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The Potential for Developing Green Tourism Products at Ba Vi National Park, Vietnam

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Abstract
This study evaluates the potential for developing green tourism products at Ba Vi National Park, a protected mountain destination located near Hanoi, Vietnam, and proposes a coordinated development framework consistent with ecological conservation and sustainable destination management. The study combined secondary data for 2023–2025 with primary data collected in 2026 through in-depth interviews, visitor surveys, and surveys of tourism-service households in the buffer zone. A total of 260 valid questionnaires were analyzed, including 225 visitor responses and 35 responses from local tourism-service households. Descriptive statistics, comparison, and synthesis were used to examine tourism resources, market demand, infrastructure and services, human resources, community participation, management conditions, and the current greenness of tourism products. The findings show strong resource and market potential: visitor evaluations of natural and cultural resources ranged from 4.07 to 4.36 on a five-point scale, and 82.2% of visitors were concerned or very concerned about green tourism when selecting a destination. Tourism arrivals reached 558,740 in 2025, while tourism revenue reached VND 149.7 billion. Nevertheless, the transition from nature-based tourism to fully green destination management remains incomplete. Weaknesses were identified in waste sorting, public sanitation, reduction of single-use plastics, environmental interpretation, green accommodation operations, community training, and carrying-capacity control. The study identifies five "green gaps" between: resources and environmental management; accessibility and green service quality; awareness and visitor behavior; community potential and participation capacity; and tourism growth and ecological carrying capacity. A multi-stakeholder framework is proposed, centered on ecological zoning, thematic green products, green infrastructure, environmental education, community-based livelihoods, digital visitor management, and shared responsibility among park authorities, tourists, businesses, and buffer-zone communities.

Keywords: Green Tourism, Green Tourism Products, Sustainable Tourism, National Parks, Ba Vi National Park, Community Participation, Ecological Carrying Capacity

1. Introduction

The global tourism sector is increasingly required to reconcile economic development with environmental protection and long-term sustainability. Climate change, biodiversity loss, pollution, and visitor congestion have intensified pressure on tourism destinations, particularly protected areas whose attractiveness depends directly on ecological integrity. In this context, green tourism has emerged as an important development orientation because it seeks to reduce environmental impacts, use natural resources efficiently, conserve local cultural values, and improve benefits for host communities. The shift is also demand-driven. Following the COVID-19 pandemic, tourists have increasingly favored nature-based experiences, open spaces, health-oriented travel, environmentally responsible services, and destinations capable of offering meaningful encounters with local ecosystems and communities (UNEP & UNWTO, 2005; Weaver, 2006; Fennell, 2020) [51, 59, 15].

In Vietnam, green tourism has become part of the national orientation toward green growth and sustainable tourism development. The Vietnam Tourism Development Strategy to 2030 emphasizes resource conservation, environmental protection, destination quality, and greater community participation. Green tourism is therefore not limited to ecotourism in a narrow sense. It also includes the greening of the entire tourism value chain, including transport, accommodation, food services, visitor management, waste reduction, environmental education, and community-based experiences. This policy context creates both an opportunity and an obligation for natural destinations to convert their existing resource advantages into

tourism products that satisfy market demand without undermining ecological systems.

Ba Vi National Park is one of the most important forested and biodiversity-rich areas in northern Vietnam. Its mountain ecosystems, cool climate, diverse landscapes, medicinal plants, cultural and spiritual sites, and convenient location near Hanoi provide favorable conditions for ecotourism, green recreation, environmental education, nature-based wellness, trekking, and community-based tourism. The park also functions as an ecological corridor and a "green lung" west of Hanoi, helping regulate the regional climate, protect upstream water resources, and maintain ecological balance. As a result, Ba Vi is well positioned to serve the large metropolitan market for short trips and weekend nature-based tourism.

Tourism activity at Ba Vi National Park has expanded rapidly. The number of visitors increased from 412,580 in 2023 to 558,740 in 2025, while tourism revenue rose from VND 102.4 billion to VND 149.7 billion during the same period. The growth reflects the park's strong appeal for domestic tourists, especially families, young people, students, and weekend visitors from Hanoi and neighboring provinces. However, rapid growth has also generated pressure on internal roads, parking, trails, waste management, public sanitation, and sensitive ecological zones, particularly during weekends, holidays, and the wild sunflower season.

Despite substantial potential, the park's tourism products have not yet been comprehensively transformed into green products. Current activities remain strongly oriented toward sightseeing, photography, spiritual visits, camping, and general nature recreation. Environmental education, specialized ecological interpretation, low-carbon transport, systematic waste sorting, community participation, green service standards, and ecological carrying-capacity management are still uneven. This creates a gap between the park's high-quality natural resources and the actual environmental quality and depth of visitor experiences.

Previous international studies have clarified the principles of sustainable tourism in protected areas, the role of destination management, the importance of communities, and the contribution of visitor education (Eagles *et al*., 2002; Honey, 2008; Ballantyne *et al*., 2011) [14, 21, 4]. Vietnamese studies have examined ecotourism, community-based tourism, green growth, and sustainable tourism at different destinations. Nevertheless, research directly addressing the integrated potential for green tourism product development at Ba Vi National Park remains limited. Existing work commonly focuses on one aspect—such as ecological resources, environmental impacts, or community tourism—rather than simultaneously examining resources, product formation, infrastructure, human resources, governance, and market demand.

Accordingly, this study aims to: (1) systematize the theoretical basis for green tourism product development; (2) assess the potential and current conditions for developing green tourism products at Ba Vi National Park; (3) evaluate the current greenness of tourism products and identify major constraints; and (4) propose coordinated solutions for sustainable green tourism product development through 2030. The study contributes an integrated destination-level assessment and introduces the idea of "green gaps" to explain why strong ecological potential has not yet been fully converted into a coherent green tourism system.

2. Literature Review and Conceptual Framework

2.1 Green tourism and green tourism products

Green tourism is broadly understood as tourism development that minimizes negative environmental impacts, conserves natural and cultural resources, supports host communities, and maintains long-term economic viability. Its core principles are consistent with the three dimensions of sustainable development: environmental integrity, economic efficiency, and social equity. In protected areas, the concept further requires that tourism remain subordinate to conservation objectives and operate within ecological limits (Eagles *et al*., 2002; UNEP & UNWTO, 2005) [14, 51].

A tourism product is a bundle of services and experiences developed through the use of tourism resources to satisfy visitor needs. From a service-management perspective, the product includes both tangible components—such as landscapes, facilities, transport, and accommodation—and intangible components—such as atmosphere, hospitality, interpretation, learning, and social interaction. A green tourism product extends this concept by embedding environmental responsibility and sustainability throughout design, operation, and consumption. It should use resources rationally, reduce waste and emissions, protect ecosystems, support local livelihoods, and encourage responsible visitor behavior.

Green tourism products may include ecotourism, nature-based wellness, community-based tourism, green rural and agricultural tourism, environmental education, cultural-spiritual tourism managed under environmental standards, and low-impact outdoor sports. The categories can overlap. Their shared requirement is that nature and culture are not merely consumed as attractions but managed as assets that must be maintained or restored. Therefore, the greenness of a product cannot be assessed solely by its natural setting; it must also be evaluated through service operations, waste management, community benefits, environmental education, and governance quality.

2.2 Conditions and criteria for green tourism product development

The formation and development of green tourism products depend on an interconnected set of conditions. First, natural and cultural resources provide the substantive basis for product development. Scenic landscapes, forests, biodiversity, climate, water resources, traditional practices, local knowledge, and historic sites can support differentiated visitor experiences. Second, infrastructure and tourism services must facilitate access and comfort without generating excessive ecological costs. Green transport, waste and wastewater treatment, energy efficiency, low-impact construction, clear ecological signage, and adequate sanitation are particularly important.

Third, human resources and local communities influence both service quality and sustainability. Employees require professional skills as well as knowledge of ecology, conservation, interpretation, and responsible tourism. Communities should participate as service providers, cultural interpreters, local suppliers, and co-managers rather than remaining marginal beneficiaries. Fourth, policy and destination governance determine whether resource use is coordinated and controlled. Spatial zoning, environmental standards, carrying-capacity assessment, monitoring, stakeholder coordination, and incentives for green

investment are essential. Finally, market demand affects the commercial viability of green products. Destinations need sufficient visitor interest, willingness to participate in responsible experiences, appropriate market segmentation, and credible green branding.

Based on the source research, a green tourism product can be assessed through six broad criteria: (1) environmental friendliness and ecosystem protection; (2) rational use of natural and cultural resources; (3) community participation and local benefit sharing; (4) green infrastructure and service operations; (5) environmental education and visitor awareness; and (6) market relevance and long-term economic viability. These criteria form the analytical basis of the present study.

2.3 Previous research and the research gap

International scholarship has established a strong conceptual foundation for sustainable tourism in protected areas. Eagles *et al*. (2002) [14] emphasized the need to balance conservation, economic development, and social equity. Weaver (2006) [59] highlighted visitor behavior and green marketing, while Honey (2008) [21] warned that ecotourism can become commercialized and environmentally damaging if monitoring and control are weak. Studies of community-based ecotourism show that local participation can strengthen livelihoods and improve incentives for conservation. Research on mountain ecotourism also identifies landscape quality, distinctive climates, biodiversity, and indigenous culture as important product foundations.

More recent work has shifted attention toward visitor learning, environmental responsibility, digital communication, and the willingness of younger tourists to pay for meaningful ecological experiences. Ballantyne *et al*. (2011) [4] demonstrated the potential of wildlife tourism experiences to influence environmental learning. Studies of national parks in Asia likewise suggest that environmental education, social media, and participatory conservation activities can increase the attractiveness and perceived value of green tourism products.

Vietnamese research has examined green tourism, ecotourism, sustainable tourism, community-based tourism, and responsible tourism at several destinations, including northern national parks, Phong Nha–Ke Bang, Xuan Son, Xuan Thuy, Quang Nam, and the Mekong Delta. These studies confirm Vietnam's strong resource base but repeatedly identify limitations in green infrastructure, destination management, product standardization, community capacity, and environmental monitoring. Studies directly related to Ba Vi have addressed community tourism in the buffer zone, the status of ecotourism, tourism-related environmental impacts, and destination diversification. However, they have not fully integrated ecological resources, market demand, green services, human resources, community participation, management capacity, and product design within a single assessment.

The research gap is therefore both conceptual and practical. Conceptually, green tourism, ecotourism, responsible tourism, and sustainable tourism are often used interchangeably, producing inconsistent evaluation criteria. Practically, there is insufficient destination-specific evidence on how Ba Vi's resources can be transformed into concrete green products under realistic infrastructure, governance, and community conditions. This study addresses that gap through a combined analysis of six potential dimensions and four groups of current performance indicators, followed by a multi-stakeholder implementation framework.

3. Materials and Methods

3.1 Study area and research scope

Ba Vi National Park is located west of Hanoi between approximately 20°55′–21°07′ N and 105°18′–105°30′ E. The park includes strictly protected, ecological restoration, and administrative-service zones, together with a buffer zone of more than 35,000 ha. Its terrain ranges from about 100 m to 1,296 m above sea level and includes the main peaks of Vua, Tan Vien, and Ngoc Hoa. The altitudinal gradient creates distinctive climatic and ecological conditions, including cool high-elevation microclimates and diverse evergreen forest ecosystems.

The research covered the park's core tourism areas and selected buffer-zone communities involved in tourism. Secondary data were collected for 2023–2025, primary data were collected in 2026, and the proposed orientations and solutions extend to 2030. The analytical scope included tourism resources; potential green product types; infrastructure and services; human resources and local participation; management and policy; and market demand.

> *Data note: The original report contains two area figures—approximately 9,702.41 ha in the administrative description and 10,814 ha in the biological-resource table. Because the present manuscript is a faithful English restructuring of the source, both figures are retained in their respective contexts rather than externally reconciled.*

3.2 Data Collection

Primary data were collected through in-depth interviews and structured questionnaires. In-depth interviews were conducted with management personnel at Ba Vi National Park to obtain information on tourism operations, green tourism orientations, resource use, infrastructure, environmental management, community participation, and implementation constraints. The interviews also supported interpretation of the product inventories and management conditions.

Questionnaires were administered to two groups: visitors and households providing tourism-related services in buffer-zone communities. Visitor surveys were conducted at major tourism locations and routes, including the Old French Church, Thuong Temple, pine forests, ecotourism areas, nature trails, and selected buffer-zone sites. Household respondents were selected among local actors directly involved in accommodation, food services, agricultural products, or other tourism services in Ba Vi, Van Hoa, Yen Bai, Minh Quang, and nearby areas.

A combination of random and convenience sampling was used because tourist flows and tourism-service households were geographically dispersed. The planned sample comprised 250 visitor questionnaires and 50 household questionnaires. After screening for duplication, missing information, and invalid responses, 260 valid questionnaires were retained: 225 from visitors and 35 from tourism-service households.

3.3 Measurement and sample size

The minimum visitor sample was estimated using the Taro Yamane formula, $n = N/[1 + N(e^2)]$, with an estimated 2025 visitor population of 558,740 and a permissible error of 7%, producing a minimum of approximately 205 visitors. The final valid visitor sample of 225 exceeded this threshold.

The questionnaire used closed and open-ended questions. Evaluation statements were measured on a five-point Likert scale, where 1 represented "strongly disagree" and 5 represented "strongly agree." Mean values were interpreted as follows: 1.00–1.80, very low; 1.81–2.60, low; 2.61–3.40, medium; 3.41–4.20, high; and 4.21–5.00, very high.

3.4 Data processing and analysis

Survey data were checked, coded, and entered into Microsoft Excel. Descriptive statistics were used to calculate frequencies, percentages, means, modes, variances, and standard deviations. Comparative analysis examined changes over time and differences across resource, service, environmental, and community dimensions. Qualitative interview information and secondary documents were synthesized to interpret the quantitative results and identify achieved outcomes, limitations, and underlying causes.

The study did not estimate a causal model. Its purpose was an integrated descriptive assessment of destination potential and current performance. The analytical process therefore linked the theoretical criteria for green tourism products with observed conditions at Ba Vi National Park and used the resulting gaps to structure development solutions.

4. Results

4.1 Tourism growth, visitor structure, and green market demand

Tourism activity recovered and expanded during 2023–2025. Total arrivals increased by 18.0% in 2024 and by a further 14.7% in 2025. Domestic tourists accounted for more than 98% of recorded arrivals, confirming Ba Vi's dominant role as a short-haul destination for Hanoi and the northern domestic market. Tourism revenue grew faster than visitor numbers in both comparison periods, while average spending per visitor increased from VND 248,200 in 2023 to VND 267,900 in 2025. The increase indicates gradual expansion of accommodation, recreation, camping, and nature-based services beyond entrance-only visitation.

Table 1: Visitors and tourism revenue at Ba Vi National Park, 2023-2025

Indicator	2023	2024	2025	Change 2024/2023	%	Change 2025/2024	%
Total visitors (arrivals)	412,580	486,930	558,740	+74,350	+18.0	+71,810	+14.7
Domestic visitors	406,390	480,110	551,480	+73,720	+18.1	+71,370	+14.9
International visitors	6,190	6,820	7,260	+630	+10.2	+440	+6.5
Tourism revenue (VND billion)	102.4	126.8	149.7	+24.4	+23.8	+22.9	+18.1
Average spending (VND/visitor)	248,200	260,400	267,900	+12,200	+4.9	+7,500	+2.9

Source: Ba Vi National Park Management Board (as reported in the source study).

The visitor survey confirms the park's metropolitan and weekend-market orientation. Domestic visitors represented 92.0% of the survey sample. Family and weekend groups accounted for 52.4%, while individuals and young friend groups accounted for 37.3%. Visitors aged 18–35 represented 55.6% of respondents, showing a relatively young market with strong interest in outdoor experiences and digital travel information.

Nature sightseeing and ecological relaxation were the main travel purpose for 40.9% of respondents, followed by picnicking, trekking, and camping at 27.1%. Cultural and spiritual visits represented 20.0%, while research, learning, and environmental education accounted for only 8.4%. This low educational share indicates that the park's scientific and ecological learning potential remains underdeveloped.

Green tourism demand was substantial. A combined 82.2% of visitors were either concerned or very concerned about the green characteristics of a destination. However, the average stay was only 1.1 days, indicating that Ba Vi remains primarily a day-trip or short-stay destination. The market therefore supports green product development, but the existing product system is not yet sufficiently diversified to lengthen stays and increase visitor expenditure.

Table 2: Visitor profile, trip characteristics, and green tourism demand (n = 225)

Survey characteristic	Number	Share (%)
Domestic visitors	207	92.0
International visitors	18	8.0
Family/weekend group	118	52.4
Individual or young friend group	84	37.3
Organization/school group	23	10.3
Age below 18	16	7.1
Age 18–25	71	31.6
Age 26–35	54	24.0
Age 36–45	46	20.4
Age above 45	38	16.9
Nature sightseeing/ecological relaxation	92	40.9
Picnic, trekking, and camping	61	27.1
Spiritual-cultural visitation	45	20.0
Research, learning, and environmental education	19	8.4
Other purposes	8	3.6
Very concerned about green tourism	84	37.3
Concerned	101	44.9
Neutral	31	13.8
Low concern	7	3.1
Very low concern	2	0.9
Average length of stay	1.1 days	—

Source: Authors' survey, 2026.

4.2 Natural, ecological, and cultural resource potential

Ba Vi National Park possesses a rich ecological resource base. The park's mountain terrain, altitudinal climatic differentiation, evergreen forests, streams, waterfalls, and historical structures create a diverse setting for ecotourism, trekking, nature education, wellness, scientific research, and cultural-spiritual experiences. The biological-resource inventory in the source reports 2,181 plant species, including 503 medicinal plant species, together with 65 mammal species, 194 bird species, 61 reptile species, 27 amphibian species, and 552 insect species.

Medicinal plants such as ba kich, sa nhan, ha thu o, and dang sam, along with high-elevation flora and wildflowers, provide opportunities for medicinal-plant interpretation, traditional wellness experiences, and environmental education. The wild sunflower season in October–November is already a distinctive seasonal attraction. The botanical garden and gene-conservation areas also support field learning for schools, universities, and research groups.

Visitor evaluations were consistently positive. All nine resource criteria had mean scores above 4.0. Cool climate and fresh air received the highest mean (4.36), followed by mountain and forest landscape attractiveness (4.31) and the overall capacity of tourism resources to support sustainable green tourism (4.28). Cultural-historical sites and French colonial architecture received the lowest mean within the resource group, but still achieved a high score of 4.07. Modes were generally 4, and standard deviations were below 0.90, indicating broad agreement among visitors.

Table 3: Biological resources reported for Ba Vi National Park

Biological resource indicator	Reported quantity
Natural area in the biological-resource inventory	10,814 ha
Plant species	2,181
Medicinal plant species	503
Mammal species	65
Bird species	194
Reptile species	61
Amphibian species	27
Insect species	552

Source: Ba Vi National Park Management Board, as reproduced in the original study.

Table 4: Visitor evaluation of tourism-resource potential

Evaluation criterion	Mean	Mode	Variance	SD
Mountain and forest landscapes are attractive for ecotourism	4.31	4	0.63	0.79
Forest ecosystems and biodiversity create distinctive appeal	4.24	4	0.67	0.82
Cool climate and fresh air are outstanding advantages	4.36	5	0.58	0.76
Trekking and nature exploration routes have development potential	4.18	4	0.71	0.84
Primary forest, wild sunflowers, and medicinal plants have tourism value	4.13	4	0.73	0.85
Cultural-historical sites and French architecture enhance attractiveness	4.07	4	0.77	0.88
Ba Vi is suitable for environmental education and ecological research	4.17	4	0.69	0.83
Streams, waterfalls, and landscapes support ecological relaxation	4.21	4	0.66	0.81
Tourism resources can support sustainable green tourism	4.28	4	0.62	0.79

Source: Authors' survey, 2026.

4.3 Infrastructure, services, human resources, and management conditions

Ba Vi is well connected to Hanoi through major roads, and travel from the city center generally requires 1.5–2 hours. Internal roads provide access to Thuong Temple, the Old French Church, the botanical garden, and trekking routes. This accessibility supports weekend tourism, but steep sections and forest roads become difficult during the rainy season. High visitor concentration also creates congestion at popular points.

The accommodation base includes resorts, homestays, weekend retreats, and community-based lodging. Some facilities use green spaces, natural materials, and adaptive reuse of older structures. However, the greening of operations is uneven. Many small establishments have not systematically adopted waste sorting, energy efficiency, single-use plastic reduction, or standardized wastewater treatment. Food services, guiding, outdoor activities, and local-product experiences have expanded, but the overall green value chain remains fragmented.

Administrative statistics show growth in both conventional tourism services and environmental facilities. From 2023 to 2025, accommodation establishments increased from 85 to 108, ecological homestays from 32 to 46, sorted-waste-bin locations from 120 to 185, standard public toilets from 18 to 27, compliant wastewater-treatment establishments from 25 to 41, ecological signs from 45 to 65, and internal electric/green transport routes from 3 to 6. These improvements demonstrate progress, yet survey evidence indicates that quality and consistency still lag behind visitor expectations.

Tourism employment increased from 500 workers in 2023 to 615 in 2025. Growth was strongest among community workers, guides, collaborators, and seasonal employees. Buffer-zone communities also provide a substantial participation base: the source estimates 835 households with potential to participate in green tourism across Ba Vi, Van Hoa, Yen Bai, Minh Quang, and adjacent areas. Local Dao and Muong cultural practices, medicinal knowledge, food, agriculture, and community life provide a foundation for differentiated tourism products.

Management orientation increasingly recognizes ecological conservation, green infrastructure, community livelihoods, and environmental awareness. Nevertheless, a unified operational standard for green tourism and green services has not yet been fully applied. Carrying-capacity assessment, real-time visitor monitoring, stakeholder coordination, and systematic environmental performance control remain limited.

Table 5: Tourism infrastructure and green-service facilities, 2023-2025

Indicator	Unit	2023	2024	2025	Change 24/23	%	Change 25/24	%
Tourism accommodation	establishments	85	95	108	+10	+11.8	+13	+13.7
Ecological homestays	establishments	32	38	46	+6	+18.8	+8	+21.1
Restaurants/food services	establishments	70	78	86	+8	+11.4	+8	+10.3
Sorted-waste-bin locations	locations	120	150	185	+30	+25.0	+35	+23.3
Standard public toilets	facilities	18	22	27	+4	+22.2	+5	+22.7
Centralized waste collection points	locations	10	13	16	+3	+30.0	+3	+23.1
Compliant wastewater treatment	establishments	25	32	41	+7	+28.0	+9	+28.1
Ecological information signs	signs	45	55	65	+10	+22.2	+10	+18.2
Ecological parking areas	locations	6	8	10	+2	+33.3	+2	+25.0
Electric/green internal routes	routes	3	4	6	+1	+33.3	+2	+50.0
Environmentally friendly internal roads	km	18.5	21.0	24.6	+2.5	+13.5	+3.6	+17.1

Source: Source report synthesis from park management data.

4.4 Existing green tourism products and level of exploitation

The park currently offers three broad groups of tourism products. The first group comprises ecological sightseeing and forest exploration. Major products include the Old French Church–pine forest route, Vua Peak–Tan Vien Peak trekking, primary-forest observation between approximately 400 and 1,100 m elevation, botanical-garden visits, and seasonal wild-sunflower tourism. Forest-landscape sightseeing and wild-sunflower visits are highly exploited, whereas primary-forest interpretation remains moderate and relatively shallow.

The second group includes nature experience and environmental education. School visits, biodiversity observation, trekking combined with ecological learning, community environmental activities, and the experimental "one day as a forest guardian" program have been introduced. However, these products are generally organized on request or in cooperation with schools and organizations rather than as standardized, regularly marketed products. Specialized ecological guides, interpretive materials, and structured learning content remain insufficient.

The third group includes nature-based accommodation, wellness, community experiences, and green cultural-spiritual tourism. High-end ecological resorts, spa and wellness services, ecological homestays, weekend retreats, and light nature experiences are expanding. Cultural-spiritual routes to Thuong Temple and other sites can be combined with walking, reduced motorized access, and environmental interpretation. French colonial ruins and Dao–Muong cultural experiences also offer potential for integrated heritage-ecology products. Nevertheless, most products remain independent and are not yet connected into a complete green tourism value chain.

4.5 Visitor evaluation of product greenness and environmental management

Visitors recognized the strong natural association of Ba Vi's tourism products. The statement that products are linked to nature and forest landscapes received a mean of 4.07, and the natural quality of the tourism environment received 3.99. Overall satisfaction with the destination's greenness was 3.78, and willingness to return because of the environment reached 3.86.

However, operational indicators were weaker. Reduction of single-use plastics received the lowest product-greenness mean (3.21), followed by environmental awareness activities (3.32), waste management effectiveness (3.45), and the view that tourism activities do not significantly affect the landscape (3.55). The results show that Ba Vi is perceived as naturally green, but its tourism operations have not been greened to the same degree.

Environmental sanitation and conservation results reinforce this distinction. Natural landscapes were perceived as relatively well preserved (3.91), and rules and signs were considered understandable (3.83). In contrast, public toilets received 2.84, clear waste-sorting instructions 2.92, visitor cleanliness awareness 3.04, plastic-waste control 3.12, and staff reminders 3.26. The findings indicate weaknesses in sanitation capacity, source separation, behavior management, and interactive environmental education.

Infrastructure and service evaluations were similarly mixed. Ecological landscapes and spaces scored 4.12, and transport access scored 3.98. Nature and ecotourism experiences were regarded as reasonably diverse (3.81). Yet the environmental performance of accommodation scored only 3.17, accommodation suitability for green tourism 3.24, food-service environmental friendliness 3.26, waste collection and treatment 3.40, and overall adequacy of infrastructure and services for green tourism 3.48.

Table 6: Visitor evaluation of the greenness of tourism products

Criterion	Mean	Mode	Variance	SD
Products are associated with nature and forest landscapes	4.07	4	0.56	0.75
Tourism space is fresh and natural	3.99	4	0.60	0.77
Tourism activities do not substantially affect the landscape	3.55	3	0.78	0.88
Environmental infrastructure is adequate	3.62	3	0.74	0.86
Waste management and sanitation are effective	3.45	3	0.81	0.90
Single-use plastics are being reduced	3.21	3	0.88	0.94
Environmental awareness activities are effective	3.32	3	0.83	0.91
Environmental information and signage are adequate	3.50	3	0.77	0.88
Understanding of ecosystems increased after the visit	3.58	4	0.73	0.85
Tourism products are environmentally friendly	3.68	4	0.69	0.83
Satisfied with the destination's level of greenness	3.78	4	0.66	0.81
Willing to return because of the tourism environment	3.86	4	0.63	0.79

Source: Authors' survey, 2026.

Table 7: Visitor evaluation of environmental sanitation and conservation

Criterion	Mean	Mode	Variance	SD
Waste bins are conveniently located	3.59	4	0.91	0.95
Waste bins have clear sorting instructions	2.92	3	1.18	1.09
Public toilets are clean and have adequate water	2.84	3	1.22	1.11
Camping areas are cleaned adequately	3.31	4	1.03	1.01
Visitor plastic waste is well controlled	3.12	3	0.98	0.99
Natural landscapes remain relatively pristine	3.91	4	0.72	0.85
Tourism does not substantially disturb wildlife	3.31	3	0.92	0.96
Ecological trails are not encroached upon by waste	3.46	4	0.95	0.97
Rules and signs are understandable and attractive	3.83	4	0.75	0.87
Staff consistently remind visitors to protect the environment	3.26	3	1.02	1.01
Other visitors demonstrate cleanliness awareness	3.04	3	1.08	1.04
Satisfied with the park's environmental protection efforts	3.54	4	0.85	0.92

Source: Authors' survey, 2026.

Table 8: Visitor evaluation of infrastructure and tourism services

Criterion	Mean	Mode	Variance	SD
Transport provides convenient access to tourism sites	3.98	4	0.82	0.91
Ecological landscapes and spaces are well maintained	4.12	4	0.69	0.83
Tourism information and directional signs are adequate	3.72	4	0.93	0.96
Rest areas and public toilets meet visitor needs	3.53	4	1.02	1.01
Accommodation quality is suitable for green tourism	3.24	3	1.08	1.04
Accommodation emphasizes environmental protection	3.17	3	1.12	1.06
Food services are hygienic and environmentally friendly	3.26	3	1.05	1.02
Restaurants use local products	3.56	4	0.94	0.97
Waste collection and treatment are relatively effective	3.40	3	1.01	1.00
Cleanliness is maintained at tourism sites	3.59	4	0.92	0.96
Nature and ecotourism services are diverse	3.81	4	0.84	0.92
Infrastructure and services meet green tourism requirements	3.48	4	0.97	0.98

Source: Authors' survey, 2026.

4.6 Community participation and capacity

Local respondents demonstrated strong awareness of ecological potential and a strong desire for sustainable tourism development. Awareness of local ecological potential received a mean of 4.26, recognition of increasing tourist demand for green products received 4.09, and the belief that green tourism would improve long-term livelihoods received 4.26. The strongest mean in the household survey was the demand for stricter control of waste and pollution (4.40), followed by the desire to expand community-based tourism (4.34).

Current participation and institutional support were less developed. Direct opportunities to participate in service provision scored 3.71, and tourism as an important source of income scored 3.80. Participation in local specialties and services scored 3.49. Government or park support received 3.26, green improvement of village infrastructure 3.06, and systematic green-tourism training only 2.86. The community therefore possesses motivation and local assets but lacks training, formal linkages, investment support, and deeper roles in product design and management.

Table 9: Evaluation by tourism-service households in buffer-zone communities (n = 35)

Criterion	Mean	Mode	Variance	SD
Awareness of local ecological potential	4.26	4	0.43	0.66
Understanding that green tourism is linked to forest conservation	3.83	4	0.62	0.79
Recognition that visitors increasingly prefer green products	4.09	4	0.49	0.70
Opportunity to participate directly in tourism services	3.71	4	0.97	0.99
Tourism has become an important income source	3.80	4	0.81	0.90
Participation in local specialties and services	3.49	4	1.14	1.07
Support received from authorities/park management	3.26	3	1.08	1.04
Systematic training in green tourism skills	2.86	3	1.13	1.06
Village infrastructure improved in a green direction	3.06	3	0.88	0.94
Desire to expand community-based tourism	4.34	4	0.29	0.54
Demand for stricter waste and pollution control	4.40	5	0.36	0.60
Belief that green tourism will improve long-term livelihoods	4.26	4	0.43	0.66

Source: Authors' survey, 2026.

4.7 Overall assessment and the five green gaps

The park has achieved several important outcomes. Tourism arrivals and revenue are increasing; resource quality is highly evaluated; ecological landscapes remain relatively well maintained; tourism infrastructure has expanded; and nature-based, wellness, spiritual, and community products have begun to form. The park also benefits from a large nearby market and strong community interest in green tourism.

At the same time, limitations are structural rather than resource-based. Product development remains fragmented and heavily dependent on sightseeing. Green operating standards are inconsistent, environmental education lacks depth, public sanitation and waste sorting are weak, community training is insufficient, and visitor concentrations are not managed through a scientific carrying-capacity system. The source research synthesizes these weaknesses as five green gaps.

First, the resource–management gap refers to the difference between highly valued landscapes and biodiversity and the weaker quality of waste control, environmental monitoring, and visitor management. Second, the access–green service gap reflects convenient transport and strong landscape quality but only moderate environmental performance in accommodation, food services, sanitation, and waste treatment. Third, the awareness–behavior gap is shown by high stated interest in green tourism but weaker visitor cleanliness, plastic reduction, trail compliance, and noise control. Fourth, the community potential–capacity gap

reflects strong local motivation and cultural assets but limited training and institutional support. Fifth, the growth–carrying capacity gap arises because visitor numbers have increased faster than the park's capacity to manage peak-period congestion and ecological pressure.

These gaps interact. Weak carrying-capacity management intensifies waste and congestion; poor service standards weaken the credibility of green branding; limited interpretation reduces behavioral change; and insufficient community capacity prevents tourism benefits from being distributed through a broader local green value chain. The central challenge is therefore a transition from the passive use of "green natural resources" to active "green destination governance."

Table 10: Five green gaps identified at Ba Vi National Park

Green gap	Evidence from the study	Strategic response
Resource–management gap	High resource means (4.07–4.36) versus weaker sanitation, plastic control, and visitor management	Improve environmental operations and monitoring
Access–green service gap	Access 3.98 and landscape maintenance 4.12, but green accommodation operations 3.17–3.24	Green service standards and infrastructure investment
Awareness–behavior gap	82.2% express concern about green tourism, but visitor cleanliness awareness is 3.04	Interactive education, incentives, and enforcement
Community potential–capacity gap	Strong desire to expand community tourism (4.34), but training is 2.86	Training, finance, market linkage, and co-design
Growth–carrying capacity gap	558,740 visitors in 2025 and peak-period congestion without real-time limits	Zoning, reservations, time slots, and digital flow control

Source: Synthesized directly from the findings of the original study.

5. Discussion

5.1 Strong natural potential does not automatically create green tourism products

The findings confirm that Ba Vi National Park has a strong resource base for green tourism. High visitor ratings for climate, landscapes, biodiversity, and sustainable development potential are consistent with protected-area tourism literature, which identifies ecological quality and distinctiveness as essential product foundations (Eagles *et al*., 2002; Buckley, 2009) [14, 6]. The proximity to Hanoi adds a major market advantage, allowing the park to capture growing demand for short nature-based trips, weekend retreats, and outdoor activities.

However, the study also demonstrates that a nature-based product is not necessarily a green product. Visitors may experience forests, cool climates, and mountain landscapes even when waste management, accommodation operations, transport, environmental interpretation, and community benefits remain insufficiently green. This distinction explains why the highest means were associated with natural conditions, whereas operational indicators—particularly plastic reduction, public sanitation, waste sorting, and green accommodation—were only moderate. The result supports the argument that sustainability must be embedded in the entire destination system rather than treated as a characteristic of the attraction alone (UNEP & UNWTO, 2005; Bramwell & Lane, 2013) [51, 5].

5.2 Product depth, environmental learning, and visitor behavior

Ba Vi's current product portfolio is broad but not sufficiently deep. Sightseeing, photography, weekend recreation, and spiritual visitation are well established, while scientific interpretation, guided biodiversity experiences, conservation participation, and environmental education remain limited. This restricts both the learning value of visits and the park's ability to differentiate itself from other peri-urban nature destinations.

Environmental education is particularly important because stated pro-environmental attitudes do not always become responsible behavior. The study found high interest in green tourism but only moderate evaluations of visitor cleanliness and plastic-waste control. Signs and rules alone are unlikely to produce durable behavioral change. International research suggests that memorable, participatory experiences can generate stronger environmental learning than passive information (Ballantyne *et al*., 2011) [4]. Programs such as guided ecological interpretation, forest restoration, citizen science, waste-free camping, and "one day as a forest guardian" can therefore serve both educational and product-development functions.

5.3 Community participation and equitable green value chains

Community results reveal a favorable social foundation but limited institutional capacity. Local respondents understand the ecological value of the destination, believe that green tourism can improve livelihoods, and strongly support stricter environmental control. Yet training, support, and direct participation remain modest. This pattern is consistent with research showing that local support for sustainable tourism depends not only on awareness but also on meaningful participation and perceived benefits (Choi & Sirakaya, 2006; Lee, 2013) [9, 28].

For Ba Vi, community participation should move beyond seasonal labor and small-scale sales. Dao and Muong medicinal knowledge, food, agriculture, crafts, cultural practices, and local guiding can be integrated into thematic products. Such integration can distribute benefits, diversify the visitor experience, reduce pressure on the core zone by attracting visitors to the buffer zone, and strengthen incentives for conservation. Nevertheless, commercialization must be managed carefully to prevent the simplification or loss of cultural authenticity.

5.4 Carrying capacity and the governance of a peri-urban national park

Ba Vi faces a governance challenge typical of protected areas located near large urban markets: accessibility stimulates rapid growth, but the same growth can exceed ecological and service capacity. The seasonal concentration of visitors around the Old French Church, pine forests, Thuong Temple, and wild-sunflower sites produces localized congestion, waste, noise, trail erosion, and vehicle pressure. The absence of reservations, time-slot controls, and real-time flow management leaves the park reliant on conventional administrative methods.

Carrying capacity should be treated as a dynamic management process rather than a fixed number. It must consider ecological sensitivity, trail conditions, parking and sanitation capacity, visitor behavior, seasonality, and the

recovery capacity of each zone. Digital tickets, route-level visitor limits, GIS-based monitoring, shuttle systems, and advance information can help redistribute demand. These measures are especially important if the park seeks to increase visitor spending and experience quality without continually increasing visitor volume.

5.5 Academic and practical implications

Academically, the study contributes an integrated assessment that links resource potential, product formation, services, communities, governance, and demand. The five-green-gap concept provides a practical diagnostic lens: it shifts attention from whether a destination possesses green resources to whether its institutions and service system can convert those resources into sustainable value.

Practically, the results imply that Ba Vi should not position itself only as a "green landscape" near Hanoi. Its competitive position should be based on verified green operations, ecological learning, community value creation, and controlled visitor flows. A credible green destination brand requires measurable service standards and transparent environmental management.

6. Proposed Development Framework and Policy Recommendations

6.1 Development principles

Green tourism product development at Ba Vi National Park should follow five principles derived from the source study. First, conservation must remain the non-negotiable foundation because the park's long-term tourism value depends on ecosystem integrity. Second, development should shift from relying on naturally green scenery to greening the entire operating system, including infrastructure, services, supply chains, and management. Third, product design and visitor regulation should be based on ecological carrying capacity. Fourth, local communities should be placed at the center of the value chain and receive tangible, long-term benefits. Fifth, the destination should prioritize high-quality ecological and educational experiences rather than maximizing visitor volume.

6.2 Ecological zoning, spatial planning, and carrying-capacity management

The park should implement functional ecological zoning with three connected spaces. The conservation core should allow only controlled trekking, research, primary-forest observation, and environmental education. The community buffer zone should host ecological homestays, Dao–Muong cultural experiences, local food, medicinal-plant experiences, and ecological agriculture. The tourism-service zone should concentrate resorts, camping, wellness, parking, and visitor facilities under strict limits on construction density, building height, green-space ratios, wastewater treatment, and landscape compatibility.

A detailed inventory of resources, ecological sensitivity, infrastructure capacity, and visitor pressure should be completed for each route and site. GIS and digital maps should support monitoring. High-pressure sites—including the Old French Church, pine forests, and Thuong Temple—should introduce electronic reservations, time slots, daily quotas, and peak-period environmental staff. Environmentally friendly trails, ecological signs, and clearly defined rest areas should reduce off-trail movement and habitat disturbance.

Carrying-capacity indicators should include ecological, physical, social, and management dimensions. Monitoring should cover visitor density, trail erosion, waste volume, noise, parking pressure, wildlife disturbance, and visitor satisfaction. Limits should be reviewed seasonally rather than applied uniformly throughout the year.

6.3 Thematic green tourism product system

The product portfolio should be reorganized into integrated thematic clusters. A forest ecology and biodiversity cluster could include guided primary-forest walks, ancient Calocedrus-tree interpretation, bird and plant observation, citizen science, and ecological research. A mountain trekking cluster could connect Vua and Tan Vien peaks with safety guidance, ecological interpretation, and leave-no-trace rules. An environmental education cluster should offer structured modules for schools and universities, including forest ecosystem learning, climate regulation, medicinal plants, waste reduction, and the "one day as a forest guardian" experience.

A nature-based wellness cluster could combine cool-climate retreats, walking, yoga, meditation, traditional medicinal-plant knowledge, spa services, and local healthy food. A community-based cultural cluster could feature Dao and Muong homestays, cuisine, agricultural practices, medicinal knowledge, crafts, storytelling, and local guiding. A green cultural-spiritual cluster could integrate pilgrimage with walking routes, electric shuttle access, waste-free festivals, and interpretation of the relationship between cultural values and mountain ecosystems.

Products should be connected into one-day, two-day, and multi-day itineraries to extend the average stay beyond 1.1 days. Each product should specify target markets, group-size limits, environmental rules, local suppliers, educational content, and monitoring indicators.

6.4 Green infrastructure and service standards

Investment should prioritize environmental infrastructure rather than only expanding access. Key needs include ecological public toilets, drinking-water refill points, sorted-waste stations with clear instructions, centralized collection, wastewater treatment, low-impact rest areas, and safe trail facilities. Private vehicles should gradually be restricted in sensitive areas through buffer-zone parking and internal electric shuttles.

A local green tourism standard should be introduced for resorts, homestays, restaurants, campsites, and tourism operators. Criteria should cover energy and water efficiency, renewable energy where feasible, wastewater treatment, single-use plastic reduction, waste sorting, local procurement, environmentally friendly materials, staff training, and visitor communication. Recognition and promotion should be linked to verified compliance rather than self-declared green claims.

Food and accommodation providers should be encouraged to purchase local agricultural products and reduce packaging. Homestays and community businesses require technical assistance to adopt standards without losing cultural authenticity or facing unreasonable costs.

6.5 Human resources and community participation

Training should be organized for park staff, guides, tourism businesses, and community members. Park personnel need skills in sustainable destination management, visitor-flow

regulation, environmental interpretation, digital monitoring, and product development. Guides and collaborators require ecological knowledge, first aid, trekking safety, communication, and responsible-tourism facilitation.

Community programs should include homestay management, food hygiene, service quality, digital marketing, environmental protection, product design, and small-business management. Training should be practical and linked to specific products rather than delivered as general awareness sessions. Demonstration households and peer learning can help disseminate standards.

Local participation should be formalized through cooperative groups, service contracts, benefit-sharing arrangements, and consultation in route and product planning. Preferential credit, small grants, and market access should support ecological homestays, medicinal-plant experiences, clean agriculture, local food, and traditional crafts.

6.6 Environmental management, visitor education, and digital governance

The park should implement a zero-waste direction for tourism activities. Single-use plastics should be progressively restricted, waste sorting should be mandatory at major sites, and campsites and events should follow take-back or deposit requirements. Environmental performance should be monitored by location and season.

Visitor education should move from administrative signs to interactive interpretation. Pre-visit information, guide briefings, mobile content, ecological games, conservation activities, and visible feedback on environmental outcomes can strengthen behavioral change. Visitors should understand not only what is prohibited but why particular ecosystems and species require protection.

Digital governance should integrate electronic tickets, time-slot reservations, visitor-density data, parking information, GIS maps, environmental incident reporting, and visitor feedback. A green tourism information portal can promote certified products, community experiences, responsible behavior, and alternative routes during peak periods.

6.7 Responsibilities of tourists, businesses, communities, and public authorities

Tourists should comply with designated routes, avoid littering and excessive noise, minimize single-use plastics, use refillable containers, respect wildlife, and participate in conservation activities where offered. Behavioral expectations should be clearly communicated before arrival and reinforced through incentives and proportionate enforcement.

Tourism businesses should adopt green operating criteria, train staff, source locally, support community products, and coordinate with the park on waste, visitor limits, and environmental monitoring. Tour operators should prioritize small-group ecological and educational tours over mass visitation.

Buffer-zone communities should protect forest resources and cultural values while developing ecological homestays, local guiding, medicinal-plant services, clean agricultural products, cuisine, and crafts. Community groups can also participate in waste collection, fire-risk monitoring, and visitor education.

Local government and tourism authorities should integrate green tourism into socio-economic planning, invest in environmental and digital infrastructure, establish a green certification system, support finance and training, control unauthorized construction, and strengthen regional linkages among Ba Vi, Son Tay, Xu Doai cultural sites, craft villages, and peri-urban ecological agriculture.

Table 11: Stakeholder responsibilities in the proposed implementation framework

Stakeholder	Priority actions	Expected contribution
Park management/public authorities	Ecological zoning; carrying-capacity limits; e-ticketing; environmental monitoring; green infrastructure; certification	Lower ecological pressure and stronger destination governance
Tourism businesses	Green operations; local procurement; small-group products; staff training; waste and wastewater control	Higher service quality and a credible green value chain
Buffer-zone communities	Ecological homestays; local guiding; culture, medicine, food, agriculture, and crafts; conservation participation	Local livelihoods, benefit sharing, and cultural preservation
Tourists	Responsible conduct; waste reduction; route compliance; conservation participation	Improved environmental quality and reduced behavior-related impacts
Universities and training institutions	Guide training; product design; monitoring support; environmental education modules	Professional capacity and evidence-based innovation

Source: Structured from the original study's solution groups and recommendations.

7. Conclusion

This study examined the potential for developing green tourism products at Ba Vi National Park through an integrated assessment of resources, market demand, infrastructure, services, human resources, community participation, management, and current product performance. The park has outstanding ecological and market advantages. Its forest ecosystems, mountain landscapes, cool climate, biodiversity, medicinal plants, cultural values, and proximity to Hanoi provide a strong basis for ecotourism, wellness, trekking, environmental education, community tourism, and green cultural-spiritual experiences.

Survey results show high visitor appreciation of the park's resources and substantial interest in green tourism. Tourism growth and expanding infrastructure also create favorable commercial conditions. However, the destination's natural greenness is stronger than the greenness of its operations. Waste sorting, public sanitation, plastic reduction, environmental interpretation, green accommodation, community training, and carrying-capacity management require substantial improvement. Existing products remain fragmented and dominated by sightseeing rather than specialized ecological learning and conservation experiences.

The five green gaps identified in the study demonstrate that the core problem is not a lack of resources but a difference between ecological potential and destination-management capacity. Closing these gaps requires ecological zoning, route-level carrying-capacity control, thematic green

products, environmental infrastructure, green service standards, community-based value chains, interactive visitor education, and digital governance. The park, public authorities, businesses, tourists, and buffer-zone communities must share responsibilities and benefits.

If these measures are implemented in a coordinated and controlled manner, Ba Vi National Park can develop into a leading green tourism destination in the Hanoi Capital Region. Green tourism can then contribute not only to visitor experience and tourism revenue but also to forest conservation, biodiversity protection, environmental education, and sustainable livelihoods for buffer-zone communities.

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