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ENVIRONMENTAL PROTECTION MODEL IN TOURIST AREAS AND TOURIST DESTINATIONS IN VIETNAM

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ABSTRACT

Tourist areas and destinations are crucial for the advancement of Vietnam's tourism sector and the local economy, as they possess abundant and diverse tourism resources that appeal to both domestic and international visitors. By 2023, Vietnam will have 573 tourism destinations, 64 provincial-level tourist areas, and 7 national-level tourist areas officially recognized (Thanh Giang, 2023). These tourist regions and locations are esteemed for their appealing tourism assets, transit amenities, and physical and technical infrastructure. The strategic planning and investment in tourist regions around the nation have significantly transformed the aesthetics of these locations to accommodate the extensive demands of tourists. Nonetheless, a significant challenge for numerous tourist regions and destinations in Vietnam currently is the escalating issue of environmental pollution resulting from the extensive and erratic expansion of tourism in terms of planning and management. The swift advancement prioritizing economic gains, coupled with inconsistent management strategies and a notable absence of a unified management framework, has engendered challenges in the planning and development of tourist sites and destinations. This results in the tourism landscape, the primary feature that establishes the value of tourist locations and destinations, not being honored. As tourism seeks to establish itself as a pivotal economic sector, fostering the advancement of other economic domains, the management of tourist areas and destinations in conjunction with environmental conservation must be prioritized. Without effective policies, planning, and management related to environmental protection, these tourist areas and destinations will lose their appeal to visitors.

KEYWORDS: Tourist Area, Tourist Destination; Environmental Protection; Environmental Protection Model; Environmental Pollution.

1. INTRODUCTION

Vietnam is situated in the easternmost region of the Indochina peninsula in Southeast Asia, adjacent to Laos, Cambodia, China, the East Sea, and the Gulf of Thailand. Vietnam possesses a diverse and abundant array of tourism resources, with the tourism sector recognised as a pivotal component of the national economy (Vietnam National Administration of Tourism, 2024).

2023 signifies a robust resurgence of Vietnam's tourism sector. The influx of international and domestic tourists has demonstrated remarkable growth, substantially aiding the socio-economic advancement of the nation. Vietnam welcomed 12.6 million international tourists, a 3.4-fold increase from 2022, with tourism income projected at VND 37.8 trillion, reflecting a 52.5% rise compared to the previous year.

The expected number of domestic tourists is 108 million, with revenue from accommodation and food services totalling VND 673.5 trillion, reflecting a 14.7% increase compared to 2022. A multitude of national and international tourist events were organised, enhancing the image of Vietnam and its people to global audiences.

Overall, Vietnam's tourism in 2023 has had significant advancements, solidifying its status on the global tourism landscape.

In addition to the advantages of tourism, tourism operations can also have significant adverse effects on the environment, including:

- The tourism sector utilises an extensive quantity of water, often surpassing the domestic water requirements of local residents. This may result in a scarcity of domestic water, particularly during the arid season. Excessive water use for tourism activities, including landscape irrigation, hotel sanitation, and swimming pools, can deplete groundwater and disrupt natural ecosystems.
- Untreated domestic wastewater from tourist regions can contaminate water sources, diminish water quality, and adversely impact human health and aquatic ecosystems.
- Littering is a pressing concern; the substantial garbage generated by tourists can contaminate soil, water, and air, adversely impacting the landscape and human health. Plastic bags, plastic bottles, and foam containers are the predominant forms of waste in tourist locations, posing challenges for decomposition and adversely impacting the ecosystem.
- Modes of transportation, particularly motorcycles and boats, constitute the primary source of pollutants responsible for air pollution in tourist regions and destinations. The adverse environmental impacts linked to tourism, including greenhouse gas emissions from air travel and littering at popular sites, can be substantial (Liu, 2022). The tourism sector contributes approximately 5% of worldwide CO2 emissions, with aircraft responsible for 40% of CO2 emissions associated with tourism transportation (Pan, 2018). Emissions from fossil fuel combustion associated with tourism contribute to heightened air pollution, adversely impacting the health of humans, animals, and plants.
- Tourist regions and attractions frequently utilise substantial energy, particularly electricity, to facilitate activities such as illumination, climate control, and the operation of technological equipment. Excessive energy use can lead to environmental contamination through greenhouse gas emissions, hence exacerbating climate change.
- Noise from automobiles, recreational activities, and nocturnal tourism can impact the health and comfort of both tourists and local residents. Noise pollution can induce insomnia, diminish attention, result in hearing damage, and contribute to various other health issues.
- Unregulated tourism development can detrimentally affect the natural environment, resulting in unfavourable alterations to the ecosystem. Degradation of natural resources, pollution, and loss of biodiversity are detrimental as they heighten vulnerability, diminish system health, and impair resilience (Pueyo-Ros, 2018; De Groot, 2002).

The development of tourism infrastructure, including roads and resorts, can obliterate habitats and obstruct the movement and reproduction of wildlife. Tourism activities may result in the overexploitation of natural resources, hence impacting biodiversity.

To mitigate the environmental impact of tourism, it is essential to concurrently implement strategies including the planning of sustainable tourism development, enhancing investment in wastewater treatment, fostering environmental awareness among the public and tourists, adopting energy-efficient solutions, ensuring effective waste management, and promoting the advancement of civilised and sustainable tourism models (Tu Quyen, 2023).

2. RESEARCH METHODS

2.1. Expert and Community Interview Method

Conduct interviews with tourism management, environmental specialists, and local people to gather information regarding environmental concerns in tourist areas and destinations. This also serves as a means to enhance comprehension of community involvement in environmental conservation at tourist sites and destinations.

2.1.1. Expert Interviews

This study involved comprehensive interviews with 18 specialists specialising in tourism management, environmental science, and sustainable development. The specialists were chosen based on their experience, duration of employment, and practical comprehension of the research domain. Expert interviews were performed as semi-structured in-depth interviews, including targeted questions and open conversations to effectively leverage professional perspectives. The interviews sought to gather comprehensive insights from experts regarding the present environmental conditions in tourist regions and destinations; the origins of environmental issues; evaluation of the effectiveness of current management practices; observations on the degree of collaboration and engagement among authorities, businesses, communities, and tourists in environmental conservation; and recommendations for appropriate models for environmental protection linked to sustainable tourism development.

2.1.2. Interviews with Local Communities

This study involved semi-structured interviews with 45 local residents in tourist regions and destinations, including Ha Long Bay (Quang Ninh province), Tam Chuc (Ha Nam province), Hoi An Ancient Town (Quang Nam province), Dong Giang Heaven Gate (Quang Nam province), Cu Lao Cham (Quang Nam province), Ba Na (Da Nang city), Ngu Hanh Son (Da Nang city), and Tuyen Lam Lake (Lam Dong province). Participants included both individuals directly engaged in tourism activities and those who were not involved. The interview sample was chosen by a purposive sampling procedure, guaranteeing variety in age, gender, occupation, and degree of connection to tourism. The gathered material effectively illustrates the community's understanding, perspectives, and degree of involvement in environmental preservation efforts within the research area. Interviews with local communities seek to gather data on individuals' understanding, perspectives, and practical experiences about environmental challenges stemming from tourism activities, alongside their involvement and engagement in environmental conservation within local tourist areas and destinations. While the technique of interviewing experts and communities yields comprehensive and pragmatic insights, it is not without its limitations. The gathered knowledge is subjective, reliant on individual views and experiences, and prone to prejudice. Secondly, the limited number of interviewers hampers the ability to guarantee representation of the entire community or area experts. Thirdly, the quality of data is significantly influenced by the interviewer's proficiency and may be compromised by language hurdles, cultural differences, or psychological reluctance to disclose information. Ultimately, the processing and analysis of qualitative data necessitate time and effort, and are prone to the researcher's subjectivity.

2.1.3. Direct Observation Method

Monitor the actions of tourists and personnel at tourism sites to evaluate human interaction with the environment and to identify detrimental behaviours such as littering or encroachment on the ecological system. While direct observation facilitates the acquisition of empirical data regarding the conduct of tourists and employees at tourist sites, this methodology possesses significant limitations. Initially, observation may be constrained by temporal and spatial parameters, resulting in the exclusion of behaviours or circumstances that transpire beyond the observational scope. The Hawthorne effect, wherein visitors or employees alter their behaviour upon realising they are being monitored, might skew the gathered results. Third, observation frequently fails to elucidate the reasons or underlying causes of behaviours, necessitating the integration of additional approaches, such as interviews, to achieve a more comprehensive understanding. Ultimately, documenting and scrutinising observed behaviour necessitates the researcher to possess advanced observational skills; otherwise, it is prone to inaccuracies or bias in the data collection process.

2.1.4. Survey Method of Residents and Tourists

Enquire with inhabitants and tourists regarding their understanding of environmental issues and the execution of environmental protection measures in tourist areas and destinations. Subsequently, evaluate the influence of community awareness on

the environmental protection behaviours associated with tourism. The survey method is effective for gathering data on residents' and tourists' attitudes and behaviours about environmental issues, although it possesses specific limitations. The poll depends on self-reporting by participants, which is prone to social bias, since respondents often supply answers that align with the questioner's expectations rather than truly representing reality. The comprehension and articulation levels of residents and visitors may vary significantly, impacting the precision and uniformity of the gathered data. Third, surveys frequently encounter challenges in accessing less cooperative communities or visitors, as well as individuals facing linguistic and cultural obstacles. This method primarily yields quantitative or descriptive data, which fails to elucidate the underlying reasons and motivations of behaviour, necessitating integration with qualitative methodologies for a thorough analysis.

2.2. Case Study Method

1. Investigate successful environmental protection models in renowned tourist destinations, examining effective strategies implemented in various countries, nature reserves, and areas dedicated to sustainable tourism development.
2. Assess pragmatic models: Examine and contrast environmental protection frameworks in designated tourism regions and locales, assessing the practicality and efficacy of each framework in preserving resources and the environment while attracting visitors.

The case study method, while highly effective in conducting in-depth analyses of successful tourism environmental protection plans and evaluating the feasibility and efficacy of each specific model, possesses inherent limitations. The research findings are frequently localised and challenging to generalise, as each example possesses distinct characteristics related to geographical environment, culture, and management strategies. The selection of case studies may be influenced by sample bias, resulting in an emphasis on successful models while neglecting unsuccessful or ineffective cases, so distorting the overall perspective. Third, comprehensive analysis necessitates significant time, money, and extensive data, often encountering challenges in obtaining complete information, particularly when examining models in foreign countries or isolated regions. This method is significantly reliant on the researcher's skills and expertise in data collection and interpretation, perhaps resulting in subjective analysis.

2.3. Method of analysing tourism environmental protection policies and strategies

Examine current environmental protection measures in tourism and suggest innovative strategies. These policies may encompass the creation of natural reserves, the ban or limitation of activities detrimental to the tourism environment, the formulation of legislation for animal conservation, or the regulation of infrastructure development in tourist areas and destinations. The examination of tourism environmental protection policies and strategies aids in assessing the efficacy of existing legislation and suggesting enhancements, although it possesses certain limits. The analysis mostly relies on accessible papers, legal texts, and reports, which may not entirely capture the actual execution and efficacy at the local level. Secondly, policies and initiatives are frequently influenced by intricate political, economic, and social considerations, complicating their objective and complete evaluation. Third, new concepts may face challenges in execution due to resource constraints, stakeholder consensus, or deficiencies in the management framework. This analysis frequently neglects the direct influence on the behaviour of inhabitants and tourists, necessitating integration with additional empirical research methodologies for a thorough evaluation.

2.3.1. Study Overview

Presently, numerous models of environmental protection in tourist areas and destinations have been effectively implemented, yielding significant benefits for both tourism development and the preservation of the environment, natural resources, and ecosystems.

2.3.2. Ecology Tourism Matrix Model in Munnar Tourist Area, Kerala (India)

The Munnar tourist region in Kerala, India, has effectively implemented the Ecology - Tourism Matrix (ETM) model to formulate a tourism development strategy centred on resource conservation and sustainable development, ensuring a balance between tourism advancement and environmental preservation in this unique tourist area. The ETM model employs a dual-indicator approach, utilising ecological sensitivity (ESI) and tourism attractiveness (TAI) to assess each tourist destination (attraction/various activities) within the tourist region. In the ETM model, tourist destinations are defined as locations capable of attracting visitors, possessing conservation importance, and holding

tourism relevance. Destinations are identified by a compilation of tourism materials, presented for group deliberation, using expert insights and targeted research. The evaluation procedure, as per ESI and TAI, relies on the identification of primary variables, subordinate variables, and their respective weights. The Ecological Sensitivity Index (ESI) evaluates the ecological vulnerability of a tourist destination through three primary variables (ecosystem, biodiversity, and landscape) and 15 sub-variables, each assigned a specific weight. The Tourism Attractiveness Index (TAI) measures the current and future appeal of a destination based on three essential variables (inherent competitiveness, significance, and activity distribution) and 7 sub-variables. Following the evaluation of each location individually, based on the accrued points, the tourist destinations are rated according to their respective levels: High (≥75), medium (51-74), and poor (≤50) scores. The integrated assessment of the two variables (ESI and TAI) identifies places for conservation or tourist purposes. **Utilising the ETM model for the investigation and evaluation of Munnar STZ yields a multifaceted result, including:**

1. Forming a classification system for tourist attractions in an environmentally sensitive region/destination;
2. Being the basis for orientation and tourism conservation/development strategy for regions;
3. Being a specific sustainable tourism planning tool for ecologically sensitive destinations. The ETM model is designed primarily for tourist regions and destinations characterised by rich and delicate ecosystems. The concept seeks to reconcile infrastructure growth with the conservation requirements of a destination, without undermining the vital infrastructure that supports tourism. The model has been formulated and utilised by numerous developing nations (Thuy Van, 2019).

2.4. The Ecotourism Model in Costa Rica

Costa Rica is regarded as a forerunner in the establishment of the "ecotourism" model. This concept underscores the synergy between environmental conservation and tourism advancement via activities such as visiting nature reserves, national parks, and engaging in sustainable tourism practices. Costa Rica allocates about 25% of its land area to natural reserves, national parks, and biosphere reserves, ranking among the highest globally. The government established these places to safeguard biodiversity and to draw tourists for ecological activities. In Costa Rica, tourists are accompanied by individuals well-versed in the ecology, aiding them in comprehending the significance of environmental conservation and the necessity of preserving natural habitats. Tourist regions, attractions, lodgings, dining establishments, and tourism enterprises in Costa Rica are required to adhere to environmental requirements, including the utilisation of renewable energy, waste recycling, and resource conservation. Costa Rica emphasises not only established tourist locations but also promotes the development of new tourist locales in lesser-known regions, thereby alleviating congestion in major tourist areas and safeguarding natural resources. A crucial aspect of Costa Rica's ecotourism concept is its emphasis on community and social values, integrating environmental conservation with social advantages for local populations. Tourists are urged to engage in community activities, including visiting indigenous villages, experiencing the lifestyles of indigenous peoples, and acquiring knowledge about traditional conservation practices. Costa Rica's "ecotourism" concept exemplifies how a nation can grow tourism while safeguarding environmental resources. Costa Rica's achievement in integrating tourism development with environmental conservation has not only drawn tourists to the nation but has also served as a model for several other countries in establishing a sustainable and responsible tourism sector (Nguyen Chau Anh, 2024; Costa Rica Tourism Board, 2023).

2.5. Community Environmental Protection Model in the Tourism Sector in Sabah National Park (Malaysia)

The community environmental protection concept in the tourism sector of Sabah National Park (Malaysia) is a sustainable development approach that integrates environmental resource conservation with tourism advancement, simultaneously generating advantages for the local community. Sabah National Park, situated on the Malaysian island of Borneo, is among the most biodiverse regions globally, featuring tropical rainforest ecosystems, towering peaks like Kinabalu, and coral reefs, establishing it as a significant ecotourism site. To safeguard the environment and ensure sustainable tourism growth, a community-based environmental protection strategy has been implemented, wherein the local community plays a crucial role in the management and preservation of natural resources. This strategy underscores the involvement of local communities in environmental

conservation and tourism advancement. It is a collaborative management framework involving government entities, non-governmental organisations (NGOs), researchers, and local people. The community engages in environmental maintenance and protection while capitalising on ecotourism opportunities to enhance income and promote awareness of environmental conservation, recognising the intrinsic connection between sustainable tourism development and environmental safeguarding. The government and stakeholders have instituted stringent management protocols for tourism operations in Sabah National Park to guarantee sustainable tourism development. These methods encompass: Certain regions within the national park may impose daily visiting limits to mitigate environmental and ecological damage; garbage management initiatives, particularly concerning plastic garbage, are implemented to uphold cleanliness and save wildlife from the hazards of refuse; Tourism activities, including the ascent of Mount Kinabalu, are meticulously regulated to prevent adverse effects on the ecosystem. Regulatory agencies perform environmental inspections, coordinate research initiatives, and evaluate environmental repercussions. The Government and pertinent organisations have actively endorsed ecotourism initiatives, guiding visitors to appreciate nature responsibly while safeguarding unique flora and fauna. These initiatives not only safeguard the environment but also enhance income for local populations. Initiatives including sea turtle conservation, Sumatran rhino conservation, and primary forest protection offer visitors the chance to engage in animal preservation activities (Nguyen Lan Huong, 2020).

2.6. The Environmental Responsibility Model in New Zealand

New Zealand is distinguished for its environmental protection policies within the tourism sector. The "Environmental Responsibility" model is extensively implemented in tourist regions and destinations, necessitating that tourists and tourism enterprises engaged in tourism activities pledge to save the environment. Renowned tourist locations like Rotorua and Queenstown mandate that visitors adhere to environmental protection restrictions, including prohibitions against littering, hunting wildlife, and damaging natural ecosystems. Cities like Auckland and Wellington adopt "zero emission tourism" efforts, promoting the use of public transit or electric vehicles over private cars for tourists. Tourism enterprises in New Zealand are required to perform environmental impact assessments prior to the initiation of new tourism projects and to pledge adherence to environmental protection protocols (Viet Le, 2023).

2.7. Zero Carbon tourism model in Bhutan

Bhutan is distinguished by its sustainable tourism policy and dedication to preserving the natural environment. The zero carbon tourism concept in Bhutan safeguards the ecosystem while fostering sustainable cultural and economic benefits for the nation. Bhutan is the sole nation globally dedicated to preserving a carbon-negative status, signifying that it sequesters more carbon from the atmosphere than it releases. This is accomplished by safeguarding forests, which cover about 70% of the country and significantly absorb CO2. This policy establishes the framework for zero carbon tourism, ensuring that tourists to Bhutan do not elevate the nation's CO2 emissions. Bhutan emphasises ecotourism, promoting visitor engagement in nature conservation activities, including trekking, exploring national parks, and visiting wildlife sanctuaries. These activities are structured to minimise ecological impact while simultaneously enhancing tourists' awareness of environmental conservation. Bhutan implements a policy that restricts the number of tourists to the nation. Travellers to Bhutan must remit payment for their journey in accordance with the High Tourist Fee Policy. This regulates tourist numbers, mitigates adverse environmental effects, and ensures the sustainable development of the tourism sector. Bhutan promotes the utilisation of low-impact transportation methods, including electric vehicles and public transit. The nation additionally limits the utilisation of private vehicles, particularly in tourist regions, to mitigate carbon emissions. Tourists in Bhutan can engage in carbon offset programs by supporting tree planting and forest conservation initiatives. The Bhutanese government prioritises the regeneration of natural resources to safeguard the environment and preserve biodiversity. Bhutan's zero-carbon tourism strategy exemplifies that the integration of environmental conservation and sustainable tourist development can save nature while yielding enduring economic advantages (An Nhu, 2022; Hong Nhung, 2023).

2.8. The "Green Key" Sustainable Tourism Model in Europe

The "Green Key" Sustainable Tourism Model is an international certification program, established in Europe, for lodging facilities, restaurants, and

tourism enterprises that adhere to environmental protection criteria. This model fosters sustainable tourism by reducing the environmental effect of the tourism sector. Accommodation facilities involved in the Green Key program must implement energy conservation measures (including LED lighting and efficient air conditioning) and minimise water usage (such as energy-efficient hot water systems and water-saving showerheads). Tourist regions and attractions must adopt strategies to mitigate plastic waste, enhance recycling efforts, and manage garbage sustainably. Tourist regions and places involved in the Green Key program receive the "Green Key" accreditation, indicating their dedication to environmental conservation in tourism (Lan Anh, 2024).

2.9. State Management Model for Tourism in the Maldives

The Maldives is a premier global tourist destination, particularly renowned for its luxury resort tourism, with opulent resorts situated on individual islands. The Government of the Maldives acknowledges the significant contribution of tourism to the national economy, while emphasising the necessity for sustainable management to mitigate adverse environmental effects. The Government of the Maldives has instituted initiatives to promote sustainable tourism, including ecotourism and the enforcement of environmental protection regulations for resorts. This concept encompasses regulating tourist influx, promoting the utilisation of renewable energy by lodging providers, reducing waste, and safeguarding critical ecosystems, including coral reefs and marine environments. The Government of the Maldives enforces tourism island management rules, supervised by state institutions such the Ministry of Tourism, to prevent the degradation of environmental quality due to tourism activity. The Maldivian government has implemented eco-friendly operational standards for resort islands, including: prohibition of mining activities that damage coral and reef structures; stringent management of all coastal constructions (such as dykes, breakwaters or jetties); regulations ensuring that the construction of jetties and breakwaters does not disrupt seawater flow; mandatory installation of incinerators and bottle crushers at resorts; prevention of deep waste burial; and architectural guide Tourists are urged to adhere to environmental protection standards, including conserving water and electricity, and refraining from activities that damage coral. To enhance tourism knowledge regarding the fragility of the ecosystem and marine environment in the Maldives, numerous resort islands have disseminated informational booklets and encouraged tourists to participate in specialised training courses and seminars on environmental conservation. The resort islands execute a landscape enhancement initiative by cultivating plants and flowers for ornamental and recreational objectives, including the planting of trees along pathways and lawns beneath coconut trees, palm trees, and orchards. Each resort island manages a substantial volume of garbage on-site. The Maldives government has established a model of state administration for resort islands, characterised by stringent environmental protection legislation, resulting in the creation of 86 distinctive tourism goods in the form of unique resort islands. The development of tourism products derived from the islands' natural resources and local cultural context has revolutionised the tourism industry, therefore transforming an economy that was originally reliant on traditional fishing into one focused on tourism service development. Consequently, the Maldivian government concluded that sustainable tourist development is significantly reliant on environmental conservation (Nguyen Lan Huong, 2020).

2.10. The "Co-management" Model for Coral Reefs in Australia

The "Co-management" strategy for the Great Barrier Reef (GBR) in Australia exemplifies the collaboration among government agencies, local communities, NGOs, and industry to sustainably manage natural resources. The Great Barrier Reef is a crucial and complex marine environment globally, however it confronts numerous problems from climate change, pollution, overfishing, and particularly the effects of the tourism sector. This cooperative management strategy has been designed to safeguard and sustain the coral reef ecosystem while reconciling economic development, environmental conservation, and community advantages. Governments and regulatory bodies have instituted stringent rules for the tourism sector to mitigate environmental effects. Visitors must comply with regulations prohibiting trespassing on the reef, pollution, and disruption of marine life. Tourism enterprises must comply with stringent environmental regulations. The collaborative management strategy for the Great Barrier Reef has evolved over several years and encompasses numerous stakeholders, including the Commonwealth and Queensland Governments, local communities, fishing groups, the tourism

sector, non-governmental organisations, scientists, and research institutions. The collaborative management paradigm underscores the distribution of authority and accountability among stakeholders. Decisions on resource management and environmental protection are not determined by a singular government body but arise from the collaboration and consensus of multiple stakeholders. Local communities and fishing organisations can actively participate in management decision-making and the oversight of resource exploitation activities. They offer insight into the effects of extraction operations on local ecosystems and livelihoods. Enhancing awareness and educating communities regarding the significance of coral reefs and environmental concerns is a crucial component of this model. Communication strategies must not only engage communities but also promote behavioural change among tourists and industries (Nguyen Lan Huong, 2020; Pham Thi Tram, Le Hong Ngoc, 2024).

2.11. Community Tourism Development Model in Annapurna Nature Reserve (Nepal)

The Annapurna Nature Reserve in Nepal spans 7,629 km² within the Himalayan highlands and has a population exceeding 125,000, comprising ethnic minorities such as Gurung, Thakali, and Manangba. Established in 1986, the Annapurna Conservation Project aimed to promote community tourism linked to nature conservation and environmental protection. The project has established tree nurseries to support community and private forestry initiatives, constructed fuel storage facilities for oil and gas to substitute firewood, and promoted the development of small hydropower stations within the community. The project has enabled local populations to engage in services including homestay enterprises, trekking guidance, food and beverage provision, laundry services, and tea house management. Fifteen percent of tourism income are allocated to nature protection, thirty-five percent to firefighting and repair of tourist infrastructure, and fifty percent to community development support. The government has established a specialised program that prioritises women's involvement in conservation decision-making. This methodology has established a compelling paradigm in resource management that aligns with local customs. Consequently, local residents can sustain their daily lives without compromising conservation principles, thereby enhancing Annapurna's diversity and significance for tourism growth (Ha Thi Thu Thuy, 2023). Numerous models have been developed globally to safeguard the environment in tourist regions and destinations. The aforementioned models have been chosen for research to serve as a foundation for generalisation, from which to derive lessons learnt for Vietnam.

Lessons learnt that can be implemented in Vietnam include:

1. Concerning the objective of establishing environmental protection models in tourist regions and destinations: Research and analysis of global models indicate that the majority seek to address the "conflict" between tourism development and environmental preservation, employing a systematic approach orientated towards sustainable development. Thus, the preservation and protection of the environment are guaranteed to be "balanced" with tourism, economic, and social development, and vice versa. This goal is particularly challenging for developing economies, as their governments frequently prioritise economic development over environmental conservation.
2. Concerning the applicability of environmental protection models: Each model is designed for a specific issue, according to the features of the particular tourism area or destination, hence establishing an appropriate environmental protection framework.
3. In terms of spatial considerations, the construction of an environmental protection model for any given tourist region or destination must distinctly delineate priority conservation zones, priority tourism development zones, and locations where conservation and tourism development can be integrated. Determining the "subject" and its primary objectives is fundamental for the implementation of policies, measures, and the formulation of judicious investment decisions.
4. The development of an environmental protection model is examined under "dynamic" conditions, wherein the components of the system are perpetually in motion and evolving over time. Therefore, the consideration and analysis of environmental protection must also account for the fluctuations of other factors (such as tourism, economy, population, and government). Certain approaches have been implemented, resulting in enhanced management of tourism activities and environmental conservation. Nevertheless, several contemporary models lack clear delineation of responsibilities,

duties, authorities, or overlaps within the management process, resulting in challenges in task execution (Dinh Chau, 2020).

5. Utilising a modelling approach that involves constructing a digital model for the development of an environmental protection framework. Digital models facilitate the provision of precise data, quantifying study factors and converting them into a standardised unit for comparative analysis, so informing decisions regarding development plans or areas designated for tourism development or conservation.

Nonetheless, engaging with numerical models in research presents greater challenges than qualitative research, as it necessitates not only specialised knowledge but also an understanding of mathematical models, variable selection methodologies, and the tools employed to execute the model. This approach is limited by the complexity that arises when the research issue encompasses numerous interrelated factors (Thuy Van, 2019). Vietnam remains a developing nation, where tourism is a rapidly growing sector that increasingly contributes to the national economy. Nonetheless, despite these promising outcomes, the tourism sector is concurrently exerting both direct and indirect adverse effects on the natural and social environments in numerous tourist regions and destinations nationwide. Currently, it is essential and opportune to research and develop an environmental protection model within the tourist sector to mitigate the adverse effects of tourism on the environment and to facilitate the restoration of diminished natural values. How can one construct a paradigm that promotes tourism development while preserving existing environmental values? Tourist sites and destinations in Vietnam can draw from global practical experiences to select and develop appropriate models that ensure balanced development. The state management agency for tourism and environment is crucial in overseeing and safeguarding the environment in tourist regions and attractions. It will be exceedingly challenging and inefficient for the state to undertake environmental protection independently, as resources for implementation are perpetually constrained. Therefore, "Cooperative management" will serve as a model to alleviate the state's burden of responsibility, distributing the obligation for environmental protection among various stakeholders, including tourism enterprises, local residents, and tourists, who, while benefiting from the natural environment, must concurrently assume responsibility for its preservation. During that period, the state will assume the role of management, executing functions of orientation, guidance, and overall administration. **This study employs a model method, representing a system with interacting components that function according to a certain process, involving participants engaged in environmental conservation within tourist areas and destinations, including:**

1. Tourism and service businesses/facilities in tourist areas and destinations;
2. Local state tourism management agencies;
3. Local state environmental management agencies;
4. Local authorities;
5. Tourist area and destination management units (Board of Directors/Management Board);
6. Local communities;
7. Tourists;
8. Professional social organizations and NGOs.

3. RESULTS AND DISCUSSION

3.1. Current Environmental Situation in Tourist Areas and Destinations in Vietnam

The environment in Vietnam's tourist zones is currently confronting numerous significant issues, adversely impacting the quality of tourist experiences and the sustainable development of the tourism sector.

- **The following are key environmental issues in tourist regions and attractions in Vietnam:** Ineffective management and protection of the environment in tourist areas and destinations: One of the main causes of pollution and destruction of the tourism environment is the lack of strict management and effective planning. Tourism infrastructure has not been built in accordance with environmental protection requirements and there is a lack of educational programs on environmental protection for tourists and the community. Handling of violations of the tourism environment is not strong enough and has no deterrent effect. The situation of littering or hunting wild animals, leading to the environment in tourist areas and spots not being well protected (Nguyen Van Dinh, Nguyen Thi Thu Ha, 2022).
- The act of dumping waste, polluting the environment in tourist areas and spots is still common: The problem of dumping waste causing unhygienic, polluting the environment in tourist areas and spots and

related, affecting environmental resources needs to be thoroughly recognized. Many localities, including localities with seas and beaches, do not have a wastewater treatment system before discharging into the sea. In addition, many businesses and establishments on the coast, lakes, rivers, and tourist service points do not really care about collecting waste from daily business activities. At tourist areas and spots, littering is still common, although tourist areas have arranged waste containers, creating many offensive images. In many tourist areas and spots, the situation of waste thrown away by tourists is a serious problem. Areas such as Ha Long Bay, Phu Quoc, Da Nang, Sa Pa... have witnessed the sight of plastic waste flooding the coast, streams, forests, or famous tourist destinations. Water sources in some tourist areas and spots are also polluted, especially in coastal tourist areas and spots, where wastewater from tourism, industrial, and domestic activities has not been properly treated according to regulations. This reduces water quality and harms aquatic ecosystems (Le Anh Tuan, 2017).

- Overcrowding in tourist areas and destinations: Some tourist areas and destinations with too many tourists, overloading the infrastructure and tourism environment. For example, Ha Long Bay, Sa Pa, Phong Nha - Ke Bang... are facing this problem. Overcrowding not only reduces the tourist experience but also harms the ecosystem, disrupting the balance of nature (Quang Xuong, 2024).
- Tourist landscapes in tourist areas and destinations are not respected: The landscape of tourist areas and destinations plays an important role in creating the value of tourist areas and destinations. Recently, many tourist areas and destinations have received attention for planning and investment, the appearance of tourist areas and destinations across the country has improved a lot. Construction works have been deployed, resorts, hotels, restaurants, entertainment venues and tourism services for tourists have been developed with attention. However, many tourist areas and spots have very high landscape value, which need to be exploited and promoted effectively, but in reality, the value of landscape seems to be underestimated in many places. Disrespect for the landscape is shown through the construction of works of inappropriate scale and height, the exterior architecture of the works is too different due to the use of materials that are not suitable for the general landscape; concreting tourist areas and spots; using and introducing plants from other places that are not native to the area (Le Anh Tuan, 2017).
- Negative impacts on the ecosystem: Some ecotourism areas are threatened by tourism activities without a reasonable environmental protection plan. Infrastructure development activities and exploitation of natural resources for tourism purposes reduce forest areas and destroy the habitats of flora and fauna. Coastal tourism areas and destinations such as Phu Quoc, Nha Trang or Con Dao are facing the problem of coral bleaching, marine pollution and impacts from tourism activities such as scuba diving and cruise ship transportation. Uncontrolled tourism development can impact the land (erosion, landslides), change habitats, and threaten wild animals and plants (noise, hunting, supply of wild game meat, stuffed animals, insects...). Construction of roads and campsites hinders the movement of wild animals to find prey, mate or reproduce, and destroys coral reefs due to the exploitation of specimens, ornamental fish or anchoring of boats.
- Tourism resources in tourist areas and destinations are being encroached upon: It can be determined that the encroachment on resources arises from two subjects, from investors in tourism-related projects and from tourists who are the subjects of tourism activities. For investors, the issue of investment project establishment and environmental impact assessment has not been given due attention, leading to disregard and neglect of environmental impacts during the investment, construction, use and operation process. For tourists, in the process of developing tourism activities in tourist areas and destinations, many tourists have committed inappropriate actions, encroaching on the value of tourism resources such as: writing names, carving letters on architectural works, on the walls of caves, on the trunks and leaves of trees in tourist areas and destinations; breaking branches, breaking stalactites in caves (Le Anh Tuan, 2017).
- Climate change and natural disasters: Climate change causes extreme weather phenomena such as storms, floods, droughts, seriously

affecting tourism activities. Coastal, island or mountainous tourist areas and destinations are greatly affected, reducing the ability to develop sustainable tourism and causing financial and human losses (Le Do, 2023).

The reasons leading to the above environmental situation in tourist areas and destinations in Vietnam are the number of tourists is increasing and lacking control:

1. **Tourism growth exceeds management capacity:** Vietnam is becoming a popular tourist destination in the world, leading to a sharp increase in the number of tourists. However, tourism development is not accompanied by improvements in infrastructure and environmental management systems, causing many tourist areas and destinations to become overloaded and unable to meet environmental protection requirements;
2. **Lack of control over the number of visitors:** Famous tourist areas and destinations in Vietnam such as Ha Long Bay, Phu Quoc, Da Nang or Nha Trang... all face overload during peak season. The sudden increase in the number of tourists makes waste management, ecosystem protection and infrastructure, technical facilities difficult, leading to pollution.

Littering and waste pollution:

1. Tourists' littering habits: One of the main causes of environmental pollution in tourist areas and spots is tourists' littering. This situation is common in beaches, eco-tourism areas and famous tourist attractions. Although localities have launched propaganda campaigns and provided trash bins, the awareness of a part of tourists is still limited;
2. Plastic waste pollution: Plastic waste, including bottles, plastic bags, packaging, etc., is a big problem in tourist areas and spots. Plastic waste not only causes loss of aesthetics but also seriously affects the ecosystem, especially marine ecosystems (coral reefs, marine animals).

Water pollution and air pollution:

1. Water pollution: Many coastal tourist areas, ecological areas or areas with river and lake systems are being polluted by waste from tourists and tourism businesses. These wastes can be domestic wastewater, wastewater from restaurants, hotels, as well as chemicals from entertainment services (such as dyes or cleaning chemicals);
2. Air pollution: Although air pollution is not a prominent problem in natural tourist areas, in urban tourist areas or tourist areas with a large number of vehicles and means of transport (such as Da Nang city, Nha Trang, Ha Noi), air pollution due to emissions from vehicles, construction activities and industries is increasing rapidly.

Unsustainable tourism activities:

1. Hunting and wildlife exploitation tourism: Some tourist areas and destinations have activities related to hunting or trading in wildlife, affecting biodiversity. These activities not only violate the law but also threaten the existence of rare animal species;
2. Marine tourism and diving: Tourism activities such as fishing, scuba diving, boating… and water sports can damage coral reefs and marine ecosystems. Improper diving, the use of harmful equipment or unsustainable exploitation of marine resources are among the causes of the decline of marine ecosystems.

- Tourist areas and destinations that focus too much on economic benefits: The situation of tourist areas and destinations in Vietnam focusing too much on economic benefits while ignoring environmental and social factors is a prominent issue in the current tourism industry. Although the tourism industry contributes greatly to the national economy, unsustainable tourism development can lead to many negative consequences for the environment, culture, and local community life.
- Lack of synchronous planning and investment in tourist areas and destinations: In investment projects to develop tourist areas and destinations, hotels, entertainment areas, resorts, and tourism service areas, the issue of synchronous investment in sub-areas to contain and treat waste before discharging it into the environment, especially wastewater, has not been given attention. There is currently a lack of a system of guiding signs and waste collection equipment suitable for the landscape, nature, and structure of tourist areas and destinations.
- Impacts of tourism infrastructure construction:

1. Unsustainable infrastructure development: Many tourist areas in Vietnam are developed without adequate environmental protection plans. The construction of hotels, resorts, shopping centers and other tourist facilities can cause ecological imbalance, destroy

natural landscapes and degrade the quality of soil, water and air;

2. Destruction of ecosystems: The construction of unsustainable tourism infrastructure in eco-tourism or coastal areas can cause the destruction of ecosystems, such as corals, mangroves, and rare species of flora and fauna. For example, tourism development on islands, bays or nature reserves without proper planning can result in the loss of important biological values.

- Lack of respect for the law and social norms in tourist areas and destinations: Participants in tourism activities still lack awareness in protecting tourism environmental resources, lack of respect for the law, do not respect social norms in tourism investment activities, participate in tourism activities; some subjects, for profit, have cut down on construction items related to environmental protection, cut down on the number of workers collecting waste in tourist areas and destinations. Tourists have not strictly followed the regulations of tourist areas and destinations, creating negative images that affect the environment.
- The legal corridor in protecting the tourism environment in tourist areas and destinations is not strong enough: Many legal documents have been developed and promulgated such as the Law on Environmental Protection, the Law on Tourism, the Law on Construction, etc. and related decrees and circulars have been issued, creating a suitable legal corridor. However, the regulations, sanctions, and economic penalties for indiscriminate discharge of waste that affects the tourism environment are not specific and not strong enough.
- The management and supervision regime is still weak:

1. Lack of overall planning and effective management: Management and supervision at tourist areas and destinations are still weak, lacking clear environmental protection policies and sustainable tourism development strategies. The authorities have not fully implemented the inspection and supervision of tourism activities, thereby being unable to control negative impacts on the environment;
2. Sanctions for violations are not strict: Although there are legal regulations on environmental protection, the handling of environmental violations in tourist areas and destinations is still limited. The lack of strict sanctions for acts of pollution and environmental destruction reduces the effectiveness of environmental protection.

- Lack of facilities, equipment and human resources in tourist areas and destinations:

1. Facilities, equipment and human resources in tourist areas and destinations in Vietnam are currently lacking and not uniform, this is one of the main reasons for the reduction of service quality and affecting environmental protection, as well as sustainable tourism development;
2. Investment in equipment and facilities for storing, collecting and treating waste is not much and not uniform, the location of garbage containers and collection is not convenient, and there is no scientific distinction between types of waste. In addition, many tourist destinations have not arranged enough human resources to clean and collect waste, leading to the current situation of waste overload within the tourist area and destination, thereby causing many limitations and shortcomings.

- Lack of participation of the community and businesses:

1. Community and business awareness: Although a large part of the local community and businesses are aware of the issue of environmental protection, some tourism businesses still do not pay attention to environmental protection during their operations. Businesses do not invest in environmental protection measures, use resources wastefully, or do not have specific environmental protection programs;
2. Lack of participation of local communities: The lack of participation of local communities in tourism management and environmental protection makes the tourism environment vulnerable. Local communities are not fully equipped with knowledge and skills on environmental protection and have not really participated in natural resource protection programs.

- Environmental education has not been focused on in tourist areas and destinations: Currently, although all levels of education from primary to university include environmental education in the curriculum, the formation and raising of awareness of individuals has not been as expected; there is no close connection between training in schools and in families...
- Climate change and natural disasters: Climate change is affecting many tourist areas, especially coastal tourist destinations. Rising

sea levels, droughts, and extreme weather events such as storms and floods have negative impacts not only on the landscape but also on tourism infrastructure, making the environment in tourist areas more vulnerable.

Environmental pollution in tourist areas and destinations in Vietnam comes from many causes, including the rapid increase in tourists, lack of sustainable management and planning, tourists' littering habits, and unsustainable tourism activities. To address this issue, comprehensive measures are needed, ranging from raising public awareness, improving infrastructure, applying clean technology, to building stricter environmental protection policies.

3.2. Current Status of Environmental Protection in Tourist Areas and Destinations in Vietnam

3.2.1. Current Status of Environmental Protection Laws in Tourism Activities

In fact, the above documents have contributed to creating a solid legal corridor for more effective environmental protection activities in tourism. However, in addition to the positive aspects, there are still some shortcomings in the current legal regulations on environmental protection in tourism activities.

This is reflected in the following aspects:

- There are no strict regulations on the responsibility to detect and recommend handling of violations of environmental protection laws in tourism activities by organizations and individuals in charge of management and exploitation. Organizations and individuals in charge of management and exploitation play a very important role in ensuring the enforcement of environmental protection laws at tourist destinations and tourist areas because these are the entities that can easily detect violations of the law occurring at the tourist destinations and tourist areas under their management. However, current legal regulations do not clearly stipulate that detecting and recommending handling of violations of environmental protection laws in tourism activities is a responsibility of organizations and individuals managing and exploiting tourist sites and tourist areas (Ministry of Culture, Sports and Tourism – Ministry of Natural Resources and Environment, 2013). Therefore, many entities have not proactively implemented management work well, and have not paid close attention to violations of environmental protection laws occurring in the places they manage.
- It is not mandatory to issue and post regulations on environmental protection at tourist accommodation establishments (Ministry of Culture, Sports and Tourism – Ministry of Natural Resources and Environment, 2013). The regulations on this issue are not clear, but only organizations and individuals managing and exploiting relic sites, relic sites, tourist sites, and tourist attractions are required to post regulations on environmental protection (National Assembly of the Socialist Republic of Vietnam, 2020). In addition, there are regulations on security and order conditions for a number of conditional investment and business sectors, accommodation service establishments are responsible for promulgating internal regulations on ensuring security and order, preventing social evils, fire prevention and fighting, and posting them in a visible and easy-to-read place (Prime Minister, 2016). Thus, accommodation establishments are still obliged to promulgate internal regulations, but regulations on environmental protection in the regulations are not required. This is a major shortcoming, because tourist accommodation establishments have a great impact on the environment. During their operations, many tourist accommodation establishments have committed acts that cause environmental pollution such as discharging untreated waste into the environment. Therefore, there should be regulations requiring the posting of regulations on environmental protection for tourist accommodation establishments (Nguyen Phuoc Thanh, 2021).
- The main contents of the regulations on environmental protection at tourist attractions and tourist areas have not been specifically and clearly regulated. According to the regulations, organizations and individuals managing and exploiting tourist attractions and tourist areas are responsible for posting regulations on environmental protection (National Assembly of the Socialist Republic of Vietnam, 2017); the regulations stipulate that the posted content must clearly state prohibited acts and related documents (Ministry of Culture, Sports and Tourism – Ministry of Natural Resources and Environment, 2013). However, the regulations only stop at the mandatory posting of

prohibited acts, while other important contents such as: sanctions for tourists who violate prohibitions, forms of sanctions, authority to apply handling measures of organizations and individuals managing and exploiting tourist attractions and tourist areas for violations of regulations by other entities within their scope of management... are not mandatory contents according to the regulations. Because there are no specific and clear regulations, the above regulations are issued based on the discretion of the management organization and individual, which can easily lead to arbitrariness (Nguyen Phuoc Thanh, 2021).

3.2.2. Environmental Protection in Tourist Areas and Destinations Still Faces Many Shortcomings

Environmental protection in tourist areas and destinations in Vietnam is currently facing many challenges and shortcomings, despite certain efforts to raise public awareness and improve management policies. However, pollution and environmental degradation in many tourist areas and destinations continue to be serious problems.

Below are some of the current situations of environmental protection in tourist areas and destinations in Vietnam:

- Overcrowding in tourist areas, destinations and planning work still have many limitations: Many tourist areas and destinations have developed strongly, the number of tourists is increasing but there is no accompanying environmental protection strategy, leading to overload, seriously affecting the landscape and ecosystem. Planning work in tourist areas and destinations still lacks consistency and participation of environmental experts. This leads to unsustainable tourism development and harms the ecosystem and environment.
- Environmental protection infrastructure in tourist areas and destinations is not yet synchronized: Many tourist areas and destinations do not have a reasonable wastewater and waste treatment system. Solid waste has not been classified or treated properly, leading to environmental pollution in tourist areas and destinations that is still common. Tourism infrastructure in some tourist areas and destinations is still limited, not able to withstand the sharp increase in tourists during peak seasons. This puts pressure on the waste and clean water treatment system and causes overload to the tourism environment (Luu Thi Thu Thuy, 2020).
- Environmental management in tourist areas and destinations still has many limitations: Although there are legal regulations on environmental protection in tourist areas and destinations, the enforcement of sanctions for violations is still not strict. Handling of littering, hunting wildlife or destroying coral reefs has not been effectively implemented. Monitoring and inspection of tourism activities in tourist areas and destinations have not been fully and continuously implemented. This leads to the situation where travel companies or tourists arbitrarily conduct activities that pollute the environment without being promptly handled.
- Difficulties in protecting National Parks and Nature Reserves: Some National Parks and Nature Reserves in Vietnam are facing encroachment by unsustainable tourism activities, such as tourists visiting without complying with nature protection regulations, or illegal exploitation of natural resources in these areas. Tourism development in ecological areas such as forests, seas, or relic sites can have negative impacts on wild animals and plants, reduce biodiversity and destroy their natural habitats.
- Environmental protection awareness of tourists in tourist areas and destinations is still limited: Although many tourist areas and destinations have had propaganda campaigns and installed trash bins, the situation of tourists littering is still common. This is especially serious in famous tourist areas and destinations such as Ha Long bay, Phu Quoc, Nha Trang, Da Nang... where the number of tourists is very crowded. A part of tourists still has no awareness of protecting the ecosystem, such as diving which damages coral reefs, or encroaching on wildlife in nature reserves.
- Environmental protection efforts in tourist areas and destinations have been implemented: Many tourist areas and destinations have implemented propaganda programs on environmental protection, such as launching campaigns "Say no to plastic waste" or encouraging tourists to participate in activities to clean up the tourist environment. Some tourist areas and destinations have begun to apply environmentally friendly technological solutions, such as using renewable energy, high-tech wastewater

treatment systems, or building sustainable eco-tourism areas and destinations to preserve and promote natural values. Authorities have recognized the importance of sustainable tourism development and are making efforts to develop environmental protection policies and plans, such as planning eco-tourism areas and regulations to minimize the negative impacts of tourism on the environment.

3.3. Some Solutions to Protect the Environment in Tourism Activities in Tourist Areas and Destinations

3.3.1. Some Proposals to Improve the Law on Environmental Protection in Tourism Activities in Tourist Areas and Destinations

- Supplementing regulations on the responsibility to detect and propose handling of violations of the law on environmental protection in tourism activities of organizations and individuals in charge of management and exploitation. Specifying the responsibility to detect and propose handling of violations of the law on environmental protection in tourism activities of organizations and individuals in charge of management and exploitation is an important basis to enhance the responsibility of the management and exploitation team and avoid missing violations of the law.
- Regulations on promulgation and posting of regulations on environmental protection at tourist accommodation establishments. Accordingly, the law should supplement regulations in the direction of requiring the posting of regulations on environmental protection at tourist accommodation establishments, and at the same time, clearly specify the specific contents required when posting such as prohibited acts, sanctions for violations... This will be a solid legal basis for tourist accommodation establishments to handle violations, contributing to raising the awareness of tourists as well as the tourist accommodation establishments themselves (Nguyen Phuoc Thanh, 2021).
- More specific regulations on the main contents of regulations on environmental protection at tourist destinations and tourist areas. Regulations on environmental protection at tourist destinations and tourist areas are only most effective if they have all the necessary contents. Therefore, in addition to the regulations on prohibited acts that are mandatory, some other contents such as forms of sanctions, powers of organizations and individuals managing tourist destinations and tourist areas also need to be specifically regulated to have a complete legal framework. At the same time, the law should also have specific regulations on the authority to apply handling measures of organizations and individuals managing and exploiting against violations of internal regulations by other entities within their scope of management.

3.3.2. Proposing Solutions to Improve Environmental Protection in Tourist Areas and Destinations in Vietnam

- Planning the development of tourist areas and destinations in a reasonable and sustainable manner: Localities and tourist areas and destinations need to develop clear tourism development strategies and plans, ensuring that tourism activities do not harm the environment. Planning of tourist areas and destinations must be based on the conservation and sustainable development of natural resources, while also being associated with the protection of ecosystems and biodiversity. Tourist areas and destinations should avoid building too much infrastructure that is harmful to the environment, but instead should develop tourism activities that have little impact on the landscape, environment and natural resources.
- Strengthening inspection, supervision and law enforcement in tourist areas and destinations: For newly invested tourist areas and destinations, it is necessary to assess environmental impacts and strictly implement regulations on waste discharge during operation. For invested tourist areas and sites, it is necessary to review construction items, wastewater and waste treatment processes to ensure compliance with legal regulations. Authorities need to strengthen the supervision and inspection of tourism activities at tourist areas and sites. There needs to be a specialized team to check compliance with environmental protection regulations and promptly handle violations of the law. Strengthen the management of tourism activities in nature reserves, historical sites and ecological areas, to prevent encroachment due to tourism activities. Licensing and management of tourism in these areas requires the

participation of environmental experts to avoid harming the environmental ecosystem. Environmental violations such as littering, hunting wildlife, or destroying the landscape need to be strictly handled. Applying administrative penalties, even revoking operating and business licenses for tourist areas and destinations that violate regulations is necessary to protect the environment and ensure the goal of sustainable tourism development.

- Improving infrastructure and waste treatment systems: Tourist areas and destinations need to invest in effective waste and wastewater treatment systems, especially those with a large number of tourists. There needs to be systems for collecting, classifying and recycling waste, minimizing the amount of waste released into the environment. Install enough trash cans in tourist areas and destinations. At the same time, public sanitation facilities also need to be improved so that tourists can easily use them and keep the environment clean. Developing green transport infrastructure such as using electric vehicles, bicycles, etc. that are environmentally friendly to minimize air and noise pollution in tourist areas and destinations.
- Encourage cooperation in protecting the tourism environment: State agencies and tourism businesses need to coordinate closely in developing and implementing strategies to protect the tourism environment. Tourism businesses need to participate in environmental protection programs, from reducing plastic waste to initiatives to protect wildlife in tourist areas and destinations. The government can create policy mechanisms to support tourist areas and destinations to apply sustainable tourism models, such as tax incentives for businesses using green technology, reducing carbon emissions, or contributing to environmental protection funds.
- Applying green technology in tourism activities: Focus on developing sustainable tourism models, combining environmental protection with enhancing tourism value. Activities such as visiting nature reserves, hiking in forest trails, or sightseeing in pristine areas help tourists understand and respect nature better. Tourist areas and destinations need to apply new technologies to minimize environmental impacts, such as using renewable energy (solar, wind), advanced clean water treatment systems, or minimizing the use of plastic products.
- Raising awareness of environmental protection for tourists and the community: Organize propaganda campaigns to raise awareness among tourists and local communities about the impact of tourism on the environment. Campaigns such as "Say no to plastic waste", "Preserve natural landscapes" or "Tourism to protect wildlife" need to be regularly deployed in tourist areas and destinations. Encourage tourists to participate in environmental protection activities: Activities such as collecting waste, participating in beach cleaning programs, planting trees in tourist areas and destinations can be organized for tourists to participate. This helps tourists be more responsible in protecting the tourism environment. Implement environmental protection education programs in schools and communities, especially in areas with a large number of tourists; review and adjust training programs at all levels, introduce environmental protection issues with appropriate content and duration, and have more appropriate methods and forms in implementing environmental protection awareness education activities.

3.3.3. Environmental Protection Model in Tourist Areas and Destinations

3.3.3.1. Research on Approaches to Environmental Protection Models in Tourist Areas and Destinations

In addition to the general model of managing tourist areas and destinations, in reality, there are also models built with the aim of finding solutions to balance the conservation and preservation of the values of the natural environment, social environment with tourism development. With the model approach, it is a system with components interacting with each other, operating according to a certain process; on the basis of research and development of environmental protection models in tourist areas and destinations in different regions, from which a common environmental protection model for tourist areas and destinations in Vietnam is proposed (Ministry of Culture, Sports and Tourism, 2018).

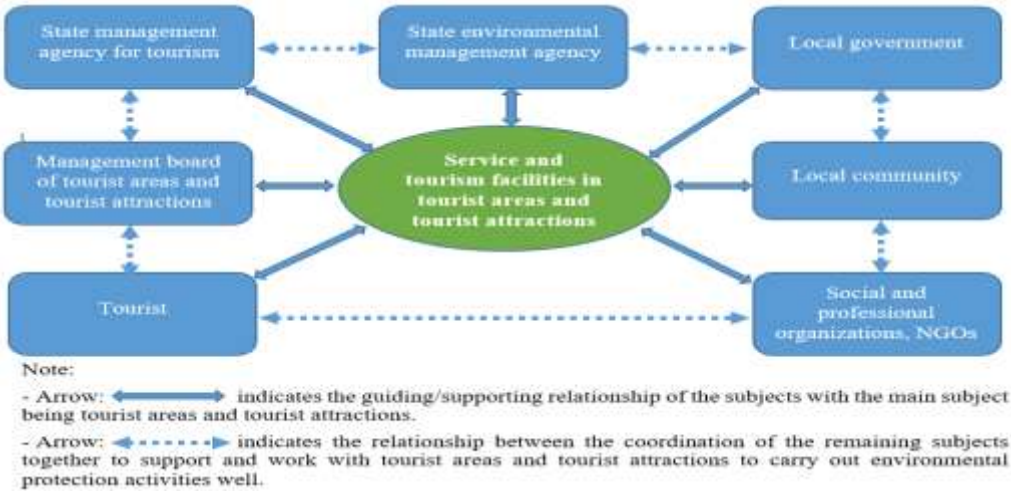

Figure 1: Model of Environmental Protection in Tourist Areas and Tourist Destinations with the Participation of Stakeholders.

Analysing the roles and responsibilities of entities participating in implementing the environmental protection model in tourist areas and destinations.

- Roles and responsibilities of businesses/tourism and service establishments in environmental protection in tourist areas and destinations: Fulfilling obligations and complying with environmental protection regulations during the construction and business exploitation in tourist areas and destinations; implementing environmental protection criteria for tourist and service establishments according to the provisions of law. Calling on and supporting local communities; tourists to jointly fulfill their responsibility to protect the environment. In addition, as a component in the environmental protection management agency model, businesses/tourism and service establishments can participate in giving opinions in the process of formulating policies related to environmental protection; social criticism on environmental quality and environmental protection policies in tourist areas and destinations; Monitor the implementation of policies by management agencies and monitor the compliance level of participating entities.
- Roles and responsibilities of local state management agencies on tourism in environmental protection at tourist areas and destinations: Coordinate with state management agencies on environment to direct and request entities to perform functions and tasks on environmental protection; Coordinate and propose orientations, processes, and measures to protect the environment at the local level, and at the same time organize the supervision of compliance and implementation by participating entities; Closely monitor, inspect and supervise enterprises/facilities with environmentally sensitive tourism service business activities that may cause negative impacts on the environment in the management area; Coordinate in propagating, educating and urging entities participating in the model to comply with environmental protection regulations in the management area; Coordinate to propose measures to raise awareness of the subjects operating in the management area about the dialectical relationship between tourism development and environmental protection and vice versa, thereby realizing the significance of environmental protection. Play a leading or co-leading role in activities in the model. Thus, it can be seen that the position and role of the State management agency on tourism in the model is extremely important, decisive to the success and effectiveness of the model, therefore, the level of participation in the model of this component is very broad and relatively comprehensive.
- -The role and responsibility of the State management agency on environment at the local level in environmental protection in tourist areas and spots: Coordinate and direct other components in the model to ensure good

implementation of environmental protection work; Propagate and widely disseminate regulations related to environmental protection work of the State, sectors and levels to organizations/individuals operating in the area; Implement supervision, inspection and urge the implementation of environmental protection obligations of subjects participating in the model; Coordinate with local state management agencies on tourism to play a leading role in activities in the model.

- Role and responsibility of local authorities in environmental protection at tourist areas and sites: Local authorities are understood as People's Committees at all levels in the locality, including: provincial/municipal, district and commune levels. Depending on the characteristics, nature, scale and type, a tourist area or site can be managed by the provincial, district or commune levels. Normally, tourist areas and sites have an area scale located in many districts, the area of the tourist area located in which district will be administratively managed by that district (boundaries, population…) and responsible for environmental protection work on that area. In fact, local authorities are the units that understand best the current status of socio-economic and environmental life in the administrative area under their management. Therefore, mobilizing local authorities to participate in the model of environmental protection agencies in the tourism sector is to take advantage of local resources, improve the effectiveness and practicality of the model.

Provide information on the current status of local economic, social and environmental life; at the same time coordinate the development of plans; environmental protection measures in tourist areas and spots in the management area; Reconcile environmental conflicts and interests between entities operating in the management area, which can be internal conflicts within the community, or conflicts between tourism and service businesses/establishments, or conflicts between the community and businesses/establishments...; Coordinate the inspection and monitoring of environmentally sensitive activities and urge compliance and implementation of environmental protection regulations by entities operating in the management area; Coordinate propaganda and education to raise awareness and consciousness of environmental protection among entities operating in the management area.

- The role and responsibility of the management unit of tourist areas and spots in environmental protection at tourist areas and spots: At each tourist area and spot nationwide, there is a unit (usually called the Management Board) to help the local government manage the state and exploit to serve tourism development, including: conservation, preservation and restoration, embellishment of relics and scenic spots; management of tourism development activities and management of natural resource protection, restoration and preservation of intact ecosystems, conservation of biodiversity in the assigned management area. With the characteristic of being the direct management unit, grasping the general characteristics, current status of the environment and tourism development in the area, when participating in the environmental protection model in the tourism sector, the Management Board plays an important role and has the widest level of participation compared to other components (simultaneously carrying out environmental protection and tourism development) showing: Coordinating with the subjects participating in the model to carry out environmental protection and tourism development; Providing data and documents on the characteristics, current status of the environment, environmental protection work as well as the tourism development situation in the area as a database for assessment and proposing remedial measures; Inspecting and monitoring all behaviors that may affect the environment or the tourism development potential of the subjects operating in the area; Adjusting and reconciling conflicts that may occur in environmental protection and tourism service business between the subjects operating in the area.
- The role and responsibility of local communities in environmental protection in tourist areas and destinations: Environmental protection in tourist areas and destinations is facing conflicts in environmental behavior between different components of society, especially between local communities and businesses/business establishments exploiting resources. To effectively manage the environment, it is necessary to promote the role of the community, because environmental protection is closely linked to the interests of the community. Community participation in

environmental protection is one of the important solutions for environmental protection management in tourist areas and destinations. Decisions on planning and resource use plans will directly affect the quality of life of the local community. Community participation in environmental protection in the tourism sector not only creates more local resources for environmental protection, but also acts as a fast and effective environmental monitoring force, helping environmental management agencies promptly resolve environmental pollution as soon as it appears. Communities participating in the Model can participate in developing tourism development plans, environmental protection or resource exploitation in tourist areas and destinations. The level of community participation in each tourist area and destination has its own characteristics, depending on customs, practices and intellectual level.

- Roles and responsibilities of tourists in environmental protection in tourist areas and destinations: Actively comply with regulations and rules on environmental sanitation; Use environmentally friendly tourism products and services; Do not use products from animals and plants on the prohibited list; Participate in the process of developing regulations and plans on environmental protection in tourist areas and destinations; At the same time, tourists have the right to reflect on the environmental quality at tourist areas and destinations, promptly warning state agencies, organizations and individuals in environmental control.
- The role and responsibility of professional social organizations and NGOs in environmental protection at tourist areas and destinations: Professional social organizations participate in policy making; review, approve and especially enforce laws on environmental protection; International NGOs in Vietnam can also transfer technology, provide financial support and convey experiences in environmental protection work in countries around the world to the components in the model; Participate in social criticism on the environment for investment projects, promptly warn state agencies, organizations and individuals in controlling enterprises and investors to comply with environmental impact assessment reports.

Action plan to implement the tourism environment protection model. Assign main tasks to subjects:

1. Tourism and service businesses/facilities in tourist areas and destinations: Apply environmental standards, train staff, communicate to visitors.
2. Local state tourism management agencies: Policy coordination, model implementation support
3. Local state environmental management agencies: Environmental quality monitoring, technical treatment recommendations.
4. Local authorities: Approve plans, provide budget support.
5. Tourist area and destination management units (Board of Directors/Management Board): Live deployment, daily testing.
6. Local communities: Participate in environmental protection and social monitoring.
7. Tourists: Responsible consumption, environmental quality feedback
8. Professional social organizations and NGOs: Technical support, training, funding, communication.

Below is a detailed action plan (at a clear roadmap level) to implement the environmental protection model in tourist areas and destinations, with the participation of 8 specific groups of subjects. The roadmap is divided into stages, each stage has its own objectives, tasks, main responsible subjects and expected results.

Table 1: Phase 1 - Start-Up and Site Survey (Duration 1–3 months).

No.	Actions	Target	Main subject	Expected results
1	Survey of environmental status at tourist destinations	Identify prominent environmental issues and their main sources	(3), (5), (6), (8)	Environmental status report
2	Analysis of the role and current status of participation of the subjects	Clarify strengths/weaknesses, cooperation gaps	(2), (4), (8)	Role and influence matrix
3	Establish an interdisciplinary model coordination group	Coordinate between the parties	(4), (2), (3), (5)	Multi-stakeholder coordination group officially established
4	Determine the model's objectives, scope, and evaluation indicators.	Create a clear model deployment platform	Coordination group	Clear set of goals and KPIs

Table 2: Phase 2 - Model Design and Task Assignment (Duration 2–3 months).

No.	Actions	Target	Main subject	Expected results
1	Building a coordination mechanism between subjects	Responsibility binding, information mechanism	(4), (5), (2), (3)	Memorandum of Understanding (MOU)
2	Design specific activities for each target group	Attach practical roles to each party	Coordination group	Detailed action plan by subject
3	Building environmental education and communication programs	Raising awareness among community and visitors	(6), (7), (8)	Media kit and propaganda campaign

Table 3: Phase 3 - Pilot Implementation (6 months).

No.	Actions	Target	Main subject	Expected results
1	Organize training for businesses and communities	Strengthening model implementation capacity	(1), (6), (8)	100% of tourism establishments and community representatives trained
2	Apply the model at the pilot destination	Synchronously deploy environmental protection activities	All subjects	The model is applied in practice
3	Establish environmental monitoring and reporting system	Monitor and respond promptly	(3), (5), (2)	Monthly periodic report
4	Organize the event "Green Tourism"	Attracting tourists to participate	(7), (1), (4)	Increase awareness and positive behavior from visitors

Table 4: Phase 4 - Evaluate, Adjust and Replicate (2–3 months).

No.	Actions	Target	Main subject	Expected results
1	Evaluate model performance according to defined indicators	Measuring success and survival	Coordination team and experts	Detailed model evaluation report
2	Organize a workshop to get feedback on model improvement	Perfect the model before replicating	All subjects	Advanced version model
3	Plan to expand the model to other destinations	Multiplying positive impact	(2), (4), (8)	Approved replication plan and financial support

During the implementation of the model, it is necessary to periodically evaluate the effectiveness of environmental protection when implementing the model. The process of evaluating the effectiveness of environmental protection also identifies difficulties and shortcomings in implementing the model to have measures to remove and overcome them in order to perfect the model. Specialized organizations will support the subjects participating in the model to evaluate the effectiveness and propose solutions. The basis for evaluating the effectiveness of environmental protection work during the implementation of the model is determined to include: Improved environmental quality; Reduced amount of waste released into the environment; Minimized amount of resources consumed; Raised awareness of environmental protection; Strengthened implementation of environmental protection activities... And based on the results of evaluating the effectiveness of the model, identify shortcomings in implementation, thereby adjusting the model accordingly.

However, there are also potential barriers to implementing environmental protection models in tourist areas and tourist destinations, so in the implementation process, solutions need to be found to overcome these barriers to achieve good results in sustainable tourism development and environmental protection:

- Lack of coordination and consensus among subjects: Each party has its own interests, lack of coordination and information sharing mechanisms; the mindset of "others' responsibility" is still common, especially between businesses and the government. Therefore, it is necessary to: Establish an Inter-sectoral coordination group with representatives from 8 subjects, sign a memorandum of understanding (MOU) with clear commitments and apply a regular dialogue mechanism to maintain coordination.
- Lack of funding and resources for implementation: The state budget is limited, businesses often avoid environmental costs. Therefore, it is necessary to: Call for support from international organizations, NGOs, environmental funds; integrate environmental protection models into the corporate social

responsibility strategy; the government issues tax incentives or promotes green tourism to encourage.

- Low environmental awareness and behavior: Tourists and local communities lack understanding or do not prioritize environmental issues; littering and resource destruction still occur. Therefore, it is necessary to: Organize environmental education programs for communities and businesses; launch green tourism communication campaigns, utilize social networks...; integrate environmental protection content into tourism services and local experiences.
- The legal system and sanctions are not strong enough: There are laws but enforcement is weak, penalties are not strict or lack deterrence; some regulations are unclear and easy to circumvent. Therefore, it is necessary to: Review and supplement regulations on tourism environment management in a specific and transparent manner; establish a process for periodic environmental inspection and monitoring at tourist areas and spots; strengthen community supervision and feedback channels of residents/tourists.
- Economic interests overwhelm the goal of environmental protection: Some businesses only focus on profits, causing pollution (waste discharge, deforestation, construction encroachment...); local authorities sometimes prioritize attracting tourism over conservation. Therefore, it is necessary to: Implement the "eco-tourism" model associated with resource protection, with long-term benefits; grant "green tourism destination" certificates to qualified units, with incentives; publicize the tourism environment rankings to create social pressure.
- Lack of technology, data and environmental management capacity: Small tourist destinations lack environmental quality monitoring systems (air, water, waste); environmental management is still manual and passive. Therefore, it is necessary to: Invest in digital technology systems, environmental monitoring sensors; train managers and the community in digital environmental management; connect with scientific organizations and universities for technical advice and research.
- Short-term mentality, lack of long-term commitment: Some subjects only participate in form or coping; projects are easily interrupted when changing governments or lacking successors. Therefore, it is necessary to: Build a model with a 3 - 5 year plan, with clear phase goals; issue policies to attach environmental responsibility to public service and business KPIs; support the building of a network of local environmental volunteers.

3.3.3.2. Applying Artificial Intelligence to Protect the Environment in Tourist Areas and Destinations

Application of artificial intelligence (AI) in environmental management in tourist areas and destinations is increasingly becoming a powerful tool to ensure protection and sustainable development in these tourist areas and destinations. Along with the increase in tourists, resource management, environmental protection and improving the tourist experience are very important. Applying AI to effectively address these challenges through many different approaches such as:

- Forecasting and analyzing the number of visitors: AI can forecast and analyze the number of visitors to tourist areas and destinations based on historical data, seasons, weather, special events, etc. Use AI to analyze and forecast the number of visitors during peak seasons, thereby adjusting the number of tickets or activities at tourist areas and destinations. This helps managers to come up with a reasonable plan to coordinate the number of tourists, avoid overloading and minimize negative impacts on the natural environment (Anh Hao, 2020).
- Enhance the tourist experience through chatbots and virtual assistants: Apply AI to improve the tourist experience through virtual assistant systems (chatbots) that provide quick information about tourist areas, attractions, services, warnings about environmental conditions, or help tourists plan optimal tours. AI chatbots provide information about tours, warn of bad weather, or suggest activities that suit tourists' interests (Nguyet Anh, 2024).
- Manage and preserve cultural heritage: Apply AI to analyze data from environmental sensors and digital images to detect early signs of degradation of heritage structures in tourist areas and attractions, helping with timely maintenance and restoration. AI predicts the level of degradation based on environmental conditions and tourism activities, thereby proposing effective conservation measures. In

addition, AI will support the digitization of cultural heritage, historical structures and relics in tourist areas and destinations through technologies such as 3D scanning, virtual reality (VR) and augmented reality (AR). These technologies not only help protect relics from the impact of tourism activities but also create interactive tourism experiences, helping tourists explore culture without harming heritage (Thuong Nguyen, 2024).

- Smart waste management and treatment: Applying AI to classify and treat waste through automated systems. Machine learning models can analyze waste volumes, forecast collection needs, and optimize waste collection routes in tourist areas and spots. Using AI to classify waste (organic waste, plastic waste, metal, paper…), thereby optimizing recycling and minimizing the environmental impact of waste (Cao Duc Minh, 2023).
- Application in the conservation of ecosystems and flora and fauna: Applying AI to monitor and protect wildlife and rare plants in tourist areas and spots. Image recognition systems and data analysis from surveillance cameras can help detect rare animals or illegal hunting activities in conservation areas, tourist areas and spots. AI uses surveillance cameras and image recognition to monitor the presence of endangered animals and report illegal hunting (Viet Anh, 2024).
- Analyze and optimize environmental protection policies: AI applications analyze environmental data and tourism-related data to propose appropriate environmental protection policies in tourist areas and destinations. Machine learning models can identify key factors affecting the environment and propose measures to minimize the impact. AI analyzes the environmental impact of tourism activities in tourist areas and destinations and makes recommendations to improve natural resource protection policies.
- Monitor and protect the natural environment: AI applications support monitoring of environmental quality (climate, water, soil, air) through IoT (Internet of Things) sensors and data analysis. These systems can detect changes in environmental factors in real time, providing early warnings of problems such as pollution, climate change, or deterioration of the natural environment in tourist areas and destinations. Using AI to monitor coastal tourist areas and destinations, detect oil pollution, changes in water temperature and pH, thereby providing timely protection measures.
- Sustainable resource management: AI applications help manage natural resources in tourist areas and destinations such as water, electricity, and waste. The AI system monitors the level of resource usage and makes recommendations or warnings when resources are being used unsustainably. The AI system monitors water and electricity consumption in tourist areas and destinations and makes suggestions for savings, or automatically adjusts electrical equipment in case of excess.
- Forecasting and analyzing the impact of tourism on the environment: AI applications create models to forecast the environmental impact of tourism in specific areas. AI analyzes long-term environmental impacts, using historical data on visitor numbers, tourism activities, and environmental factors to forecast long-term impacts on ecosystems and environmental quality. This helps managers and governments get an overview of potential environmental problems, thereby creating more effective policies to manage tourist areas and destinations. In addition, AI systems will help calculate carbon emissions from tourist trips (including transportation, accommodation, and other activities), thereby providing recommendations for emission reduction, promoting green tourism and pollution reduction activities.

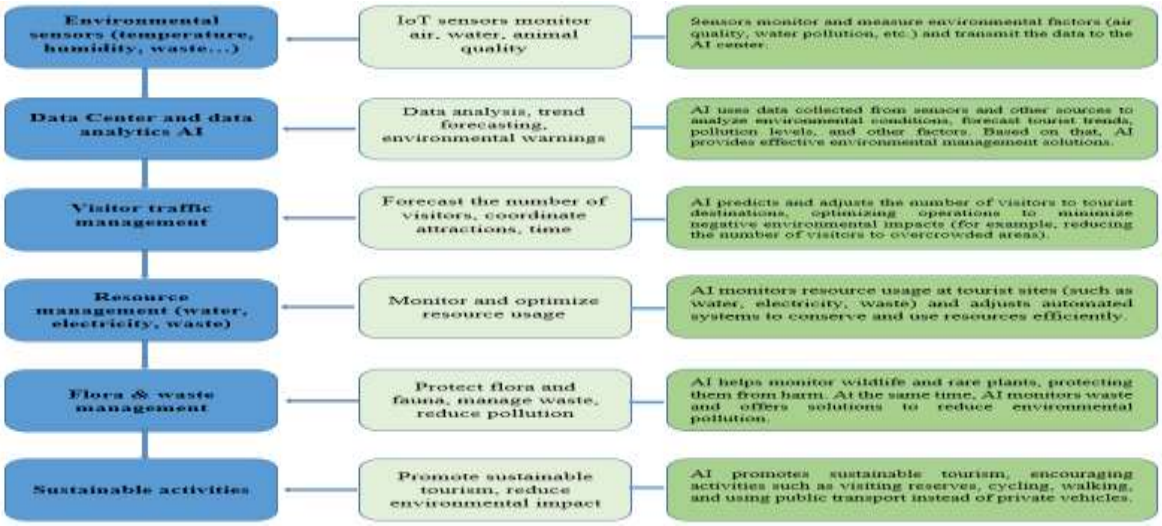

Figure 2: AI Application in Environmental Protection in Tourist Areas and Tourist Destinations.

AI technology has been successfully applied in environmental management, especially in waste management in many countries around the world, helping to increase the efficiency of waste management and minimize negative impacts on the environment such as: Fujitsu (Japan) has deployed a system using AI to classify waste at waste treatment plants; ZenRobotics (USA) has developed an automatic robot to classify waste, using deep learning technology and collecting data from sensors to analyze waste; Winnow (UK) has used AI technology to minimize the amount of food wasted in restaurants and hotels; Naver Labs (Korea) has developed an automatic robot to collect waste in public areas; multinational company MobiDev has developed an artificial intelligence-based recycling application that provides real-time recommendations on how to classify waste. The Copernicus program provides free satellite data on the environment, supporting European Union member states in monitoring and managing natural resources; the EARTH system (environmental assessment and reporting tool for health) uses AI to analyze environmental data and assess the impact on human health. AI4EO (AI for earth observation) projects have also helped reduce plastic waste in coastal areas of Spain by up to 18% through satellite data analysis and AI since 2020. The "Skynet" system (China) with more than 20 million surveillance cameras, combined with data from environmental sensors to monitor and control air and water pollution. South Korea combines AI and Internet of Things (IoT) sensors in the "Smart City" program in Seoul to monitor indoor and outdoor air quality. The Korean government has also tested robots that collect plastic waste on beaches, controlled by AI and machine learning. In Vietnam, the application of AI in the field of environment and pollution reduction has made significant progress: The Fi-Mi project, a mobile system for monitoring and predicting air quality using AI (Hanoi University of Science and Technology), monitors air pollution parameters, emission sources and impacts on human health. The surface water quality monitoring system using IoT sensor technology and big data analysis (Ministry of Agriculture and Environment) is located at 25 monitoring points on major rivers such as the Red River, Day River and Dong Nai River, allowing real-time analysis of pH, DO, COD, turbidity and water temperature, helping to detect early pollution episodes exceeding thresholds in river basins. Projects such as the "Plastic-reducing city initiative" in Da Nang and Hoi An cities have applied AI to monitor plastic waste flows, classify sources and optimize collection routes. In addition, the "smart plastic waste" phone application developed by Grac has also helped the community and the government record, analyze and handle plastic waste hotspots. According to Grac, by 2024, the platform had attracted over 100,000 users in 12 provinces and cities in Vietnam (Pham Thu Trang, 2025).

However, the application of AI to protect the environment in tourist areas and tourist attractions has challenges and difficulties such as costs, technical capacity and data privacy, including:

- High investment costs: Deploying AI systems such as smart sensors, image analysis cameras, or big data platforms requires large initial costs; small tourist attractions, small and medium-sized enterprises often do not have enough budget; maintenance costs, software

and hardware upgrades are very high.

- Lack of technical capacity and AI human resources: Local officials, management boards of tourist areas and attractions, and tourism businesses often do not have expertise in AI or data; lack of technical staff to operate, maintain, and analyze data; no standard process to integrate technology into daily environmental protection activities.
- Data privacy risks: AI systems often collect data from cameras, sensors, positioning devices, user behavior, etc., which is a concern for privacy violations, especially for international tourists or local people; lack of a clear legal framework for managing and sharing tourism environmental data.

To overcome this, it is possible to deploy a model with open source technology, mobilize international funding and public-private partnerships. At the same time, it is necessary to organize basic training on AI, coordinate with universities and outsource early-stage technology services. Regarding data, it is necessary to be transparent about collected information, apply anonymization and develop appropriate security regulations.

4. CONCLUSIONS

Vietnam is still a developing country, in which tourism is one of the industries with a fairly high growth rate and increasingly contributing to the national economy. However, along with these encouraging results, the tourism industry is also indirectly and directly negatively affecting the natural and social environment in many tourist areas and destinations across the country. Researching and building an environmental protection model in the tourism sector at the present time is necessary and timely to prevent the negative impacts of the tourism industry on the environment, while gradually contributing to the restoration of lost environmental values. However, how to build a model that both ensures tourism development without losing existing environmental values? From practical experiences in countries around the world, tourist areas and destinations in Vietnam can learn, choose and build their own suitable models that meet the balance in development. This study, with a model approach, is a system with interacting components, operating according to a certain process, including subjects participating in environmental protection in tourist areas and destinations, including: (1) Tourism and service businesses/facilities in tourist areas and destinations; (2) Local State tourism management agencies; (3) Local State environmental management agencies; (4) Local authorities; (5) Tourist area and destination management units (Board of Directors/Management Board); (6) Local communities; (7) Tourists; (8) Professional social organizations and NGOs. In addition, the study also approaches AI applications to protect the environment at tourist areas and destinations to forecast and analyze the number of visitors, enhance visitor experiences through chatbots and virtual assistants, manage and preserve cultural heritage, manage and treat smart waste, conserve ecosystems and flora and fauna, analyze and optimize environmental protection policies, monitor and protect the natural environment, manage sustainable resources and forecast and analyze the impact of tourism on the environment.

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