Sustainable Environmental Tourism Practices and their Relationship with Tourist Satisfaction in Geotourism Areas in Bohol

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ABSTRAC2

This study assessed the sustainable environmental tourism practices and their relationship with tourist satisfaction in geotourism areas in Bohol, Philippines. Specifically, it examined sustainability practices in three dimensions—solid waste management, water conservation, and energy efficiency—and evaluated tourist satisfaction through service quality and physical environment. Using a descriptive-correlational design, data were collected from 300 tourists visiting four geotourism sites: Can-umantad Falls (Candijay), Cabagnow Cave Pool (Anda), Hinagdanan Cave (Dauis), and Pahangog Twin Falls (Dimiao). Results showed that tourists perceived sustainable practices at a high level (grand mean = 3.60), with solid waste management rated highest and energy efficiency lowest. Tourist satisfaction was also notably high (grand mean = 3.47), driven primarily by staff hospitality and site safety. A significant positive relationship was found between sustainable environmental tourism practices and tourist satisfaction ($r = 0.459$, $p < .001$), although the R^2 of 0.211 indicated that sustainability practices accounted for 21.1% of variance in satisfaction. Age and civil status significantly predicted both sustainability perception and satisfaction, while educational attainment was the only variable showing a significant difference in satisfaction levels. The study recommends stronger visibility of energy-saving measures, improved enforcement of conservation policies, and continued investment in hospitality and comfort infrastructure. The modest R^2 highlights the multi-dimensional nature of tourist satisfaction and calls for future multi-predictor models. Limitations include the reliance on convenience sampling and self-reported data; future research should employ probability sampling, expanded multi-destination scopes, and mixed-methods designs to strengthen generalizability and causal inference.

Keywords: geotourism, sustainable tourism, tourist satisfaction, Bohol, environmental practices

INTRODUCTION

Sustainable environmental tourism practices have become a central concern in global tourism development, particularly as destinations strive to balance economic growth with ecological preservation and cultural integrity (Amerta et al., 2018). Geotourism—a form of sustainable tourism that focuses on geological features and natural landscapes—has emerged as a significant framework for destinations seeking to promote conservation while enhancing visitor experiences (Dowling, 2013). In the Philippines, the province of Bohol stands out as a prime geotourism destination, boasting diverse geological formations, waterfalls, cave systems, and coastal ecosystems that attract both domestic and international visitors.

Key sustainable practices in geotourism include biodiversity conservation, natural resource protection, eco-friendly infrastructure development, and responsible visitor management (Sharmili & Kannan, 2020). Research indicates that tourists who participate in environmentally responsible activities report higher satisfaction levels and are more likely to revisit destinations and recommend them to others (Costa et al., 2019). Despite growing scholarly interest in sustainable tourism and visitor satisfaction, limited research has specifically examined these dynamics within Bohol's geotourism context.

This study fills that gap by examining the level of perception of sustainable environmental tourism practices and their relationship with tourist satisfaction across four geotourism sites in Bohol. Guided by Perceived Value Theory (Iniesta-Bonillo et al., 2016), the SERVQUAL model (Parasuraman, Zeithaml & Berry), and

Butler's Tourism Area Life Cycle (TALC) model, the study contributes to the growing body of knowledge on sustainable tourism management in Southeast Asia.

Statement of the Problem

This study aimed to assess the influence of sustainable environmental tourism practices and their relationship with tourist satisfaction in geotourism areas in Bohol. Specifically, it sought to: (1) determine the demographic profile of respondents; (2) assess the level of perception of sustainable environmental tourism practices; (3) measure the level of tourist satisfaction; (4) determine the significant relationship between sustainable practices and tourist satisfaction; (5) examine the relationship between demographic profile and both sustainability perception and tourist satisfaction; and (6) identify significant differences in tourist satisfaction by demographic group.

Hypotheses

At the 0.05 level of significance, the following null hypotheses were tested:

H_0: There is no significant relationship between sustainable environmental tourism practices and tourist satisfaction.

H_0: There is no significant relationship between demographic profile and sustainable environmental tourism practices.

H_0: There is no significant relationship between demographic profile and tourist satisfaction.

METHODS

Research Design

The study employed a descriptive-correlational research design. Quantitative data were gathered using a structured questionnaire as the primary data collection instrument, enabling both descriptive analysis of sustainability perceptions and satisfaction levels, and correlational analysis to identify relationships between variables.

Research Environment

The study was conducted across four geotourism sites in Bohol, Philippines: (1) Can-umantad Falls in Candijay, a scenic waterfall in the eastern part of the province approximately 92 km from Tagbilaran City; (2) Cabagnow Cave Pool in Anda, a natural sinkhole with crystal-clear blue water located 99 km from Tagbilaran City; (3) Hinagdanan Cave in Dauis, a natural limestone cavern on Panglao Island about 12 km from Tagbilaran City; and (4) Pahangog Twin Falls in Dimiao, a scenic dual-cascade waterfall located 38 km from Tagbilaran City. These sites represent the rich geological and ecological diversity of Bohol.

Participants

A total of 300 tourists participated in the study, selected through convenience sampling based on availability and willingness to participate during site visits. Participation was entirely voluntary, and informed consent was obtained from all respondents. Confidentiality was maintained throughout the data collection and analysis process. It is acknowledged that convenience sampling may introduce selection bias and limits the generalizability of findings beyond the study sites. Future studies are encouraged to adopt probability-based sampling techniques—such as systematic or stratified random sampling—to enhance representativeness and enable broader inferences about the wider tourist population visiting Bohol's geotourism destinations.

Research Instrument

The questionnaire was adapted from Hossain et al. (2021) and Hadassa (2024) and comprised three parts: (1)

demographic profile covering age, sex, civil status, educational attainment, and employment status; (2) sustainable environmental tourism practices covering solid waste management, water conservation, and energy efficiency (15 items); and (3) tourist satisfaction covering service quality and physical environment (10 items). All items used a 4-point Likert scale (4 = Strongly Agree, 1 = Strongly Disagree). Reliability was confirmed through pilot testing, yielding a Cronbach's alpha of 0.905, indicating excellent internal consistency.

Data Analysis

Descriptive statistics—frequencies, percentages, and weighted means—were used to profile respondents and describe perceptions of sustainability and satisfaction. Simple linear regression (Pearson correlation) was employed to determine significant relationships between variables. One-way ANOVA was used to test for significant differences in tourist satisfaction by demographic subgroup. All analyses were conducted at a 0.05 significance level.

RESULTS

Demographic Profile of Respondents

The majority of respondents belonged to Gen Z (18–26 years old; 49.3%), followed by Millennials (27–45 years old; 37.3%), Gen X (46–57 years old; 11.0%), and Baby Boomers (58–76 years old; 2.3%). Males comprised 54.3% of respondents, while 45.7% were female. Most respondents were single (59.3%), college graduates (44.3%), and government employees (28.0%). The demographic profile reflects a predominantly young, educated, and working-age visitor population, consistent with broader trends in nature-based tourism participation.

Table 1. Percentage Distribution of Respondents' Demographic Profile

Category	Frequency	Percentage (%)
Gen Z (18–26 yrs)	148	49.3
Millennials (27–45 yrs)	112	37.3
Gen X (46–57 yrs)	33	11.0
Baby Boomers (58–76 yrs)	7	2.3
Male	163	54.3
Female	137	45.7
Single	178	59.3
Married	112	37.3
College Graduate	133	44.3
Government Employee	84	28.0

Perception of Sustainable Environmental Tourism Practices

Tourists reported high perceptions of sustainable environmental tourism practices overall (grand mean = 3.60, Strongly Agree). Solid waste management received the highest score (M = 3.47), followed by water conservation (M = 3.41), and energy efficiency (M = 3.15). Within solid waste management, the highest-rated indicator was the provision of clearly labeled waste bins (M = 3.72). For water conservation, the use of pails or

dippers in restrooms was rated most highly (M = 3.55). In energy efficiency, the use of small light bulbs in restrooms received the highest rating (M = 3.26), while sensor lights scored lowest (M = 2.90).

Table 2. Level of Perception of Sustainable Environmental Tourism Practices

Dimension	Weighted Mean	Interpretation
Solid Waste Management	3.47	Strongly Agree
Water Conservation Practices	3.41	Strongly Agree
Energy Efficiency	3.15	Agree
Grand Mean	3.60	Strongly Agree

Level of Tourist Satisfaction

Tourist satisfaction was high across both dimensions (grand mean = 3.47, Strongly Agree). Service quality (M = 3.52) was slightly higher than the physical environment (M = 3.42). The highest-rated service quality indicator was staff warmth and approachability (M = 3.66), followed by clarity of tour guide explanations (M = 3.65) and sense of safety (M = 3.57). The lowest-rated service quality indicator was the visible implementation of sustainability practices (M = 3.28). For the physical environment, the highest-rated item was the availability of shaded resting areas (M = 3.57), while anti-vandalism enforcement scored lowest (M = 3.27).

Table 3. Level of Tourist Satisfaction in Geotourism Sites in Bohol

Dimension	Weighted Mean	Interpretation
Service Quality	3.52	Strongly Agree
Physical Environment	3.42	Strongly Agree
Grand Mean	3.47	Strongly Agree

Relationship Between Sustainable Practices and Tourist Satisfaction

Regression analysis revealed a significant positive relationship between sustainable environmental tourism practices and tourist satisfaction ($\beta = 0.439$, $t = 8.92$, $p < .001$). The Pearson correlation coefficient was $r = 0.459$, with an R^2 value of 0.211, indicating that sustainability practices accounted for 21.1% of the variance in tourist satisfaction. While the relationship is statistically significant, the relatively modest R^2 suggests that other factors—including staff hospitality, safety, and comfort amenities—also substantially contribute to overall satisfaction. This R^2 value is consistent with those reported in comparable single-predictor tourism satisfaction studies (e.g., Shamim et al., 2024; Hadassa, 2024), reflecting the inherently multi-dimensional nature of tourist satisfaction. The remaining unexplained variance underscores the need for future research to adopt multi-predictor or structural equation modeling frameworks to capture the full complexity of satisfaction determinants, including destination image, perceived value, environmental attitudes, and revisit intention.

Table 4. Relationship Between Sustainable Practices and Tourist Satisfaction

Predictor	Estimate (β)	SE	t	p
Intercept	2.006	0.165	12.12	< .001
Sustainable Practices	0.439	0.049	8.92	< .001

Note. $R = 0.459$; $R^2 = 0.211$. $p \leq 0.05$ indicates significance.

Relationship Between Demographic Profile and Sustainability Perception

Age ($\beta = 0.158$, $t = 3.82$, $p < .001$) and civil status ($\beta = 0.106$, $t = 2.01$, $p = .045$) were the only demographic variables that significantly predicted tourists' perceptions of sustainable environmental tourism practices. Employment status, educational attainment, and sex showed no significant influence. The overall model yielded $R = 0.225$ and $R^2 = 0.051$, suggesting that demographic factors collectively explained a small but significant portion of variance in sustainability perception.

Relationship Between Demographic Profile and Tourist Satisfaction

Similarly, age ($\beta = 0.146$, $t = 3.73$, $p < .001$) and civil status ($\beta = 0.121$, $t = 2.41$, $p = .016$) significantly predicted tourist satisfaction. Employment status, educational attainment, and sex did not show significant relationships. The model yielded $R = 0.247$ and $R^2 = 0.061$.

Differences in Tourist Satisfaction by Demographic Group

One-way ANOVA revealed that educational attainment was the only demographic variable showing a significant difference in tourist satisfaction ($F = 6.49$, $df = 4, 21.9$; $p = .001$). Age, sex, civil status, and employment status did not produce statistically significant differences. These findings indicate that tourists with varying educational backgrounds evaluate geotourism sites differently, likely due to differences in expectations and environmental awareness.

DISCUSSION

The high perception of solid waste management practices aligns with the visibility of labeled waste bins and clean surroundings in Bohol's sites, consistent with Garcia and Santos (2020) who found that visible waste systems directly enhance tourist perceptions of environmental responsibility. The relatively lower rating for energy efficiency reflects the tendency of energy-saving technologies (e.g., solar panels, sensor lights) to operate behind the scenes and remain less visible to tourists, as observed by Velasco (2022).

The significant positive relationship between sustainable practices and tourist satisfaction ($r = 0.459$) corroborates findings from Shamim et al. (2024) and Lozano and Javier (2021), who demonstrated that visible sustainability measures enhance emotional satisfaction and destination trust. However, the R^2 of 0.211 indicates that satisfaction is multi-dimensional. Consistent with Sarmiento and Feliciano (2021), safety, staff hospitality, and comfort amenities emerge as equally critical determinants of visitor satisfaction.

The finding that age significantly predicts both sustainability perception and tourist satisfaction is consistent with Villoria and Santos (2021), who found that older tourists are more attentive to environmental practices. The significant influence of educational attainment on satisfaction differences reflects findings by Reyes and Villarin (2021) and Castillo (2022), who noted that higher education shapes expectations regarding site management and environmental quality.

The non-significance of sex, employment status, and educational attainment on sustainability perceptions suggests that practical, visible sustainability cues are universally accessible across diverse tourist groups—a conclusion supported by De Vera (2020) and Ferrer and Alonzo (2021).

Limitations and Directions for Future Research

Several limitations should be considered when interpreting these findings. First, the use of convenience sampling restricts the generalizability of results to the broader tourist population in Bohol and beyond. Future studies should employ probability-based sampling methods – such as systematic or stratified random sampling – to ensure greater representativeness. Second, the descriptive-correlational design, while appropriate for identifying associations, precludes causal inference. The significant relationship between sustainable practices and tourist satisfaction ($r=0.459$) should not be interpreted as causation; longitudinal or experimental designs would be needed to establish directional causality. Third, the study relies exclusively on self-reported Likert-

scale data, which may be susceptible to social desirability bias—respondents may have reported more favorable perceptions of sustainability practices than they actually held. Incorporating objective behavioral measures or observational data in future research would help mitigate this limitation. Fourth, the R^2 of 0.211 indicates that the model explains only 21.1% of the variance in tourist satisfaction, confirming that numerous other factors remain unexplored in this study. Future research should integrate additional constructs such as destination image, perceived value, environmental attitude, and revisit intention into a multi-predictor or structural equation modeling framework. Finally, broadening the geographic scope beyond Bohol's four geotourism sites to include other geotourism regions across the Philippines would enhance comparative insight and the transferability of findings. Integrating qualitative methods—such as in-depth interviews or focus group discussions—would further enrich understanding of tourists' subjective experiences and sustainability perceptions.

CONCLUSION

This study demonstrates that sustainable environmental tourism practices in Bohol's geotourism areas are well-perceived by tourists and significantly positively related to tourist satisfaction. Solid waste management and water conservation are most visible and appreciated, while energy efficiency requires enhanced visibility and communication. Tourist satisfaction is driven primarily by staff hospitality, safety, and comfort infrastructure, alongside environmental practices.

These findings have important implications for destination management. Site operators, LGUs, and national tourism agencies should prioritize making sustainability efforts more visible and interpretable to tourists, invest in upgrading energy and waste infrastructure, and continue developing the strong hospitality culture that distinguishes Bohol's tourism. Future research should explore longitudinal dynamics of sustainability perception and extend the scope to include other geotourism regions in the Philippines. Adoption of probability sampling techniques, multi-destination comparative designs, and mixed-methods approaches incorporating qualitative inquiry will be essential to deepen understanding of the complex interplay between environmental sustainability and tourist satisfaction in Philippine geotourism contexts. Scholars are also encouraged to explore structural equation modeling frameworks to disentangle the direct and indirect pathways through which sustainability practices, staff quality, destination image, and physical comfort jointly determine tourist satisfaction and loyalty.

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