

Ecological sustainability in agritourism development: navigating opportunities and challenges for a balanced future

Ekološka održivost u razvoju agriturizma: upravljanje mogućnostima i izazovima za uravnoteženu budućnost

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Abstract: This study examines the ecological impacts of rural tourism development in four eco-ethno villages in Western Serbia: Koštunići, Vraneša, Sunčana Reka, and Sirogojno. The research focused on ten ecological indicators, including ecosystem degradation, water and land pollution, disturbance of wildlife, and loss of aesthetic values, as perceived by 468 residents. Using an ordinal Likert scale, respondents assessed the extent of these impacts, with demographic factors such as gender included to explore variations in perception. The findings confirm that rural tourism significantly affects ecological systems, with a majority of respondents reporting negative impacts on key indicators. Gender differences emerged as a significant factor, with women generally perceiving more severe ecological consequences, particularly regarding water consumption and ecosystem degradation. These results underscore the importance of considering gendered roles and responsibilities in understanding how tourism affects local environments. While many respondents noted no change for some indicators, such as air pollution, others highlighted localized issues tied to tourism activities, including increased infrastructure demands and inadequate waste management.

Keywords: rural tourism, quality of life, environmental impacts, Western Serbia.

Sažetak: Ova studija ispituje ekološke uticaje razvoja ruralnog turizma u četiri eko-etno sela u zapadnoj Srbiji: Koštunići, Vraneša, Sunčana Reka i Sirogojno. Istraživanje se fokusiralo na deset ekoloških indikatora, uključujući degradaciju ekosistema, zagađenje vode i zemljišta, uznemiravanje divljih životinja i gubitak estetskih vrednosti, kako ih percipira 468 stanovnika. Koristeći ordinalnu Likertovu skalu, ispitanici su procenili obim ovih uticaja, sa uključenim demografskim faktorima kao što je pol da bi se istražile varijacije u percepciji. Nalazi potvrđuju da ruralni turizam značajno utiče na ekološke sisteme, pri čemu je većina ispitanika prijavila negativne uticaje na ključne indikatore. Rodne razlike su se pojavile kao značajan faktor, pri čemu su žene generalno uočavale teže ekološke posledice, posebno u pogledu potrošnje vode i degradacije ekosistema. Ovi rezultati naglašavaju važnost razmatranja rodni uloga i odgovornosti u razumevanju kako turizam utiče na lokalnu sredinu. Dok su mnogi ispitanici primetili da nema promena za neke indikatore, kao što je zagađenje vazduha, drugi su istakli lokalizovana pitanja u vezi sa turističkim aktivnostima, uključujući povećane zahteve za infrastrukturu i neadekvatno upravljanje otpadom.

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INTRODUCTION

Rural tourism, as explored by Gao and Wu (2017), represents a dynamic and diverse niche within the tourism sector, focusing on authentic experiences rooted in rural communities. Rural tourism's key aspects include location, sustainable development, community-based features, and experiences, with challenges mainly affecting internal resources in both developed and developing contexts (Rosalina et al., 2021). This type of tourism product encourages interactions that focus on the natural environment and traditional ways of life, highlighting the importance of sustainable practices. It supports efforts to maintain rural landscapes and ecosystems, often emphasizing environmentally responsible tourism activities. Agritourism, as a subcategory of rural tourism, combines agricultural practices with visitor participation, providing a practical way to promote ecological awareness. By offering an alternative to intensive agricultural use, agritourism can help reduce the strain on farmland, contributing to more sustainable land use and conservation (Ciolac et al., 2020; Ćirić et al., 2021). Agritourism is often aligned with sustainable tourism principles, promoting the conservation of rural landscapes and biodiversity. It encourages the use of local resources and traditional practices, which can help maintain ecological balance (Belligiano et al., 2020; Ammirato et al., 2020; Adamov et al., 2020).

Tourists are drawn to this form of tourism to engage in activities such as agricultural participation, cultural exploration, or enjoying natural landscapes (Nelson et al., 2021). Unlike urban or coastal tourism, rural tourism emphasizes a connection to traditional lifestyles and natural environments, offering experiences such as farm stays, local festivals, outdoor recreation, and wildlife observation. Panić et al. (2024) highlight its significant potential to drive economic development in rural regions by supporting local businesses and creating employment opportunities. In addition to its economic benefits, rural tourism holds the potential to foster ecological awareness and sustainable practices within both visitors and host communities. Martínez Álvarez & Cortes-Vazquez (2020) highlight this claiming that the impacts of rural tourism on socio-ecological resilience go beyond economic metrics like overnight stays or income generated. Understanding the implications of tourism initiatives requires considering the moral values that shape these practices. This includes examining the material, symbolic, and experiential transformations brought about by tourism in local communities and their interactions with the environment. By understanding the concept of sust-

ainable development, Guizzardi et al. (2021) emphasize that it can drive tourism development in small rural areas, with cultural heritage conservation and well-protected natural environments being key indicators.

While agritourism can support ecological sustainability, it also has the potential to harm local environments if poorly managed (Popescu et al., 2023; Ammirato et al., 2020). For example, increased visitor traffic can disturb wildlife and lead to soil erosion, while the need for additional infrastructure, such as parking areas or access roads, can result in the loss of natural habitats. Similarly, excessive reliance on certain agricultural activities to attract tourists may lead to overexploitation of resources or disrupt local ecosystems. The ecological impact of agritourism is not uniform and varies between regions. Some areas achieve more positive results due to effective local policies and careful integration of tourism with agricultural practices, while others may struggle with ecological challenges resulting from insufficient planning or regulation (Belligiano et al., 2020; Bocheńska-Skałicka et al., 2022). Bocheńska-Skałicka et al. (2022) also add that the transformation of traditional agricultural farms into agritourism sites can lead to significant changes in rural landscapes which may include the adaptation of farms to accommodate tourists, which may alter the natural and cultural landscape.

By promoting environmentally conscious tourism activities, such as organic farming or guided eco-trails, it encourages a harmonious relationship between tourism and nature. Moreover, the focus on preserving rural traditions and landscapes can lead to a stronger community commitment to environmental stewardship. Wang et al (2023) claim that rural tourism often thrives in areas with high ecological quality, indicating a strong relationship between ecosystem services and tourism. These services, such as climate regulation and anion supply, significantly support the development of rural tourism, promoting regional green development. Rural tourism encourages the preservation of natural resources by transforming ecological advantages into economic benefits (Li, et al., 2022). Moreover, the integration of agriculture and tourism promotes the sustainable use of ecological and environmental resources. This integration has been shown to improve the quality of the rural ecological environment by fostering better agricultural practices and environmental governance (Sun, et al., 2023; Wang et al., 2022).

This paper focuses on Western Serbia, a region characterized by its varied geography and rural lifestyle, providing a basis for rural tourism devel-

opment. The area includes diverse landscapes such as hills, rivers, agricultural lands, and forested areas, which serve as settings for different sort of tourism activities. Its proximity to protected areas of nature further contributes to its role as a rural tourism destination. The study examines four tourist villages - Koštunići, Vraneša, Sunčana Reka, and Sirogojno - that have adopted tourism to leverage their cultural and natural resources. Tourists to these villages engage in agricultural activities, participate in traditional practices, explore the natural environment, and experience the local way of life. The aim of this study is to evaluate the ecological effects of rural tourism in these villages, with a focus on changes in land use, environmental conservation, and resource management.

The findings indicate that rural tourism has influenced ecological conditions in the observed areas in both positive and negative ways. On one hand, increased awareness of the region's natural value has led to initiatives aimed at protecting certain habitats and promoting environmentally friendly practices. On the other hand, the rise in tourism activities has contributed to localized environmental pressures, such as habitat disruption and minor degradation of natural areas. These findings underscore the need for balanced tourism development that integrates ecological considerations into planning and management to ensure the long-term sustainability of these rural areas.

1. THE RESEARCH METHODOLOGY

1.1. Study area

This study examines four tourist villages in Western Serbia: Koštunići, Vraneša, Sunčana Reka, and Sirogojno. Each village represents a distinct example of the natural and cultural richness of the region, reflecting the interplay between rural traditions, cultural heritage, natural landscapes, and modern tourism activities. These villages offer diverse environments making them suitable case studies for exploring how rural tourism development impacts ecological systems observed from the perspective of local population. By analyzing these villages, the study provides important insights into the challenges and opportunities associated with balancing tourism growth and environmental sustainability. The focus on these destinations also allows for an evaluation of the extent to which tourism can support the preservation of natural habitats, promote sustainable practices, and influence local communities' perceptions of environmental stewardship.

Koštunići, located 32 kilometers northwest of Gornji Milanovac, is a rural settlement with a dispersed layout, primarily centered around cattle breeding.

Positioned on the southern slopes of Suvobor Mountain, which peaks at an elevation of 866 meters (Čulić, 2006), it is the largest rural settlement in the Gornji Milanovac municipality in terms of land area (Pavlović, 2016). The village is traversed by four mountain rivers - Grab, Bukovača, Čemernica, and Šiban - that support diverse aquatic species, including river fish and crabs (Milošević, 2006). Koštunići is recognized for its ecological and scenic values, encompassing diverse ecosystems such as river valleys, agrarian fields, forests, and meadows. These areas are rich in medicinal herbs and forest fruits (Jovanović Tončev, 2016). Due to its preserved natural environment, Koštunići holds the distinction of being Serbia's only ecological village.

Vraneša, located in the Zlatibor region near Nova Varoš, is renowned for its natural beauty. The village, set within a coniferous forest at an elevation of 943 meters, offers views of Zlatar Lake (Svojić, 2015). Its ethno-eco village features traditional Serbian architecture, utilizing sustainable materials such as black pine and stone. The wooden components are treated with natural resin, and hand-crafted split shingles are used for roofing. Surrounded by forests, hills, and rivers, Vraneša is a popular destination for outdoor activities such as trekking and exploring local landscapes. The village combines natural beauty with cultural immersion, offering visitors an authentic rural experience (Svojić, 2015).

Sunčana Reka is situated on the banks of the Drina River, near Loznica. Known for its proximity to natural attractions such as the Drina River and Banja Koviljača, as well as the historically significant Gučevo Mountain, the village is a prominent rural tourism site. The tourist complex comprises seven accommodation units with a total of 43 facilities, offering 124 beds. Visitors have access to various recreational activities, including horseback riding, ball games, and water-based activities on the Drina River (Stepanović, 2013). The village serves as a hub for both leisure and nature-based activities, highlighting the ecological potential of rural tourism.

Sirogojno, located on Zlatibor, is best known for its open-air museum, Staro Selo (Old Village), which illustrates the traditional lifestyle of Serbian peasants. The museum spans 5 hectares and includes approximately 50 buildings relocated from surrounding Zlatibor villages (Đenić, 2008). The architecture reflects traditional construction methods and interior designs typical of the hilly and mountainous Dinaric region (Ranko, 1987). Situated near one of Serbia's largest mountaineering centers, Zlatibor, Sirogojno offers both cultural and ecological value, showcasing historical crafts, skills, and sustainable rural practices.

2. SOURCES OF DATA

This study examines the ecological impacts of rural tourism development in four eco-ethno villages in Western Serbia: Koštunići, Vraneša, Sunčana Reka, and Sirogojno. Using data from 468 respondents, the research focused on ten ecological indicators: ecosystem degradation, loss of aesthetic values (particularly during summer), increased risk of landslides, disturbance of wildlife, destruction of plant life, increased water consumption, disproportionate energy use, noise pollution, land pollution, and air pollution. Respondents evaluated these impacts using an ordinal Likert scale ranging from 1 to 5, where 1 represented significant negative impacts, 5 indicated significant positive impacts, and 3 signified no change. The primary objective of the study was to assess the local population's perceptions of tourism's environmental effects, with a specific emphasis on identifying key issues and informing strategies to promote ecological sustainability.

The study builds on and adapts the methodology presented by Monterrubio et al. (2020), which investigated the effects of tourism infrastructure on rural areas and the quality of life of local populations. This research, however, focuses on the perceived impacts of ethnic villages and tourist attractions on the ecological and broader quality of life in their surrounding communities. Conducted from May 2022 to May 2023, the study gathered insights from residents of the selected villages regarding the influence of tourism development on their environment, economy, and social conditions. The research sought to explore how rural tourism impacts the local ecological balance and to identify whether these impacts vary based on demographic factors (Prnjat, 2024).

To evaluate the influence of demographic variables, gender was included as an independent variable, enabling an examination of whether perceptions of ecological impacts differ statistically between male and female respondents. The study applied Chi-Square tests to analyze the relationship between gender and responses, with statistically significant differences identified at $p < 0.05$. The analysis also assumed no significant variation in perceptions based on gender, providing a baseline for comparison.

The study formulates the following hypotheses to guide the analysis of rural tourism's impact on ecological indicators in the observed villages:

H1: Rural tourism development in the observed villages has a statistically significant impact on ecological indicators, as perceived by the local population. This reflects the assumption that residents,

as direct witnesses to environmental changes, can offer critical insights into how tourism affects local ecosystems. Supporting this, **H1a** suggests that Rural tourism development contributes to negative ecological outcomes, as identified by the respondents. Further, **H1b** proposes that gender significantly influences perceptions of ecological impacts, with male and female respondents showing differing evaluations of tourism's environmental effects, based on their roles, responsibilities, and interactions within the community. By testing these hypotheses, the study aims to clarify the nature and extent of tourism's ecological effects and identify variations in perception that can inform strategies for sustainable tourism management.

3. RESULT AND DISCUSSION

The study sample included 256 male and 212 female participants, providing insights into gender-based differences in the perception of environmental impacts caused by tourism. The subsequent tables highlight the most significant environmental effects identified by respondents, such as increased risk of landslides, growth in water consumption, and air and land pollution. These impacts are categorized by gender, offering a comparative view of how male and female participants evaluate the ecological consequences of tourism in their communities. This analysis aims to uncover any notable variations in perspectives, contributing to a deeper understanding of gender-specific concerns and priorities regarding environmental sustainability in the context of tourism development.

3.1. *Environmental impact of rural tourism*

The slightly higher concern among female respondents may reflect their heightened sensitivity to environmental changes, potentially stemming from their closer interaction with household and community spaces where air quality impacts are more immediately noticeable. This gendered disparity, though subtle, could also hint at broader societal roles where women, often caregivers or more engaged in community well-being, are more attuned to shifts in environmental conditions. Meanwhile, men's perceptions may reflect their exposure to outdoor activities or occupations where air quality is less perceptible unless it reaches critical levels.

The overall perception that air pollution remains largely unchanged could suggest that tourism-related impacts, such as vehicle emissions, construction dust, or energy use, are either not yet at a disruptive scale or are localized, affecting specific areas without broader regional visibility. However, the sizable minority noting worsening conditions

indicates that these issues are not universally distributed, potentially concentrated around high-traffic tourist zones or during peak seasons. This finding underscores the dual challenge of balancing tourism's economic benefits with the need to prevent long-term degradation of air quality.

Interpreting these results also invites a deeper reflection on the concept of "perceived" versus "actual" impacts. While visible pollution, such as vehicle exhaust or construction debris, might elicit immediate concern, subtler forms of air quality degradation, like increased particulate matter or reduced oxygenation from vegetation loss, may go unnoticed by the general population. This discrepancy highlights the importance of integrating scientific monitoring into tourism strategies, ensuring that data-driven approaches complement local perceptions to address both visible and invisible environmental challenges.

The rise in visitor numbers can result in increased vehicle traffic and emissions, presenting a dual-edged sword for rural environments (Table 1 and 2). Additionally, the farming activities that underpin agritourism, such as the use of heavy machinery for crop harvesting and land preparation, contribute to air pollution through the emissions of carbon dioxide and volatile organic compounds. Furthermore, waste management practices associated with agritourism - such as the disposal of organic waste and the use of fertilizers - can exacerbate air quality issues. Poorly managed waste can lead to the release of methane, a potent greenhouse gas, into the atmosphere. Thus, while agritourism brings economic benefits, it is imperative to recognize the environmental costs associated with increased activity in these rural areas. Table 1 indicates that there are no problems with pollution, however, for it to remain so, Local authorities must implement mitigation strategies such as promoting public transportation options and encouraging carpooling among visitors. Additionally, some agritourism operators have adopted sustainable farming practices, including the use of electric machinery and organic farming methods, which significantly reduce emissions. By analyzing the data from tables 1 and 2 it becomes evident that while agritourism can contribute to air pollution, proactive measures can effectively mitigate these effects, creating a more sustainable model for rural tourism.

From a broader perspective, the findings align with global concerns that tourism, particularly in rural areas, risks contributing to cumulative environmental pressures. Increased vehicle usage, the establishment of tourism infrastructure, and energy demands are known contributors to air quality

issues. When combined with other ecological challenges such as habitat loss, soil erosion, and the endangerment of biodiversity (Verma et al., 2023), the cumulative impact of tourism calls for proactive intervention. These insights emphasize the critical role of sustainable rural tourism practices, which must harmonize economic opportunities with environmental stewardship. Enhancing public awareness, promoting eco-friendly transportation options, and incentivizing green infrastructure development are essential steps to ensure that air pollution does not compromise the long-term viability of rural tourism destinations.

Table 1. Pollution

		Air pollution		Total
		Worse	No change	
Gender	Male	105	151	256
	Female	93	119	212
Total		198	270	468

Source: Panić, 2024

Since the p-value exceeds the commonly used threshold of 0.05 (Table 2), the results suggest that there is no statistically significant relationship between gender and respondents' perceptions of air pollution. This suggests that male and female respondents evaluate changes in air quality similarly, with no notable gender-based divergence in their assessments. While gender does not appear to influence perceptions in this context, the findings open the door to deeper exploration of other variables that might shape individual views.

The absence of a gender difference could reflect the universal nature of air quality as an environmental concern that affects all residents, regardless of their roles or responsibilities. Unlike resources like water or land, where gendered interactions are more distinct, air quality is pervasive and less tied to specific daily activities. This universality may explain the shared perspective among respondents, as both genders are equally exposed to tourism-related sources of air pollution, such as vehicle emissions, construction activities, or changes in vegetation. This finding points to other factors, such as proximity to tourism hotspots or individual environmental awareness, as likely influences on perceptions of air pollution. Residents closer to heavily trafficked areas or tourism infrastructure may notice impacts more acutely, while broader awareness shaped by education or media exposure may also play a role. The results emphasize the need to combine community insights with scientific monitoring to capture both perceived and actual air quality changes.

Table 2. Pearson Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	,387 ^a	1	,534

Source: Panić, 2024

The data on perceptions of ecosystem degradation (Table 3) reveals notable differences in how male and female respondents evaluate the impact of tourism activities. Out of 468 participants, 19 individuals (4.1%) rated the ecosystem as "much worse", 237 (50.6%) rated it as "worse", and 212 (45.3%) perceived "no change". Among male respondents ($n = 256$), 9 individuals (3.5%) indicated that ecosystem conditions were "much worse", 97 (37.9%) reported "worse", and 150 (58.6%) observed "no change". Conversely, among female respondents ($n = 212$), 10 individuals (4.7%) perceived the ecosystem as "much worse," 140 (66.0%) as "worse", and only 62 (29.2%) noted "no change".

This significant difference may reflect the distinct ways men and women engage with their natural surroundings. Women, often responsible for gathering resources in rural settings, may experience ecosystem degradation more immediately and tangibly. For instance, declining vegetation or polluted water sources could disrupt daily routines, making changes in the environment more evident to them. Their caregiving roles and heightened focus on community well-being may further amplify their sensitivity to ecological shifts. Men, on the other hand, may be more likely to perceive the ecosystem through a utilitarian lens, focusing on its ability to support agricultural productivity or outdoor labor. If these functions remain unaffected, they may be less inclined to notice or prioritize broader ecological deterioration. This divergence could also stem from differences in environmental awareness and values. Women's closer ties to the community and natural resources often foster a greater sense of environmental responsibility. They may also place more emphasis on the aesthetic and biodiversity aspects of the ecosystem, viewing its preservation as integral to cultural and environmental heritage. Men, while not indifferent to these issues, might prioritize immediate, tangible outcomes, such as economic benefits from tourism, over subtle or longer-term ecological impacts.

The findings also raise questions about the visibility and communication of ecosystem changes. Tourism-related degradation may not be evenly distributed across a region. Women's activities may bring them closer to affected areas, while men's routines may limit their exposure to such changes. This spatial and experiential divide underscores the need for targeted efforts to bridge knowledge gaps,

ensuring that all community members are equally informed about the environmental effects of tourism.

Table 3. Ecosystem degradation

		Ecosystem degradation			Total
		Much worse	Worse	No change	
Gender	Male	9	97	150	256
	Female	10	140	62	212
Total		19	237	212	468

Source: Panić, 2024

The Pearson Chi-Square test results indicate a significant relationship between gender and perceptions of ecosystem degradation caused by tourism activities (Table 4). The test value is 40.605, with an asymptotic significance (p-value) of 0.000. Since the p-value is below the standard threshold of 0.05, the results demonstrate a statistically significant association between gender and how respondents evaluate the state of ecosystem degradation. This suggests that male and female participants differ in their perceptions of the impact of tourism on the ecosystem, as reflected in the earlier distribution of responses. For example, in many rural communities, women often engage in activities closely tied to natural resources, such as collecting water or doing other important roles in conservation, farming, and food responsibilities (Vercillo et al., 2021). These roles may make women more attuned to subtle changes in the ecosystem, such as a decline in vegetation or increased water scarcity.

Table 4. Pearson Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	40,605 ^a	2	,000

Source: Panić, 2024

The data on the perceived loss of aesthetic values during the summer, categorized by gender, reveals differences in how male and female respondents evaluate this impact of tourism. Among the 468 total participants, 69 respondents (14.7%) rated the loss of aesthetic values as "much worse", 265 respondents (56.6%) as "worse", and 134 respondents (28.6%) indicated "no change". These results suggest that male respondents were more likely to report severe negative impacts ("much worse" and "worse") on the aesthetic values of the environment, with 81.6% expressing concerns about degradation compared to 59.0% of female respondents. Conversely, female participants were more likely to perceive no change in aesthetic values, with 41.0% providing this response compared to only 18.4% of males.

The higher concern among men regarding the loss of aesthetic values may reflect their greater sensitivity to visible, large-scale changes in the landscape, such as deforestation, construction, or overcrowding. Men may associate these alterations with disruptions to traditional rural landscapes, potentially viewing them as a loss of natural beauty or cultural heritage. Additionally, men's higher involvement in outdoor work or recreational activities might make them more aware of these visual changes, especially in areas frequented by tourists. Conversely, the greater percentage of women perceiving "no change" might be attributed to a different set of priorities and interactions with the environment. Women, who often focus on resource use and functionality in rural settings, may be less influenced by aesthetic changes unless they directly affect daily life. Their engagement with the environment may center more on its utility rather than its visual appeal. This perspective could explain why fewer women express concerns over aesthetic degradation caused by tourism. These differences in perception also highlight varying definitions of what constitutes "aesthetic value". For men, the term might align closely with the preservation of natural landscapes and cultural landmarks, elements that tourism often alters visibly. Women, on the other hand, may integrate a broader view, where aesthetic value encompasses not just visual beauty but also environmental functionality and ecological health, which might not appear as visibly affected by tourism.

The findings emphasize the complexity of managing tourism's impact on aesthetic values in rural areas. Effective strategies must account for these gendered differences in perception, recognizing that visual changes to the environment may provoke stronger reactions in some groups than others. Policies that focus on preserving iconic landscapes, reducing visual pollution, and ensuring careful planning of tourist infrastructure could address men's concerns more directly. Meanwhile, engaging women in conservation efforts that link aesthetic value to broader ecological health could encourage a more balanced approach.

Table 5. Loss of aesthetic values, especially during the summer

		Loss of aesthetic values, esp. during the summer			Total
		Much worse	Worse	No change	
Gender	Male	50	159	47	256
	Female	19	106	87	212
Total		69	265	134	468

Source: Panić, 2024

The Pearson Chi-Square test results (Table 6) indicate a statistically significant relationship between gender and perceptions of the loss of aesthetic values during the summer. The disparity in responses might be attributed to differences in how men and women interact with or perceive the aesthetic aspects of their environment. Men may associate tourism development with visible changes, such as overcrowding or alterations to the landscape, which are more immediately noticeable during the summer. Women, on the other hand, might place greater emphasis on the functionality or use of the environment rather than its visual attributes, leading to less frequent reporting of negative changes in aesthetics.

Table 6. Pearson Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	32,619a	2	,000

Source: Panić, 2024

Perceptions of increased landslide risk show some variation between male and female respondents (Table 7). Overall, 9.6% of participants rated the risk as "much worse," 47.6% as "worse", and 42.7% as showing "no change". Among males, 62.5% perceived the risk negatively ("much worse" or "worse"), compared to 51.0% of females. Conversely, a larger proportion of females (49.1%) reported "no change" compared to males (37.5%).

Rural tourism destinations often feature natural landscapes such as mountains and valleys, which are prone to landslides due to factors like high rainfall and seismic activity (De Vilder et al., 2022). García-Chevesich et al. (2022) add that activities such as agricultural irrigation can exacerbate landslide risks by saturating subsurface materials, particularly in regions with dry climates and concentrated rainfall. The expansion of tourism infrastructure, such as roads and facilities, can further destabilize slopes, particularly when construction occurs in ecologically sensitive areas. This is a significant concern in areas with extensive agricultural practices. The level of awareness and preparedness among residents can vary based on socioeconomic factors such as development maturity, economic status, and education (Qasim & Qasim, 2020). In many rural areas, according to Alam (2020) residents may have a low perception of landslide risk, which affects their preparedness and response to potential disasters. This is, same author highlights, evident in regions like Southeast Bangladesh, where despite high-risk conditions, communities perceive low risk and show reluctance to relocate.

Similarly, in rural tourism settings, a lack of awareness about how tourism activities can exacerbate natural vulnerabilities may further hinder effective disaster management and risk reduction.

Table 7. Increased risk of landslides

		Increased risk of landslides			Total
		Much worse	Worse	No change	
Gender	Male	27	133	96	256
	Female	18	90	104	212
Total		45	223	200	468

Source: Panić, 2024

The Pearson Chi-Square test result indicates a statistically significant relationship between gender and perceptions of increased landslide risk (Table 8). This statistical significance suggests that male and female participants differ in their perceptions of tourism's impact on the likelihood of landslides. These differences could be influenced by the distinct roles and responsibilities typically undertaken by men and women in rural communities. Men may engage more frequently in activities like farming, forestry, or construction, which are directly impacted by land instability, making them more sensitive to the risk of landslides. Women, on the other hand, may interact with the environment in ways less immediately tied to land stability, which could contribute to their more frequent perception of no significant change. Additionally, social and cultural factors, such as gendered awareness of environmental risks or exposure to tourism activities that exacerbate land instability, may shape these perceptions. Understanding these nuances is crucial for developing tailored communication and risk mitigation strategies that address the concerns of all community members effectively. This approach can ensure that both genders are engaged in sustainable tourism development while minimizing the environmental and social risks associated with increased land instability.

Table 8. Pearson Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6,331 ^a	2	,042

Source: Panić, 2024

The significant proportion of respondents reporting worsening conditions suggests that tourism activities are creating noticeable disturbances to wildlife, likely driven by increased human presence and habitat encroachment. Tourism infrastructure, such as roads, accommodations, and recreational

facilities, often cuts into natural habitats, disrupting migration patterns, nesting areas, and feeding grounds. Additionally, the growing number of tourists engaging in activities like wildlife observation or off-trail hiking may inadvertently stress animal populations, altering their behavior or pushing them further from their natural ranges. These disturbances, as highlighted by Cui et al. (2021), emphasize the urgent need for improved management strategies that minimize human-wildlife interactions and mitigate the ecological impacts of tourism.

Conversely, the substantial percentage of participants perceiving no change in wildlife conditions reveals a more complex and uneven dynamic. This could indicate that some wildlife populations are more resilient or that the effects of tourism are geographically localized, concentrated in specific hotspots. For instance, species that are less reliant on habitats affected by tourism infrastructure might not exhibit visible changes, leading some residents to perceive minimal or no impact. Alternatively, this "no change" response might reflect a lack of direct interaction with or awareness of wildlife among certain segments of the population, particularly in areas less frequented by tourists.

This divergence in perceptions underscores the importance of conducting localized assessments to identify areas where wildlife disturbances are most acute. Such assessments can help pinpoint the types of species and habitats most affected by tourism, providing a targeted basis for conservation efforts. As suggested by Tsunoda & Enari (2020), balancing wildlife conservation with the needs of local communities requires innovative strategies such as land-sharing approaches, where tourism activities are designed to coexist with wildlife habitats, or compact planning that minimizes habitat fragmentation. These strategies on one hand reduce human-wildlife conflicts and on the other promote a more harmonious relationship between tourism and conservation. Moreover, tourists must be made aware of how their activities, even seemingly harmless ones, can disrupt wildlife, while locals could benefit from understanding how sustainable tourism practices can support both ecological preservation and economic growth.

Table 9. Increased disturbance of wildlife

		Disturbance of wildlife		Total
		Worse	No change	
Gender	Male	104	152	256
	Female	121	91	212
Total		225	243	468

Source: Panić, 2024

Table 10 shows a statistically significant relationship between the gender of the respondents and perceptions of wildlife disturbance caused by tourism. Those who frequently interact with natural habitats, such as farmers or outdoor workers, may be more attuned to disruptions caused by tourism activities. Banerjee & Sharma (2021) emphasize that gender roles significantly influence human-wildlife interactions. Women's roles and responsibilities, access to spaces, and interactions with wildlife are distinct from men's, indicating that gender can shape perceptions and concerns about wildlife disturbance. Men, often involved in outdoor labor such as farming or forestry, may perceive disturbances through direct interactions with wildlife or habitat changes in their work environment. Women, on the other hand, might notice disruptions more indirectly, such as through changes in biodiversity around their homes or community spaces. Additionally, women may exhibit greater environmental sensitivity due to their caregiving roles or involvement in community activities, leading to heightened concern for ecological stability. Wildlife encounters that are seen as dangerous or disruptive can hinder psychological restoration, while those perceived as fascinating or engaging can enhance it (Johansson et al., 2024). This suggests that both genders may experience wildlife disturbances differently based on their appraisal of the threat or benefit posed by the wildlife.

Table 10. Pearson Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12,572 ^a	1	,000

Source: Panić, 2024

Table 11 results suggest that a majority of participants did not observe significant impacts on plant life, but a notable minority expressed concerns about worsening conditions. Among the total respondents, the proportions of males and females perceiving worsening conditions are nearly equal, with 87 males (34.0%) and 88 females (41.5%) reporting negative impacts. However, a larger proportion of males (66.0%) indicated no change compared to females (58.5%). This slight variation may indicate that females are slightly more attuned to or concerned about changes in plant life, potentially due to differing interactions with or reliance on local flora.

Motivational factors, such as material benefits and formal institutions, play a leading role in encouraging residents to engage in environmental governance. However, the focus on economic benefits

might overshadow concerns about plant life destruction unless these are directly linked to residents' livelihoods (Fan et al., 2024). For instance, residents may prioritize broader environmental goals, like water quality or waste management, if these appear to have a more immediate connection to their economic stability. Hu et al. (2021) state that residents' environmentally responsible behavior positively influences tourists' green consumption, which can indirectly support plant conservation. For example, suppose local communities adopt visible practices such as maintaining green spaces or promoting eco-friendly tourism activities. In that case, tourists may be more likely to follow suit and support initiatives that protect vegetation. However, the primary focus might be on broader environmental issues rather than specific concerns about plant life, unless these are highlighted as part of the tourism experience. Unless the significance of vegetation preservation is explicitly highlighted - for example, by showcasing the role of local plants in biodiversity, traditional practices, or ecosystem services - plant life conservation may receive less attention from both residents and tourists.

Table 11. Destruction of plant life

		Destruction of plant life		Total
		Worse	No change	
Gender	Male	87	169	256
	Female	88	124	212
Total		175	293	293

Source: Panić, 2024

The Pearson Chi-Square test result of 2.805 indicates that there is no statistically significant relationship between the gender of the respondents and perceptions of the destruction of plant life due to tourism. This result suggests that perceptions of plant life destruction are relatively consistent across genders, indicating that factors other than gender - such as proximity to affected areas or awareness of environmental issues - may play a more critical role in shaping these perceptions. Similarly, Kor et al. (2021) observed a widespread concern for plant life sustainability in their research, although their findings did not specifically highlight gender-based differences in these concerns. This aligns with the idea that plant conservation often resonates as a universal issue, transcending demographic categories like gender. However, the level of concern may still depend on personal experiences with environmental changes, exposure to tourism activities, or cultural values tied to vegetation.

Table 12. Pearson Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2,805 ^a	1	,094

Source: Panić, 2024

The results on perceptions of increased water use due to tourism reveal a nuanced picture. While 59.0% of respondents perceived no change in water use, 40.2% believed it had worsened, and a very small fraction (0.8%) noted improvements (Table 13). The significant minority expressing concerns suggests that tourism-related activities are exerting noticeable pressure on water resources in certain areas. This could include higher water demands from accommodations, recreational facilities, and tourism-related infrastructure, especially during peak seasons. Although the majority perceived no change, this may reflect either effective water management in some regions or a lack of awareness about how tourism indirectly impacts water availability.

The finding aligns with broader observations, such as those by Cao et al. (2023), who identified weak decoupling between tourism economic growth and water consumption. This indicates that while tourism economies grow, the rate of water consumption increases at a slower pace, often due to efficient water use practices or technological advancements. Such decoupling could explain why some respondents did not observe significant changes in water use, as sustainable practices may already be mitigating more severe impacts in certain areas. However, the substantial minority reporting worsening conditions highlights areas where water management may be inadequate or where tourism's demand is particularly acute. For instance, water-intensive facilities like swimming pools, landscaped gardens, or high-capacity accommodations can strain local resources, particularly in rural areas where infrastructure may already be underdeveloped. Additionally, increased competition for water between tourism operators and local communities can exacerbate tensions and affect residents' perception of resource fairness.

These findings underscore the importance of proactive water management strategies in tourism development. Investments in water-efficient infrastructure, such as low-flow fixtures, rainwater harvesting systems, or wastewater recycling technologies, can help minimize tourism's impact on local water supplies. Equally important is raising awareness among tourists and operators about responsible water use, particularly in regions where water resources are already limited. Highlighting

water conservation as part of the tourism experience can reinforce the importance of sustainable practices. The data also suggest an opportunity to explore the broader relationship between water resource management and tourism growth. While efficient practices may reduce water consumption, a stronger focus on integrating local knowledge and community participation in water governance could further enhance outcomes. Engaging residents in monitoring water use and decision-making can ensure that tourism development does not come at the expense of local needs, fostering a more equitable and sustainable balance.

Table 13. Increase in water use

		Increase in water use			Total
		Worse	No change	Better	
Gender	Male	87	166	3	256
	Female	101	110	1	212
Total		188	276	4	468

Source: Panić, 2024

The statistical significance between genders on water use increase suggests that men and women perceive tourism-related water use differently, possibly due to varying roles, responsibilities, and interactions with water resources within their communities (Table 14). Women, who are often more directly involved in managing household water supplies, may be more aware of increased competition or shortages caused by tourism demands. This heightened awareness is likely rooted in their daily responsibilities which require consistent and reliable access to water. In contrast, men's interaction with water resources often centers on activities like agriculture or other external uses, making their concerns more focused on operational efficiency rather than immediate availability. They generally exhibit stronger positive attitudes towards water conservation compared to men. This suggests that women may be more inclined to support and engage in water-saving behaviors (Casado-Díaz et al., 2020). This tendency aligns with the observation that women prioritize domestic water use, while men emphasize irrigation systems' efficiency. This distinction reflects broader patterns in environmental attitudes, with women often displaying greater environmental concern and awareness of resource management issues. According to Lafuente et al. (2021), these differences are also influenced by women's relatively higher levels of political knowledge and engagement in water-related governance, which may enhance their understanding of the systemic challenges posed by tourism-driven water demands.

Globally, women are disproportionately affected by poor water access, particularly in regions with high water insecurity. In such areas, women frequently bear the responsibility of water collection, often traveling significant distances to secure this essential resource (Kakinuma & Wada, 2024). This highlights a significant gender-based disparity in water security, where women's livelihoods and well-being are directly impacted by the availability and quality of water resources. In tourism-dependent regions, this disparity becomes even more pronounced, as the competition for water between local communities and the tourism sector can exacerbate existing inequalities.

Table 14. Pearson Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9,351 ^a	2	,009

Source: Panić, 2024

The relatively high percentage of respondents reporting "no change" in energy use suggests that existing energy infrastructure in some rural areas is adaptable enough to handle increased demand from tourism activities without causing noticeable disruptions (Table 15). This stability may be attributed to either adequate energy capacity in certain regions or effective management practices that balance local and tourism-related energy needs. However, the 43.2% of respondents who observed worsening conditions highlight significant localized challenges. These concerns likely stem from issues such as increased competition for electricity between tourism facilities and local communities or the visible overuse of energy-intensive amenities, such as heating, cooling, and lighting in tourist accommodations or recreational spaces.

Such challenges are often exacerbated in tourism-dependent areas where seasonal demand spikes can strain already limited energy resources. For example, during peak tourist seasons, the demand for electricity in hotels, restaurants, and other facilities can compete with the energy needs of local residents, creating tensions and potential shortages. Additionally, rural regions with underdeveloped energy infrastructure are particularly vulnerable to these pressures. In such areas, even modest increases in energy demand from tourism can expose systemic weaknesses, leaving communities and tourism operations alike struggling to meet their energy needs. Tourism development inherently changes energy use patterns in rural areas. As infrastructure expands to accommodate more visitors, energy consumption grows, requiring

greater reliance on local energy systems. This development can improve energy literacy among residents, but it also necessitates more energy consumption to support tourism activities (Sun et al., 2023; Wu et al., 2022). While this growth can bring benefits it also increases the sector's dependency on energy resources. In many cases, this reliance still heavily leans on conventional energy sources, such as fossil fuels, which contribute to environmental degradation and pose a dual challenge of managing resource availability and sustainability.

Despite these concerns, tourism can also act as a catalyst for positive change in energy systems if managed properly. For instance, it can drive investments in renewable energy sources, such as solar or wind power, which not only reduce environmental impacts but also create more resilient and sustainable energy infrastructure. Tourism businesses adopting energy-efficient technologies can further help mitigate the pressure on energy resources. These advancements not only benefit the tourism sector but also improve energy access and reliability for local communities, creating a win-win situation.

Table 15. Disproportionate use of energy

		Disproportionate use of energy			Total
		Much worse	Worse	No change	
Gender	Male	4	89	163	256
	Female	0	113	99	212
Total		4	202	262	468

Source: Panić, 2024

This statistically significant result suggests that perceptions of disproportionate energy use are not evenly distributed and are influenced by the gender of the respondents (Table 16). In the case of gender, this could reflect differing interactions with or awareness of energy-related issues. For instance, women, often responsible for managing household energy consumption, might be more sensitive to the impact of tourism on local energy supplies, especially if it disrupts daily routines. In rural areas, women often bear a dual burden of productive and reproductive work. While men and women may participate equally in productive work, women typically handle most of the reproductive tasks, such as household chores, which limits their leisure time and affects their energy expenditure patterns. (Picchioni et al., 2020). This additional workload can lead to higher energy use by women in non-leisure activities. Due to the additional reproductive work, women have fewer leisure opportunities, which can further impact their energy expenditure patterns

(Picchioni et al., 2020). Conversely, men might focus on broader aspects of energy use, such as infrastructure reliability or efficiency, which could lead to differing evaluations. Pueyo et al. (2020) indicate that men-owned enterprises use electricity more frequently and intensely than women-owned enterprises, despite better business performance, due to factors like poor access to finance, education, and social norms.

Table 16. Pearson Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18,512 ^a	2	,000

Source: Panić, 2024

The data on perceptions of noise pollution caused by tourism reveals a complex dynamic between local experiences and environmental changes. Of the 468 respondents, 44.4% reported that noise pollution had worsened, while the majority (54.7%) perceived no change, and only 0.9% described the situation as "much worse" (Table 17). These findings suggest that while a significant minority is concerned about increased noise levels, the majority may not feel that tourism has notably disrupted the acoustic environment. This discrepancy highlights how noise pollution, often considered a less visible form of environmental degradation, can be experienced unevenly within rural communities.

In rural areas, even moderate increases in noise can have an outsized impact due to the typically low baseline noise levels. For local residents accustomed to tranquil environments, the addition of tourism-related sounds can significantly alter the soundscape. This change not only affects their routines and well-being but also challenges the expectations of tourists seeking quiet, restorative getaways. Additionally, noise pollution can have profound ecological effects, disrupting wildlife behavior such as breeding, feeding, and migration patterns. These disruptions can cascade through ecosystems, compounding the broader ecological impacts of tourism development.

The expansion of road networks in rural areas, as noted by Iglesias-Merchán et al. (2021), is a key driver of increased noise pollution. The growth in both the size and extent of roadways facilitates higher traffic volumes, bringing more vehicles into previously quiet and remote areas. This infrastructure development, while essential for improving accessibility and supporting tourism growth, introduces persistent sources of noise that can erode the natural tranquility of rural landscapes. The cumu-

lative effect of these changes may not be immediately visible to all residents, particularly those who view tourism as a source of economic benefit or community development. Interestingly, some studies suggest that rural residents may be less sensitive to noise pollution than urban counterparts, potentially due to a lack of awareness about its long-term effects or because the perceived economic and social benefits of tourism outweigh these concerns. For instance, improved infrastructure, increased business opportunities, and enhanced local facilities linked to tourism might offset concerns about noise for some residents. This underscores the dual nature of tourism impacts, where the same activities can be seen as both beneficial and disruptive, depending on the perspective.

Table 17. Noise pollution

		Noise pollution			Total
		Much worse	Worse	No change	
Gender	Male	0	112	144	256
	Female	4	96	112	212
Total		4	208	256	468

Source: Panić, 2024

The Pearson Chi-Square test result of a p-value of 0.077 indicates that the relationship between noise pollution perceptions and gender is not statistically significant at the conventional threshold (Table 18). One explanation for this consistency could be the localized or temporary nature of noise disruptions in rural tourism. Noise generated by activities such as seasonal events, increased traffic during peak tourism periods, or construction projects tends to be confined to specific times or areas. As a result, its impact may not be substantial enough to create noticeable disparities in how it is perceived by different demographic groups. In addition, rural tourism areas, by their nature, often maintain a baseline of quiet, making occasional noise spikes more apparent to all residents, regardless of their roles or daily routines.

The lack of significant variation could also suggest that the sources of noise pollution, such as road traffic or outdoor recreational activities, are universally experienced within these communities. Unlike issues such as water use or land pollution, which may disproportionately affect certain groups due to their specific roles or responsibilities, noise pollution is likely to be encountered in common spaces, such as near roads, tourist attractions, or public venues, leading to more uniform perceptions across genders.

Table 18. Pearson Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5,139 ^a	2	,077

Source: Panić, 2024

The relatively high percentage of respondents (50.6%) reporting worsening conditions underscores growing concerns about tourism's impact on land quality (Table 19). This highlights the strain that tourism-related activities place on rural environments, particularly in areas where waste management systems are underdeveloped or inadequate. Issues such as littering, improper waste disposal, and the proliferation of single-use plastics are common in regions that experience seasonal surges in tourist numbers. These activities not only degrade the visual appeal of rural landscapes but also contribute to long-term ecological harm. One major factor contributing to these perceptions is the expansion of tourism infrastructure, which often encroaches upon natural landscapes. The construction of accommodations, roads, and recreational facilities, especially near ecologically sensitive areas like lakes and forests, can fragment habitats and reduce biodiversity. As noted by Jinghui et al. (2020), these land-use changes often come at the expense of natural beauty and ecological balance, eroding the very features that make rural areas attractive to tourists. Additionally, increased soil erosion, runoff, and nitrogen export associated with these developments can impair water quality in nearby ecosystems, further exacerbating environmental degradation. Such changes are often highly visible to residents, reinforcing the perception of worsening land conditions and amplifying concerns about the sustainability of tourism development.

Tourism's impact on land quality also highlights the challenge of balancing economic growth with environmental stewardship. While tourism can generate economic opportunities, its rapid and unregulated growth often creates unintended consequences, such as the overuse of natural resources and the loss of pristine landscapes. Rural communities that depend on these resources for their livelihoods may find their quality of life diminished as pollution and degradation increase. Residents often perceive these changes as direct threats to the sustainability of their environment, which can lead to tensions between tourism operators and local populations (Krstić et al., 2024).

Table 19. Land pollution

		Land pollution			Total
		Much worse	Worse	No change	
Gender	Male	5	159	92	256
	Female	8	78	126	212
Total		13	237	218	468

Source: Panić, 2024

The significant relationship between gender and perceptions of land pollution caused by tourism highlights how gendered roles and responsibilities shape environmental awareness. Women, often tasked with managing household waste and participating in community-level environmental activities, are likely more attuned to visible forms of land pollution, such as litter or improperly disposed waste, and its immediate impacts on daily life. Their proximity to these issues makes them more sensitive to changes in environmental conditions that affect their routines and responsibilities. This aligns with findings by Tantoh et al. (2021), who note that women in rural areas frequently face disenfranchisement in accessing and managing land resources, further exacerbating their vulnerability to environmental challenges like land pollution.

This limited access to land management and decision-making processes can amplify women's concerns, as they often have less agency in implementing or influencing conservation efforts. Despite their close interaction with the land, women may lack the formal authority to address pollution issues, leading to frustration and a heightened awareness of its negative effects. Conversely, men, whose interactions with the environment are often tied to outdoor labor or occupational activities, such as farming or construction, might evaluate land pollution differently. Their focus may be less on the visibility of waste and more on how pollution impacts the land's functionality and utility for economic activities. For instance, men may prioritize concerns about soil fertility or land availability over littering or waste disposal. These differing perspectives reflect the broader socio-cultural dynamics in rural communities, where gender roles influence how individuals interact with and perceive environmental issues. Women's concerns may also be driven by the cumulative impact of land pollution on family health, aesthetics, and community well-being, while men might view land degradation through the lens of productivity and resource use. This divergence underscores the importance of considering both perspectives when addressing land pollution in tourism areas.

Table 20. Pearson Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	,387 ^a	1	,534

Source: Panić, 2024

CONCLUSION

This study examined the ecological impacts of rural tourism development in selected villages, focusing on how residents perceive changes in various environmental indicators. The findings confirm that rural tourism development significantly affects ecological indicators, supporting the primary hypothesis (H1). Respondents identified several key environmental issues, including increased air and land pollution, higher water consumption, and risks such as ecosystem degradation and landslides. These findings align with global concerns about the environmental trade-offs of tourism development, particularly in fragile rural settings where ecosystems are more vulnerable to anthropogenic pressures. The study also underscores the importance of local perceptions as a valuable tool for assessing ecological impacts, as residents serve as direct witnesses to changes in their environment caused by tourism. This reinforces the need for participatory approaches in planning and monitoring rural tourism initiatives, ensuring that the voices of affected communities are heard. Moreover, the study highlights how these impacts are not uniform, with some respondents reporting no significant changes, suggesting that environmental challenges might be concentrated in high-tourism areas or periods. Understanding these dynamics can help policymakers design more localized and context-specific interventions to balance tourism growth with environmental preservation.

The study explored gender as a variable influencing perceptions of ecological impacts, providing strong support for H1b. Results show that women were more likely than men to perceive worsening conditions, especially in areas like ecosystem degradation, water use, and land pollution. These gender-based differences reflect the distinct roles and responsibilities traditionally held by men and women in rural communities. Women often manage resources such as water and household waste, which makes them more sensitive to the pressures tourism places on these systems. For instance, competition for water resources with tourism facilities may directly impact women's daily routines, such as cooking, cleaning, or agricultural activities that rely on consistent water availability. Conversely, men, whose interaction with the environment is often

linked to outdoor work or farming, may be less focused on immediate resource competition and more attuned to broader operational challenges. This finding supports the growing body of literature emphasizing the gendered nature of environmental experiences and highlights the importance of including women in decision-making processes regarding tourism planning. By incorporating gender-specific perspectives, tourism policies can be better tailored to address the unique needs and concerns of all community members, ultimately fostering more sustainable and equitable outcomes.

The study also revealed trends that transcend gender, showing broader community concerns about tourism's environmental impacts. While a majority of respondents reported "no change" in some indicators, such as air pollution and noise, a substantial minority expressed concerns about worsening conditions. For example, increases in land and water pollution were commonly cited, likely driven by inadequate waste management systems and heightened demand for resources during peak tourist seasons. Tourism infrastructure expansion, such as road construction, lodging facilities, and recreational areas, can intensify these issues by disturbing natural habitats and introducing waste-intensive activities. These pressures are particularly acute in rural areas where infrastructure is often underdeveloped, leaving local systems unable to cope with sudden surges in demand. Additionally, localized effects, such as visible littering near popular tourist sites or increased vehicle emissions, may explain why some respondents experience more pronounced impacts than others. This uneven distribution of tourism's environmental consequences highlights the need for targeted interventions, such as zoning regulations, investment in waste management, and renewable energy initiatives. Ensuring that the benefits of tourism are equitably shared while minimizing ecological harm will be crucial for the sustainable development of rural tourism destinations.

Despite the study's significant findings, several limitations should be acknowledged, which could guide future research. First, the sample was restricted to specific villages, limiting the generalizability of results to other rural tourism destinations with differing environmental, cultural, or socioeconomic contexts. For example, rural areas with more robust infrastructure or higher environmental awareness among residents may experience and perceive tourism impacts differently. Second, while gender was a central variable in this study, other factors, such as age, education, occupation, or proximity to tourism hotspots, were not explored in-depth,

though these may also play a critical role in shaping perceptions. Third, the cross-sectional nature of the study captures perceptions at a single point in time, which may not reflect changes in attitudes or environmental conditions over the long term. Future research should consider conducting longitudinal studies to track how tourism impacts evolve and how community perceptions shift with the growth of tourism and implementation of sustainability initiatives. Additionally, expanding the scope of the research to include a greater diversity of rural settings would provide more comprehensive insights into the relationship between tourism and ecological sustainability. Integrating qualitative methods, such as in-depth interviews or focus groups, could also enrich the findings by capturing nuanced perspectives that might be missed in quantitative surveys. Ultimately, by addressing these gaps, future research can better inform policies and practices that promote sustainable rural tourism while safeguarding the ecological and social integrity of host communities.

The outcomes of this study contribute to the growing body of knowledge on rural tourism and its implications for rural development and quality of life. Future research endeavors should delve deeper into understanding the specific mechanisms that drive gender-based disparities and focus on developing strategies to empower women in rural destinations. Furthermore, addressing environmental concerns should remain a top priority, as rural tourism continues to evolve and shape the future of Western Serbia and similar regions. Ultimately, the findings emphasize the potential of rural tourism as a driver of positive change and prosperity in rural communities, and the importance of continued efforts to balance economic development with cultural preservation and environmental conservation.

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