with obvious human impact are mostly disliked in such studies. In previous studies examined the management effects on visitors' preferences in urban forests found that negative perceptions were held of forestry work signs including stumps and piles of cut trees (Heyman 2012; Tessa Hegetschweiler et al. 2020). They further concluded that a key factor in the participants' preferences was "natural" versus "human-made". Moreover, tree sizes in forested lands can also influence people's preferences (De Meo et al. 2020). A common characteristic was that as tree size increased, people's preferences for a forest stand did as well (Gundersen and Frivold 2008; Wang et al. 2022). In consistent with previous research, unmanaged and moderately treated stands consisted of a greater number of large trees in the current study, which likely affected visitors' preference.

Species composition in forests may play a key role in societies' preferences for recreation. Gundersen and Frivold (2008) pointed out that people's preferences for species compositions are associated with other factors such as visibility and stratification. When other factors are similar, in general, mixed forests are more preferred than pure forests (Frick et al. 2018). In the current study, unmanaged and moderately treated stands usually exhibited a richer tree species composition with more than three species, while previously managed stands consisted of two species. Thus, species composition likely influenced people's preferences for recreation. Moreover, deciduous-coniferous mixtures, which were present in UMS and MMS and OGD stands, are even highly preferred by people (Ebenberger and Arnberger 2019; De Meo et al. 2020).

It should be noted that similar findings among stand types may be attributed to the gender of the participants because the majority of the participants were males. Previous researchers stated that females are usually concerned two times more than males regarding the environment (Yılmaz et al. 2004; Schultz et al. 2005; Zhang et al. 2019). Therefore, the increase in female visitors over the years may refer to a demand for an environmentally-friendly mentality of management. The previously managed stands (i.e., MGS and MSW) were less preferred; this is likely due

to the mechanical degradation in the natural environment following the silvicultural treatments. Such silvicultural interventions in order for forest ecosystem to be sustainable may be restrictive on recreation experiences (Gobster and Westphal 2004; Vítková et al. 2018). On the other hand, Buckley (2000) pointed out that it may be possible to reduce the burden on protected forest areas of high natural quality by introducing tourism into managed woodlands exploited for timber. Increasing population through tourism in managed forests can reduce the pressure on natural sites, as well as restraint the exploitation in managed forests.

In a study by Gundersen et al. (2017), it was found that people preferred mostly the photos on which some digital changes were made rather than natural landscape photos. This preference shows that people would prioritize aesthetics more than ecology (Parsons and Daniel 2002; Spenceley et al. 2021). Hence, deadwoods in stands should be considered in this regard. The number of deadwoods which may have positive or negative effects for perceiving the aesthetics of the area either increase the complexity of the stand, or forms areas too difficult to perceive (Karjalainen 2006; Edwards et al. 2012; Gundersen et al. 2017). Moreover, the deadwood both enables them to perceive the harmony between the deadwood and living trees with the mature stands during degradation, and offers a natural environment where they can run away from a stressful life (Rathmann et al. 2020). Relevantly, Sacher et al. (2022) stated that deadwoods in forests does not conflict with the recreational value of forests, which is consistent with our findings. Along with these factors, the active role of accessibility on the people's preferences (Schirpke et al. 2021) and the negative effect of the intensive deadwood in the area on the visitors about security account for that OGD stands was preferred after UMS and MMS stands in the order of preference.

It was examined in our study what kind of stands the national park visitors would prefer for different activities. More fruitful results can be achieved not only by the texts telling about the social and economic benefits of forest areas but also the integration of this information with the photos depicting the forest ecology (Arnberger et al. 2021). Although visitors mainly preferred certain stands for certain recreational activities through images shown, we do not know whether they will actually visit and use these sites for those certain recreations. One of the

most important reasons of this is that people think ecological integrity, though not accurately perceived, shows parallelism with aesthetic expectations (Gobster and Westphal 2004; Gundersen et al. 2017). It was emphasized by many researchers how important the environment is perceived by the society in understanding ecology (Carlson 2001; Daniel 2001; Aasetre et al. 2016).

5 Conclusion

Outdoor recreation relies heavily on forests and wildlands. Understanding people's environmental preferences is necessary for managing high-quality forest environments for recreation. The findings of preference studies can be used to plan for social values in multiple-use forest management, in conjunction with other goals such as timber production and biodiversity protection. A national public health strategy is currently in place in Turkey, which includes encouraging physical activities and creating marked paths, simple signs of forest management, and informational materials everywhere across the country. Special attention is paid to infrastructure such as roads, tracks, and bikeways/walkways in nearby green spaces. The new facilities in recreation sites should well adapt to the local natural environment. However, it should be keep in mind that more and better facilities may result in more visitors, and consequently more threat for naturalness of the ecosystem. Based on the data, this study explores the differences between the visitors' preferences for different recreation activities. The analysis reveals that a management solution should take into account the fact that visitors' preferences vary greatly between forests for recreation activities. One of the problems in determining what kind of stand is preferred by the society is the difficulties with isolating people's experiences and expectations in the studies. Moreover, single-minded management strategies (such as protecting biodiversity to increase its recreational value) bring along the risk of ignoring other benefits of forests. Therefore, it is quite important to plan and manage forests by featuring their collective services to the public (i.e., recreation and nature conservation) in terms of providing sustainability for forests. In this regard, it is necessary to implement social projects that involve all shareholders and serve to positive consciousness with

the aim of protecting forests and other natural sources. Certain pictures might influence visitors' immediate perceptions, because pictures taken during different times of the year may display varying views. Therefore, more images taken at different seasons in each forest type should be taken into account in future studies aiming to observe the relationships between forest type and recreation preferences. Moreover, here we focused on visual assessments of visitors, yet new studies have pointed out that sounds and smells

in forests would affect people preferences for recreation, and should be combined in future studies.

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