

Environmental Sustainability as a Driver of Tourism Performance: Evidence from the Western Balkans

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Abstract: The relationship between environmental sustainability and tourism performance has become increasingly important in sustainable tourism research and policy. This study examines the association between environmental sustainability and two dimensions of tourism performance—international tourist arrivals and tourism receipts—in five Western Balkan countries: Serbia, Montenegro, Albania, North Macedonia and Bosnia and Herzegovina. The analysis is based on a small balanced panel dataset comprising 15 country-year observations for 2019, 2021 and 2024, corresponding to the available editions of the Travel & Tourism Development Index (TTDI). A parsimonious pooled OLS model is applied, with the Environmental Sustainability pillar of the TTDI as the key explanatory variable and international tourist arrivals and tourism receipts as separate dependent variables. The results indicate a positive and statistically significant association between environmental sustainability and international tourist arrivals ($\beta = 1.971$, $p = 0.006$). In contrast, the association between environmental sustainability and tourism receipts is positive but not statistically significant ($\beta = 0.857$, $p = 0.156$). The findings suggest that environmental sustainability is more clearly associated with tourism volume than with tourism-related economic outcomes in the observed sample. Given the small sample and single-predictor specification, the results should be interpreted as exploratory evidence of association rather than as evidence of causal effects. The study contributes empirical evidence from an under-researched Western Balkan context and highlights the importance of distinguishing between visitor numbers and tourism revenues when assessing the relationship between sustainability and tourism performance. The findings suggest that sustainability should be integrated into tourism development strategies alongside measures aimed at increasing the economic value generated by tourism.

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Keywords: Sustainable tourism; Environmental sustainability; Tourism performance; Western Balkans

1 Introduction

Sustainable development has remained a central issue in tourism research and policy since the publication of the Brundtland Report in 1987. More than three decades later, debates surrounding sustainable tourism continue to evolve, reflecting the complexity of balancing environmental protection, economic development and social well-being within tourism systems. Budeanu et al. (2016) emphasize that critical discussions concerning sustainable tourism remain ongoing, indicating that important theoretical and practical questions have not yet been fully resolved. In particular, a persistent gap exists between the conceptual development of sustainable tourism and its implementation in tourism planning, management and policy (Stumpf et al., 2016). Although the academic literature has expanded considerably, concerns remain regarding the extent to which sustainability principles are effectively translated into concrete tourism practices and measurable outcomes (Lana, 2009; Budeanu et al., 2016; Bramwell et al., 2017; Mura & Wijesinghe, 2023).

Environmental sustainability represents an increasingly important dimension of this debate. Growing concerns regarding resource consumption, ecosystem degradation, waste generation, energy use and climate-related pressures have strengthened the emphasis on environmental responsibility within tourism development (Purwanda & Achmad, 2022). Tourism destinations depend heavily on the quality and availability of natural resources, while tourism activities can simultaneously generate pressures on ecosystems and local communities. Consequently, sustainable environmental practices have become increasingly relevant to the long-term resilience and competitiveness of tourism destinations. This is particularly evident in the accommodation sector, where resource consumption and environmental impacts are significant and where the adoption of sustainable practices can contribute to more efficient resource management (Çelik et al., 2021; Baloch et al., 2023).

The relationship between environmental sustainability and tourism performance, however, is not necessarily straightforward. Sustainability may contribute to destination attractiveness by supporting the quality of natural environments and responding to changing visitor preferences, but tourism performance is also shaped by a wide range of economic, institutional, infrastructural and destination-specific factors. Moreover, greater tourism development may itself provide destinations with additional resources and incentives to invest in environmental protection and sustainability initiatives. This suggests that the relationship between sustainability and tourism performance may involve reciprocal and potentially complex mechanisms rather than a simple one-directional relationship.

These issues are particularly relevant in the Western Balkans, where tourism has expanded significantly while countries continue to face structural, environmental and institutional challenges. Serbia, Montenegro, Albania, North Macedonia and Bosnia and Herzegovina possess substantial natural and cultural tourism resources and have increasingly integrated tourism into broader development and European integration strategies. At the same time, differences in tourism intensity, infrastructure, environmental management and institutional capacity contribute to considerable heterogeneity across the region (Knez et al., 2022; Mitić et al., 2022). Despite this growing importance, empirical evidence on the relationship between environmental sustainability and tourism performance in the Western Balkans remains relatively limited compared with research focusing on more established European tourism destinations.

Against this background, the main objective of this study is to examine whether environmental sustainability is associated with tourism performance in the Western Balkan countries, measured through two distinct outcomes: international tourist arrivals and tourism receipts. The analysis uses a small balanced panel dataset covering five countries and three observation years—2019, 2021 and 2024—which correspond to the available editions of the Travel & Tourism Development Index (TTDI).

Given the limited number of observations and data constraints, a parsimonious pooled OLS specification is employed, with the Environmental Sustainability pillar of the TTDI as the key explanatory variable.

Accordingly, the study addresses the following research questions:

RQ1: Is environmental sustainability positively associated with international tourist arrivals in the Western Balkan countries?

RQ2: Is environmental sustainability positively associated with tourism receipts in the Western Balkan countries?

Based on these research questions and the broader literature on sustainable tourism, two hypotheses are formulated:

H1: Environmental sustainability is positively associated with international tourist arrivals in the Western Balkan countries.

H2: Environmental sustainability is positively associated with tourism receipts in the Western Balkan countries.

The contribution of the study is twofold. First, it provides exploratory empirical evidence on the association between environmental sustainability and two dimensions of tourism performance—international tourist arrivals and tourism receipts—in a relatively under-researched regional context. Second, by examining tourism volume and tourism-related economic outcomes separately, the study provides a more differentiated perspective on the relationship between sustainability and tourism performance. This distinction is relevant because an association between sustainability and a higher number of visitors does not necessarily imply a corresponding association with tourism revenues.

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The study is deliberately positioned as an exploratory analysis. The small balanced panel of 15 country-year observations and the use of a single key explanatory variable limit the extent to which the estimated relationships can be interpreted as causal. In particular, the specification does not fully account for potential omitted variables or reverse causality between tourism development and sustainability investment. The findings therefore indicate statistical associations within the observed sample rather than definitive causal effects. This limitation also provides a basis for future research using larger datasets, additional explanatory variables and more advanced panel-data and dynamic estimation approaches.

2 Method

2.1 Study area

The empirical analysis focuses on the Western Balkan countries (Serbia, Montenegro, Albania, North Macedonia and Bosnia and Herzegovina) which represent emerging tourism destinations characterized by rich natural and cultural resources, increasing tourism activity, and growing integration into the European tourism market. Despite their considerable tourism potential, these countries continue to face structural and environmental challenges (Knez et al., 2022), making the region particularly relevant for examining the relationship between environmental sustainability and tourism performance within the context of sustainable development and European integration processes (Mitić et al., 2022).

Figure 1 Map of Research Area



Source (Authors, 2026).

2.2 Data Sources and Variables

The analysis is based on a small balanced panel dataset comprising five Western Balkan countries—Serbia, Montenegro, Albania, North Macedonia and Bosnia and Herzegovina—and three observation years: 2019, 2021 and 2024. These years correspond to the available editions of the Travel & Tourism Development Index (TTDI), which provides the measure of the Environmental Sustainability pillar used in this study. The use of these non-consecutive observation years reflects the periodic availability of the TTDI rather than missing annual observations. The resulting dataset contains 15 country-year observations.

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Table 1: Description of Variables and Data Sources

Variable	Description	Source
International tourist arrivals	Number of inbound tourists (thousands)	World Bank
Tourism receipts	International tourism receipts (USD, millions)	World Bank
Environmental sustainability	Index measuring environmental performance of tourism sector (1–7 scale)	World Economic Forum (TTDI)
Cultural resources	Indicator of cultural assets and heritage attractiveness	World Economic Forum (TTDI)
Natural resources	Indicator of natural tourism potential	World Economic Forum (TTDI)
Disaster count	Number of natural disasters per year	EM-DAT
CO ₂ emissions per capita	Metric tons of CO ₂ emissions per capita	World Bank

Source: own.

Two dependent variables are used to capture different dimensions of tourism performance. The first is international tourist arrivals, measured in thousands, which represents the volume of international tourism demand. The second is tourism receipts, measured in USD millions, which reflects the monetary dimension of tourism performance. Both variables are transformed using natural logarithms prior to estimation. The logarithmic transformation reduces the influence of differences in scale and extreme observations and allows the estimated coefficient to be interpreted as a semi-elasticity because the explanatory variable remains in its original level form (Naudé & Saayman, 2005).

The key explanatory variable is Environmental Sustainability, measured using the Environmental Sustainability pillar of the Travel & Tourism Development Index. The indicator is measured on a scale from 1 to 7, with higher values representing stronger environmental sustainability performance. The pillar captures dimensions related to environmental regulation, ecosystem protection and sustainable resource management. Environmental Sustainability is retained in its original level form in the regression models.

Given the limited number of observations, a parsimonious modelling strategy is adopted. The final specification focuses on Environmental Sustainability as the key explanatory variable in order to examine its association with the two selected measures of tourism performance while avoiding an excessive number of parameters relative to the available observations. Several additional variables were considered in preliminary specifications, including cultural resources, natural resources, disaster occurrence and CO₂ emissions. These variables were not retained in the final specification because their inclusion did not produce statistically significant relationships within the available sample and would have increased model complexity considerably given the small number of observations. The preliminary specifications are discussed separately and, where appropriate, reported in the Appendix.

Although the dataset has a panel structure, the empirical analysis uses pooled Ordinary Least Squares (pooled OLS). Country- and time-specific fixed effects are not included because the dataset contains only five countries and three observation years. With such a small number of cross-sectional units and time periods, introducing multiple fixed effects would substantially reduce the degrees of freedom and limit the reliability and interpretability of the estimates. The pooled OLS specification is therefore used as a parsimonious exploratory approach that provides an initial assessment of the statistical association between environmental sustainability and tourism performance.

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The empirical models are specified as follows:

$$\ln(Arrivals_{it}) = \beta_0 + \beta_1 Environmental\ Sustainability_{it} + \varepsilon_{it} \quad (1)$$

$$\ln(Receipts_{it}) = \beta_0 + \beta_1 Environmental\ Sustainability_{it} + \varepsilon_{it} \quad (2)$$

where i denotes country and t denotes the observation year (2019, 2021 or 2024) represents international tourist arrivals, $Receipts_{it}$ represents tourism receipts, and $Environmental\ Sustainability_{it}$ denotes the Environmental Sustainability score of the TTDI. β_0 is the constant term, β_1 is the estimated coefficient of Environmental Sustainability, and ε_{it} represents the error term.

Two dependent variables are used to capture different dimensions of tourism performance. The first is international tourist arrivals, measured in thousands, which represents the volume of international tourism demand. The second is tourism receipts, measured in USD millions, which captures the economic dimension of tourism performance.

The key explanatory variable is Environmental Sustainability, measured using the Environmental Sustainability pillar of the Travel & Tourism Development Index (TTDI). The indicator is measured on a scale from 1 to 7, with higher values indicating stronger environmental sustainability performance. It captures dimensions related to environmental regulation, ecosystem protection and sustainable resource management. Prior to estimation,

international tourist arrivals and tourism receipts are transformed using natural logarithms, while the Environmental Sustainability variable remains in its original level form. The logarithmic transformation of the tourism variables reduces the influence of differences in scale and extreme observations and can contribute to a more stable distribution of the dependent variables. It also allows the estimated coefficient of Environmental Sustainability to be interpreted as a log-level semi-elasticity rather than as a percentage-to-percentage elasticity. Following Naudé and Saayman (2005), the logarithmic specification is used to facilitate the analysis of proportional differences in tourism performance across observations and to provide a more appropriate functional form for the regression analysis.

Results

Table 2 presents descriptive statistics for the variables used in the analysis. The results indicate substantial variation in tourism indicators across the Western Balkan countries, particularly in tourist arrivals and tourism receipts. Environmental sustainability shows relatively low dispersion, suggesting similar sustainability levels across the observed countries.

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Tourist arrivals (thousands)	1773.2	1911.7	118	6738
Tourism receipts (USD, millions)	1209.0	854.3	165.1	2990.5
T&T share of GDP (%)	4.11	3.25	1.0	10.4
Environmental sustainability	4.24	0.39	3.78	4.91

Source: own.

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The descriptive statistics reveal considerable variability in tourism indicators across the Western Balkan countries, particularly in tourist arrivals, tourism receipts, and the share of tourism in GDP, reflecting different levels of tourism development and economic dependence on tourism. In contrast, environmental sustainability shows relatively low variation among the observed countries, indicating broadly similar sustainability performance across the region.

Table 3: Results of the regression analysis

Variables	ln(Arrivals)	ln(Receipts)
Environmental Sustainability	1.971*** (0.006)	0.857 (0.156)
Constant	-1.421 (0.588)	3.169 (0.214)
Observations	15	15
R ²	0.453	0.148

Source: own.

* Note: Preliminary specifications incorporating cultural resources, natural resources, disaster occurrence and CO₂ emissions were also estimated. These specifications did not yield statistically significant coefficients for the respective climate- and resource-related variables and are therefore not reported in the main table. The final specification was selected to maintain parsimony given the small sample size. Full preliminary estimates can be provided in an appendix/supplementary material.

Table 3 reports the results of the pooled OLS regression models examining the association between environmental sustainability and two dimensions of tourism performance in the Western Balkan countries: international tourist arrivals and tourism receipts. Given the small

sample and the parsimonious model specification, the results should be interpreted as exploratory evidence of statistical association rather than as evidence of causal effects.

The first model indicates a positive and statistically significant association between environmental sustainability and international tourist arrivals. The coefficient of Environmental Sustainability is 1.971 ($p = 0.006$), indicating that higher sustainability scores are associated with higher levels of international tourist arrivals. Since tourist arrivals are expressed in logarithmic form while Environmental Sustainability is measured in levels, the coefficient represents a log-level semi-elasticity. Thus, a one-unit increase in the Environmental Sustainability score is associated with an increase of 1.971 units in the log of international tourist arrivals, within the observed sample and model specification.

The second model shows a positive but statistically non-significant association between environmental sustainability and tourism receipts. The estimated coefficient is 0.857 ($p = 0.156$), indicating that higher sustainability scores are associated with higher tourism receipts in the estimated model; however, the relationship does not reach conventional levels of statistical significance. Therefore, the results do not provide sufficient evidence to reject the null hypothesis of no statistically significant association between environmental sustainability and tourism receipts.

The two specifications also differ in their explanatory power. The model for international tourist arrivals has an R^2 of 0.453, indicating that environmental sustainability accounts for approximately 45.3% of the observed variation in the logarithm of tourist arrivals within this parsimonious specification. The model for tourism receipts has a substantially lower R^2 of 0.148, with environmental sustainability accounting for approximately 14.8% of the variation in the logarithm of tourism receipts. The lower explanatory power of the latter model suggests that tourism receipts are likely to reflect a broader set of economic, market and destination-specific factors that are not captured by the single-predictor specification.

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3 Policy implications and discussion

The findings of this study provide several policy-relevant insights for sustainable tourism development in the Western Balkan countries. The positive and statistically significant association between environmental sustainability and international tourist arrivals suggests that sustainability may represent an important dimension of destination competitiveness. However, given the small sample and the parsimonious pooled OLS specification, these findings should be interpreted as exploratory evidence of association rather than as evidence of a direct causal effect (Papp-Vary et al., 2025).

First, policymakers should continue to prioritize investments in environmental protection and sustainable resource management as part of broader tourism development strategies. This includes improving waste management systems, protecting natural ecosystems, promoting energy efficiency, and encouraging more efficient use of natural resources within the tourism sector. Although the present analysis does not establish a direct causal mechanism, the positive association observed between environmental sustainability and tourist arrivals supports the relevance of these areas for destination attractiveness and long-term tourism competitiveness.

Second, governments should strengthen the integration of sustainability principles into national and regional tourism strategies. This involves aligning tourism development policies with broader environmental objectives and encouraging tourism stakeholders—including accommodation providers, transport operators and local communities—to adopt more sustainable practices. Certification schemes, environmental standards and green-labeling initiatives may provide practical mechanisms for supporting this transition. Such measures can also contribute to establishing a more consistent sustainability profile across Western Balkan destinations.

Third, the different results obtained for tourist arrivals and tourism receipts highlight the importance of distinguishing between tourism volume and tourism-related economic outcomes. While environmental sustainability is positively and significantly associated with tourist arrivals, its positive association with tourism receipts is not statistically significant. This suggests that attracting a larger number of visitors does not necessarily correspond to stronger tourism revenues. Consequently, tourism policies should not focus exclusively on increasing visitor numbers but should also consider the economic value generated by tourism. A shift from a predominantly volume-based toward a more value-oriented tourism model could involve promoting higher-quality tourism products, extending the average length of stay, increasing visitor spending, and targeting market segments that generate greater local economic benefits (Becken, 2019).

Finally, regional cooperation among Western Balkan countries could strengthen the implementation of sustainability-oriented tourism policies. Joint initiatives, cross-border tourism routes, coordinated destination marketing and the development of shared sustainability standards could help improve the visibility and competitiveness of the region while supporting more consistent environmental practices. Cooperation may be particularly relevant for destinations that share ecosystems, cultural landscapes and tourism corridors across national borders.

The findings suggest that environmental sustainability should be considered as one component of a broader tourism competitiveness strategy rather than as a standalone determinant of tourism performance. The statistically significant association with tourist arrivals provides support for further investment in sustainability, while the absence of a statistically significant relationship with tourism receipts indicates that environmental improvements alone may not be sufficient to generate stronger economic returns from tourism. Future policies should therefore combine environmental objectives with measures addressing tourism quality, visitor spending, destination management and local value creation. Given the exploratory nature of the present analysis, these implications should be further assessed using larger datasets and models that incorporate additional economic, institutional, climate-related and destination-specific determinants.

4 The findings and conclusions of the paper with thoughts and suggestions for further research

This study examined the association between environmental sustainability and two dimensions of tourism performance—international tourist arrivals and tourism receipts—in five Western Balkan countries using a small panel dataset comprising observations for 2019, 2021 and 2024. The findings provide exploratory evidence of a positive and statistically

significant association between environmental sustainability and international tourist arrivals. The coefficient of Environmental Sustainability is positive and statistically significant at the 1% level, supporting H1 and suggesting that countries with higher sustainability scores tend to record higher levels of international tourist arrivals within the observed sample.

In contrast, the estimated association between environmental sustainability and tourism receipts is positive but not statistically significant. Therefore, H2 is not supported. This finding indicates that the positive relationship observed for tourism volume does not necessarily extend to tourism-related economic outcomes. The difference between the two results highlights the importance of distinguishing between destination attractiveness in terms of visitor numbers and the economic value generated by tourism. Factors such as visitor spending, length of stay, tourism product structure and market composition may contribute to tourism revenue outcomes, although these factors were not directly examined in the present analysis.

The preliminary specifications incorporating climate- and resource-related variables did not produce statistically significant relationships within the observed sample. These results should be interpreted cautiously and should not be taken as evidence that climate-related factors are unimportant for tourism development in the Western Balkans. Rather, the limited number of observations, the restricted time horizon and the availability and measurement of climate-related indicators constrain the ability of the present model to capture potentially longer-term or more complex climate–tourism relationships.

From a policy perspective, the findings support the continued integration of environmental sustainability into tourism development strategies across the Western Balkans. Sustainability-oriented investments in environmental protection, resource management, energy efficiency and green tourism practices may contribute to destination attractiveness and competitiveness. At the same time, the absence of a statistically significant association with tourism receipts suggests that sustainability policies should be complemented by measures aimed at increasing the economic value generated by tourism. These may include the development of higher-value tourism products, extension of visitor stays, diversification of tourism offers and strategies aimed at increasing local economic benefits.

The study has several limitations. Most importantly, the analysis is based on a small balanced panel of 15 country-year observations, which limits statistical power and restricts the use of more complex panel-data specifications. The single-predictor model is also subject to potential omitted-variable bias and reverse causality. Consequently, the estimated relationships should be interpreted as exploratory associations rather than causal effects. Future research should extend the temporal and geographical coverage of the analysis, incorporate additional economic, institutional, climate-related and destination-specific variables, and apply fixed-effects or dynamic panel approaches when a sufficiently large dataset becomes available. Such research could also investigate potential feedback mechanisms between sustainability investment, destination attractiveness, tourist arrivals and tourism carrying capacity.

Despite these limitations, the study contributes exploratory empirical evidence on the relationship between environmental sustainability and tourism performance in the Western Balkans, a region that remains relatively underrepresented in the empirical sustainable tourism literature. The results suggest that environmental sustainability is relevant to understanding tourism performance, particularly in relation to visitor numbers, while its relationship with tourism revenues appears more complex and requires further investigation.

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