



Original paper

## Interpretation and visitor management in national parks: Evidence from Fruška Gora

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### ABSTRACT

This study examines how visitors perceive interpretive panels and how these perceptions can inform adaptive visitor management strategies in Fruška Gora National Park, Serbia. Positioned within contemporary management trends that emphasize data-driven decision-making, visitor segmentation, and experience-centered governance, the research explores how socio-demographic characteristics influence perceptions of interpretive panels across three dimensions: Design, Engagement, and Meaning. Data were collected through an online survey (N = 385) and analyzed using independent t-tests and one-way ANOVA to identify differences among visitor groups. The findings reveal that age, education level, socio-economic status, and visit frequency significantly influence perceptions of interpretive panels, whereas gender and type of residence do not. Higher-educated and higher-income respondents demonstrated stronger engagement with interpretive content, while first-time visitors expressed more positive evaluations than repeat visitors, suggesting a novelty effect. These results highlight the managerial importance of differentiated interpretation strategies aligned with sustainable visitor management, stakeholder responsiveness, and inclusive communication. By integrating socio-demographic insights into interpretive planning, national parks can enhance visitor satisfaction, improve interpretive effectiveness, and support conservation goals.

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### INTRODUCTION

Protected areas play a crucial role in biodiversity conservation, recreation, and environmental education, but their long-term sustainability increasingly depends on understanding how visitors perceive, interpret, and respond to these landscapes. In national parks in particular, where conservation goals must be balanced with visitor use and experience, interpretation has become an important management tool for enhancing environmental understanding, supporting responsible behavior, and improving the quality of the visitor experience. As protected area management increasingly adopts data-

driven, visitor-centered, and adaptive approaches, greater attention is being paid to how different visitor groups engage with interpretive content and how such engagement can inform more responsive management strategies.

Visitor interpretation is commonly understood as a process through which individuals assign meaning to natural and cultural resources, moving beyond the passive reception of information toward more reflective and meaningful engagement with place. Previous research has shown that interpretation can enhance visitor learning, satisfaction, and pro-environmental attitudes, particularly when it is designed to provoke curiosity, emotional involvement,

and personal relevance rather than simply transmit facts (Ham & Weiler, 2002; Ballantyne & Packer, 2011; Tubb, 2003). In protected areas, interpretive media such as panels, signs, and trails can therefore serve not only educational purposes, but also broader managerial goals related to visitor orientation, communication, and conservation support.

At the same time, visitors do not interpret such content in uniform ways. Their responses are shaped by individual and contextual differences, including socio-demographic characteristics such as age, gender, education, income, and place of residence. Prior studies suggest that these characteristics can influence how visitors perceive authenticity, value, memorability, and relevance in heritage and nature-based settings, as well as how they respond to educational or interpretive interventions. This implies that interpretation is not universally experienced, but socially differentiated, and that a “one-size-fits-all” approach may not be equally effective for all visitor segments. Understanding these differences is especially important for national parks seeking to design more inclusive and engaging interpretation strategies.

Within this broader context, place attachment provides an important complementary theoretical lens. Place attachment refers to the emotional and functional bonds that individuals develop with specific places, often expressed through dimensions such as place identity and place dependence (Williams & Vaske, 2003; Kyle et al., 2004). Research has shown that attachment to natural settings can be influenced by repeated visitation, familiarity, cultural meanings, and socio-demographic background (Hammit et al., 2006; Ramkissoon et al., 2013). Although place attachment is not directly measured in the present study, it remains relevant as a wider conceptual context, since meaningful and engaging interpretation may contribute to stronger emotional and cognitive connections with protected landscapes over time.

Despite the growing body of literature on interpretation and visitor experience in protected areas, limited research has examined how socio-demographic characteristics shape visitors' perceptions of interpretive panels within a single national park context, particularly in Southeast Europe. This is an important gap, because interpretive panels remain one of the most visible and widely used communication tools in protected area management, yet their effectiveness may vary considerably across visitor groups. Fruška Gora National Park represents a particularly relevant case for such analysis due to its

ecological significance, rich cultural heritage, recreational importance, and increasing visitation pressures.

Accordingly, this study investigates how socio-demographic characteristics influence visitors' perceptions of interpretive panels in Fruška Gora National Park. More specifically, it examines whether visitors differ in their evaluations of interpretive panels across three dimensions: Design, Engagement, and Meaning, and considers the implications of these differences for adaptive and socially responsive visitor management. By identifying how different visitor segments respond to interpretive content, the study aims to support the development of more targeted interpretation strategies, improve visitor experience, and contribute to sustainable national park management.

## LITERATURE REVIEW

### Visitor interpretation in protected areas

Visitor interpretation is understood as an educational and communicative practice that helps people make sense of natural and cultural heritage, transforming a visit from passive sightseeing into meaningful experience and reflection (Ablett & Dyer, 2009; Nowacki, 2021; Tilden, 1957/1977). It is not just information delivery; it is about provoking curiosity, emotion, and ethical concern, and often aims at stewardship and sustainable behavior (Ablett & Dyer, 2009; Wang et al., 2024; Nowacki, 2021; Abrahams & Bama, 2023). Foundational work by Freeman Tilden defines interpretation as revealing meanings and relationships, rather than simply stating facts, and stresses that the goal is “provocation, not instruction” (Ablett & Dyer, 2009; Tilden, 1957/1977; Dumbrăveanu et al., 2016). Modern authors similarly describe interpretation as a structured, non-formal learning process that links place, story, and visitor in order to support understanding, appreciation, and protection of heritage (Nyaupane, 2023; Moreno-Melgarejo et al., 2019; Nowacki, 2021; Abrahams & Bama, 2023).

Interpretation is framed as a hermeneutic, dialogical process: visitors actively construct meaning through culturally situated conversations with sites, mediators and media, rather than receiving a single, fixed message (Ablett & Dyer, 2009; Black, 2018; Dogan & Kan, 2020). Interpretation is grounded in lived experience and sense of place: tangible features and intangible stories together generate immersion,

emotions, and identity-related meanings (Dogan & Kan, 2020; Kempiak et al., 2017; Echavarría et al., 2022). Concepts from cognitive psychology and educational theory (e.g., cognitive load, schema theory, Universal Design for Learning) support designing visitor-centered, cognitively inclusive interpretation that accommodates diverse backgrounds and learning styles (Zaus, 2025; Moreno-Melgarejo et al., 2019). Systematic reviews show interpretation as a tool for sustainable tourism and ecotourism, shaping visitors' knowledge, values, behavior, and even commitment to heritage preservation (Wang et al., 2024; Abrahams & Bama, 2023; Zaus, 2025; Nowacki, 2021).

Socio-demographic characteristics shape how visitors perceive, value, and respond to interpretation, meaning that the same interpretive offer can be experienced very differently across groups. Age, gender, education, income, and nationality influence tourists' sense of place, memorability, authenticity, satisfaction, and even environmentally responsible behavior, indicating that interpretation outcomes are partly socially structured rather than universal (De Cicco et al., 2024; Ma et al., 2018). Younger visitors often develop stronger place attachment and seek novelty, whereas older visitors emphasize relaxation, nature appreciation, and may engage differently with digital interpretive tools, requiring simpler, more accessible formats (Zhang et al., 2024). Gender differences appear in perceived memorability, authenticity, and value: women frequently report more memorable and authentic experiences and are more influenced by emotional value, while men may be more driven by social value and are sometimes more willing to travel longer or invest more effort in visits (Pasaco-González et al., 2023; Brochado et al., 2022). Higher education and income generally increase cultural participation and expectations, but highly educated visitors can be more critical of management, educational content, and digital services, demanding deeper context and higher-quality interpretation (Zhang et al., 2024; Falk & Katz-Gerro, 2016). Nationality and cultural background also shape interpretive preferences, with "insiders" often seeking emotional connection and affirmation of heritage, and "outsiders" prioritizing contextual explanations of customs and history (Almuhri et al., 2020; Karagöz & Ramkissoon, 2025). In essence, research shows that "one-size-fits-all" interpretation is inadequate, and effective interpretive design requires segmentation and tailoring to diverse socio-demographic groups to maximize understanding, engagement, and pro-

heritage behaviors (Pasaco-González et al., 2023; Zhang et al., 2024; De Cicco et al., 2024; Almuhri et al., 2020).

### Place attachment as a theoretical context for visitor interpretation

In natural settings, place attachment is often reinforced by perceived wildness, protection status, and opportunities for meaningful experiences that satisfy visitors' psychological needs (Cundill et al., 2017; Landon et al., 2020; Jayakody et al., 2024). Attachment to natural areas typically encompasses several interrelated dimensions, including place identity, understood as the incorporation of landscape into the self and personal memory; place dependence, referring to the functional suitability of a place for valued activities; and broader affective bonds with the environment (Landon et al., 2020; Lin & Lockwood, 2014; Subiza-Pérez et al., 2020). Previous research suggests that perceived naturalness, wildness, and limited visible human design or management can strengthen attachment to local greenspaces and mountain landscapes (Colley & Craig, 2019; Knez et al., 2018; Knez & Eliasson, 2017). Similarly, the extent to which natural environments support basic psychological needs such as autonomy, competence, and relatedness has been shown to predict stronger place identity, place dependence, and emotional connectedness (Landon et al., 2020). Protected areas, coastal environments, and high-quality rural landscapes also tend to generate stronger feelings of connectedness and restoration than urban green spaces (Wyles et al., 2019; Jayakody et al., 2024; Wynveen et al., 2020; Restall et al., 2021; Subiza-Pérez et al., 2020). In this sense, place attachment provides a relevant conceptual background for understanding how visitors may respond to interpretive elements in protected areas, as interpretation can shape how places are perceived, valued, and remembered over time.

At the same time, place attachment is not distributed evenly across populations, but is shaped by a range of socio-demographic characteristics. Studies based on large and diverse samples generally report stronger attachment among older individuals, people with longer residence duration and stronger local ties,



**Figure 1.** Map of Fruška Gora and location in Serbia (Source: Authors' elaboration based on © OpenStreetMap contributors (ODbL 1.0)).

and residents of smaller or less industrialized settlements. In contrast, attachment is often weaker among younger, more mobile, highly educated urban populations (Lewicka, 2011; Mandal, 2016; Arani et al., 2021). Age, in particular, tends to be positively associated with both place identity and place dependence, as older adults accumulate biographical memories, social relationships, and feelings of familiarity and safety that anchor them to home and neighborhood environments (Lewicka, 2011; Mandal, 2016; Clark et al., 2023; Arani et al., 2021). The effects of education and income appear more complex. In some contexts, higher educational attainment is associated with weaker traditional, locality-bound attachment, while also enabling more active and reflexive forms of attachment that coexist with broader, non-local identities (Lewicka, 2011; Mandal, 2016; Counted et al., 2019). Other socio-demographic factors, including ethnicity, migration status, and country or region of origin, may also significantly differentiate attachment levels. In several settings, long-term or native residents report stronger attachment than recent migrants, although rural youth may sometimes express only moderate attachment despite a relatively strong sense of place identity (Dlamini et al., 2020; Dlamini et al., 2021; Tešin et al., 2024; Counted et al., 2019; Akinjokun et al., 2018). Gender differences, by contrast, tend to be small or inconsistent, although some studies suggest higher place dependence or nature-related bonding among men, and stronger emotional or social bonding among women (Dasgupta et al., 2022; Tešin et al., 2024; Mandal, 2016). Although the present study does not

directly measure place attachment, these findings remain important because they indicate that visitors' responses to protected landscapes and their interpretive features are likely to vary across socio-demographic groups. This provides a useful theoretical basis for examining differences in how visitors perceive interpretive panels and engage with interpretive content in national park settings.

## METHODOLOGY

### Study area

For the purposes of this research, the study was carried out among visitors to Fruška Gora Mountain, an important recreational zone serving the two largest urban centers in Serbia, Novi Sad and Belgrade (Figure 1).

Fruška Gora is situated in northern Serbia, between 45°06'–45°12' N and 19°12'–20°01' E. It stretches along the right bank of the Danube River, in the northern part of the Srem District, within the Autonomous Province of Vojvodina. The mountain's highest peak, Crveni Čot (539 m), ranks as the third highest elevation in Vojvodina, after Gudurica (641 m) and Veliki Žam (590 m) in the Vršac Mountains. As a prominent geomorphological formation rising from the Pannonian Plain, Fruška Gora represents one of the most geologically and pedologically diverse areas in this lowland region (Petrović et al., 2013). Fruška Gora was proclaimed Serbia's first national park in 1960. Forests cover more than 90% of its territory,

complemented by approximately 5,000 hectares of meadow ecosystems. The park hosts over 1,500 plant species—including the largest concentration of linden trees in Europe—and more than 300 animal species (Butorac, 2007; Habijan-Mikeš, 2007), highlighting its exceptional biodiversity value. Beyond its natural assets, Fruška Gora is distinguished by a rich cultural and historical heritage. The area encompasses 16 Orthodox monasteries dating from the 15th to the 18th century, along with significant fortifications, castles, and palatial complexes in the surrounding landscape. Additionally, Marković et al. (2001) identified and catalogued numerous geosites within the mountain, underlining its geotourism significance. Considering the integration of diverse natural features and anthropogenic heritage elements, Fruška Gora can be conceptualized as a multifaceted tourism destination. Owing to these characteristics and its recognized importance, it was selected as the empirical setting for this research.

## Instrument

The questionnaire had two parts. Part 1 captured socio-demographic characteristics (age, gender, education, employment status, self-reported socio-economic status), visit frequency, time since last visit, and typical visit companions.

Part 2 included 33 items assessing visitor perception of interpretive panels across three interpretation dimensions (Design, Engagement and Meaning) rated on a five-point Likert scale. The dimensions and items were developed by operationalizing established interpretation principles and models (Tilden, 1957/1977; Ogden & Richards, 1923; Ham, 2013; Beck & Cable, 2011, Dowling, 2013) (Table 1).

**Table 1.** List of items used in questionnaire

Factor	Items	Theory/Concept	Author
Factor 1 "Degining"	Interpretation on interpretive panels uses various artistic elements as a means of conveying information.	Tilden principles	Tilden, 1957/1977
	Interpretive panels in Fruška Gora National Park are designed for children to be engaging, age-appropriate, and goal-oriented.	Tilden principles	Tilden, 1957/1977
	Images and information on interpretive panels clearly explain the story of Fruška Gora National Park.	The interpretive triangle	Ogden & Richards, 1923
	The organization of information on interpretive panels in Fruška Gora National Park makes them easy to follow and understand.	TORE model	Ham, 2009
	Interpretive panels in Fruška Gora National Park are designed as stories that inform, entertain, and educate readers.	Gifts of Interpretation	Beck & Cable, 2011
	Interpretive panels in Fruška Gora National Park are created for children, teenagers, older adults, and different visitor groups, using approaches tailored to each group.	Gifts of Interpretation	Beck & Cable, 2011
	Technology is integrated into interpretive panels in Fruška Gora National Park, revealing the wonders of the natural world in exciting new ways.	Gifts of Interpretation	Beck & Cable, 2011
	The quantity and quality of information presented on interpretive panels in Fruška Gora National Park ensure that the content is well-researched, accurate, and more credible than lengthy sources.	Gifts of Interpretation	Beck & Cable, 2011
	Artistic elements integrated into interpretive panels in Fruška Gora National Park are based on fundamental communication techniques.	Gifts of Interpretation	Beck & Cable, 2011
	The interpretive program on panels in Fruška Gora National Park is designed to attract support—financial, volunteer, political, and administrative.	Gifts of Interpretation	Beck & Cable, 2011
	Interpretive panels in Fruška Gora National Park are created with love for the resources and for the people who come to be inspired by them.	Gifts of Interpretation	Beck & Cable, 2011

Factor 2 "Engagement"	Interpretive panels in Fruška Gora National Park successfully connect presented information with visitors' personalities and experiences.	Tilden principles	Tilden, 1957/1977
	Information on interpretive panels in Fruška Gora National Park is not merely factual but part of a broader interpretation of natural heritage.	Tilden principles	Tilden, 1957/1977
	After viewing interpretive panels in Fruška Gora National Park, I feel that I better understand why nature conservation is important.	The interpretive triangle	Ogden & Richards, 1923
	Viewing interpretive panels in Fruška Gora National Park encourages me to think about how I can contribute to nature conservation.	The interpretive triangle	Ogden & Richards, 1923
	The presented information is relevant to visitors and directly related to the natural heritage of Fruška Gora National Park.	TORÉ model	Ham, 2009
	Visitors experience interpretation as exciting and interesting.	TORÉ model	Ham, 2009
	Interpretive panels in Fruška Gora National Park bring the past to life, making the present enjoyable and the future meaningful.	Gifts of Interpretation	Beck & Cable, 2011
	The text on interpretive panels in Fruška Gora National Park is based on what park visitors want to know.	Gifts of Interpretation	Beck & Cable, 2011
	Carefully designed programs and layouts on interpretive panels in Fruška Gora National Park enhance the overall visitor experience.	Gifts of Interpretation	Beck & Cable, 2011
	Interpretive panels in Fruška Gora National Park are powerful.	Gifts of Interpretation	Beck & Cable, 2011
	Interpretive panels in Fruška Gora National Park are effective.	Gifts of Interpretation	Beck & Cable, 2011
Factor 3 "Meaning"	Interpretive panels present a coherent whole, emphasizing the main theme of Fruška Gora National Park.	Tilden principles	Tilden, 1957/1977
	Interpretive panels in Fruška Gora National Park are intended not only to provide information but also to encourage interaction, reflection, and reaction.	Tilden principles	Tilden, 1957/1977
	Information on interpretive panels accurately conveys abiotic factors (geology, climate, etc.) and their impact on the natural heritage of Fruška Gora National Park.	ABC concept	Dowling, 2013
	Interpretive panels provide a clear understanding of animal and plant species in Fruška Gora National Park, including their interactions.	ABC concept	Dowling, 2013
	Interpretive panels highlight cultural elements connected to natural heritage, including history, tradition, and human influence in the area.	ABC concept	Dowling, 2013
	Information on Interpretive panels clearly emphasizes the main theme of geoh heritage in Fruška Gora National Park.	TORÉ model	Ham, 2009
	Interpretive panels in Fruška Gora National Park connect themes with visitors' experiences in the park.	Gifts of Interpretation	Beck & Cable, 2011
	Interpretive panels in Fruška Gora National Park present a complete theme or thesis, encompassing various aspects of the park experience and connecting them with people.	Gifts of Interpretation	Beck & Cable, 2011
	Interpretive panels in Fruška Gora National Park go beyond presenting facts to reveal deeper meanings and truths about the park's natural and cultural heritage.	Gifts of Interpretation	Beck & Cable, 2011
	Stories on Interpretive panels in Fruška Gora National Park inspire and challenge visitors to broaden their horizons.	Gifts of Interpretation	Beck & Cable, 2011
	Interpretive panels in Fruška Gora National Park foster the ability and desire to appreciate the beauty around us, provide spiritual uplift, and support resource conservation.	Gifts of Interpretation	Beck & Cable, 2011

## Procedure and data analysis

The data were collected via Google online forms from March to September 2025. Each survey took approximately twelve minutes to complete. During this process, 385 questionnaires were completed. We used ANOVA and T/test to analyze differences in term of sociodemographic characteristics. The obtained data were processed by Statistical Package for Social Sciences Version 23 – SPSS, which was used for Independent T-test and One-way ANOVA.

## RESULTS

## Study sample

In the sample of 385 respondents, the majority are female (60.0%), and most respondents are in the 18–30 age category (33.51%). Nearly two-thirds of respondents are employed (63.38%), and the largest share has completed secondary education (33.51%), followed by BSc degree holders (29.09%). Most respondents live in urban areas (88.57%). Regarding socio-economic status, 34.29% report an average level, 29.61% below average, and 18.96% above average, while 17.14% have no income. A smaller proportion of respondents are pupils or students (18.18%), and 9.09% are unemployed, with 9.35% retired. These results are presented in Table 2.

**Table 2.** Sociodemographic characteristics of respondents (N=385)

Gender		Education		Place of residence	
Male	40.0%	(Un)completed elementary school	1.30%	No income	17.14%
Female	60.0%	Secondary school	33.51%	Below average	29.61%
Age		Vocational	18.96%	Average	34.29%
18-30	33.51%	BSc degree	29.09%	Above average	18.96%
31-40	14.29%	Master degree	14.81%	Socio-economic status	
41-50	27.27%	PhD degree	2.34%	Pupil/Student	18.18%
51-60	12.99%	Place of residence		Employed	63.38%
61-65	6.49%	Urban	88.57%	Unemployed	9.09%
65+	5.45%	Rural	11.43%	Retired	9.35%

Source: Authors' reproduction

## Descriptive statistics on socio-demographic differences in perceptions of interpretive panels

The discriminativeness of the scale was tested regarding the respondents' gender, age, level of education, employment status, socio-economic status, rural or urban surrounding, visit frequency, time since last visit to Fruška Gora and typical visit companions in Fruška Gora in relation to different factors.

### Independent t-test

The independent t-test showed no statistically significant differences with regard to gender or type of residence (urban vs. rural).

### One-way ANOVA and post hoc LSD test

Further differences were identified using one-way ANOVA and the post hoc LSD test with regard to age,

education level, socio-economic status, and visit frequency. No statistically significant differences were found for employment status, time since the last visit to Fruška Gora, or typical visit companions.

Statistical significance differences were shown in differences in the responses of different age groups according to factor Meaning. Respondents in the age group 18-30 gave the highest value, 51-60, 61-65 and 65+ years old gave moderate value, while 31-40 and 41-50 gave the lowest values ( $F=2.409$ ,  $p=0.036$ ).

Statistically significant differences were found in responses across all educational levels for all three factors. For Design ( $F = 7.764$ ,  $p=0.000$ ), Engagement ( $F = 6.853$ ,  $p=0.000$ ), and Meaning ( $F = 7.310$ ,  $p=0.000$ ), respondents with bachelor's, master's, and PhD degrees reported the highest scores, those with vocational education reported moderate scores, while respondents with secondary and primary education reported the lowest scores.

The analysis indicated that socio-economic status significantly influenced two factors: Design and

Meaning. For both Design ( $F = 3.743$ ,  $p = .011$ ) and Meaning ( $F = 4.562$ ,  $p = .004$ ), respondents with above-average income reported the highest scores, those with no income or below-average income reported moderate scores, while respondents with average income reported the lowest scores.

Statistically significant differences were found across visit frequency groups for all three factors: Design ( $F = 12.439$ ,  $p < .001$ ), Engagement ( $F = 10.999$ ,  $p < .001$ ), and Meaning ( $F = 12.600$ ,  $p < .001$ ). Respondents who had visited Fruška Gora never or only once reported the highest scores, those who had visited more than five times reported moderate scores, while respondents who had visited two to three or four to five times reported the lowest scores.

## DISCUSSION

The present study investigated how socio-demographic characteristics shape visitors' perceptions of interpretive panels in Fruška Gora National Park, with the goal of informing more effective visitor management strategies. The findings provide nuanced insights into how age, education, socio-economic status, and visit frequency influence the way visitors perceive and engage with interpretive content across the dimensions of Design, Engagement, and Meaning. Although place attachment provides a relevant wider theoretical context, it was not directly measured in this study. Therefore, the observed differences across socio-demographic groups should be interpreted primarily as variations in interpretive perceptions rather than as direct differences in place attachment.

Independent t-test results indicated that gender and type of residence (rural or urban) did not significantly influence visitor responses. This suggests that both male and female visitors, regardless of their residential context, demonstrate similar patterns of interpretation and engagement with the park's facilities. Such findings align with previous research indicating that gender differences in environmental perception may be minimal in well-designed interpretive environments (Ballantyne et al., 2011; Knudson et al., 1995).

However, age, education, socio-economic status, and visit frequency were found to significantly affect visitor responses. Younger visitors (18–30 years) rated the Meaning factor highest, suggesting that early-career or young adult visitors may be more sensitive to the symbolic or experiential aspects of interpretive

content. In contrast, middle-aged respondents (31–50 years) provided lower scores, potentially reflecting differences in leisure motivations or familiarity with natural environments (Packer & Ballantyne, 2016).

Educational attainment emerged as a strong predictor across all three factors—Design, Engagement, and Meaning. Visitors with higher education levels (bachelor's, master's, and PhD) consistently reported higher scores, while respondents with primary or secondary education reported the lowest scores. This pattern may reflect differences in interpretive literacy or the ability to cognitively engage with complex environmental information (Ham & Weiler, 2002). These findings highlight the importance of tailoring interpretive content to accommodate varying levels of prior knowledge and cognitive skills among visitors, supporting inclusive educational strategies in national parks.

Socio-economic status significantly influenced perceptions of Design and Meaning, with above-average income respondents reporting higher scores. Interestingly, those with no income or below-average income demonstrated moderate engagement, while average-income respondents reported lower scores. This suggests that disposable resources and leisure opportunities may shape the perceived value and usability of interpretive facilities, consistent with research linking socio-economic factors to park participation and satisfaction (Tisdell & Wilson, 2004).

Visit frequency also had a pronounced effect on all factors. Respondents who had visited Fruška Gora for the first time or only once reported the highest scores, whereas frequent visitors exhibited moderate or lower ratings. This trend may reflect a novelty effect, where first-time visitors are more attentive and responsive to interpretive stimuli, while repeat visitors may become habituated to familiar content (Moscardo, 1996). Understanding this pattern is crucial for visitor management, as it emphasizes the need to regularly update interpretive materials to sustain engagement across diverse visitor segments.

These findings underscore the socially differentiated nature of interpretive experience in national parks. Socio-demographic variables such as age, education, socio-economic status, and visit frequency should be considered when designing interpretive programs and managing visitor flows. Parks such as Fruška Gora can enhance visitor learning and experience quality by combining broadly accessible content for first-time visitors with more

nanced and in-depth materials for highly educated or frequent visitors. Future research could build on these findings by examining how interpretive perceptions relate to other visitor outcomes, including satisfaction, environmental attitudes, revisit intentions, and place attachment, using explicit and validated measures.

## CONCLUSION

This study demonstrates that visitors' perceptions of interpretive panels in Fruška Gora National Park are shaped by socio-demographic characteristics, particularly age, education level, socio-economic status, and visit frequency. These findings show that interpretive content is not experienced uniformly and that visitor diversity should be taken into account when designing interpretation strategies in protected areas. Higher-educated and higher-income visitors reported stronger engagement with interpretive content, while younger visitors attributed greater importance to the Meaning dimension. First-time visitors also evaluated interpretive panels more positively than repeat visitors, suggesting a novelty effect and the need for periodically updated content. In contrast, gender and type of residence were not found to significantly influence perceptions.

The study highlights the managerial relevance of adaptive and segmented visitor management approaches. By incorporating socio-demographic insights into interpretive planning, national park authorities can improve interpretive effectiveness, enhance visitor experience, and better align communication strategies with the needs of different visitor groups. Tailored interpretation thus represents a practical tool for supporting inclusive, responsive, and evidence-based management in protected areas.

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