Baseline Assessment of Plastic Pollution in Viet Nam's Tourism Sector: Research report

Copyright @ 2026

By the United Nations Development Program in Viet Nam

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by means, electronic, mechanical, photocopying, recording or otherwise, without prior permission. Any use of information, in full or in part, should be accompanied by an acknowledgment of UNDP in Viet Nam as the source.

The views expressed in this publication are those of the author(s) and do not necessarily represent those of the United Nations, including UNDP, donor agencies, or UN Member States.

TABLE OF CONTENTS

List of Tables v
List of Figures v
Abbreviations and Acronyms vi

Executive Summary viii

1. General Information. **1**
1.1. Background 2
1.2. Baseline assessment objectives 3
1.3. Research objects and limitations 3
1.3.1. Research subjects/focuses 3
1.3.2. Research limitations 3
1.4. Research approaches and methods 4
1.4.1. Approach 4
1.4.2. Research methods 5
1.5. Research area 6
1.5.1. Ninh Binh 7
1.5.2. Da Nang 7

2. Key Results. **9**
2.1. Policy analysis 10
2.1.1. National-level policies in tourism plastic waste management. 10
2.1.1.1. Legal system and policy system 10
2.1.1.2. Compatibility with the ASEAN Policy Framework and the Driving Force for Greening the Tourism Sector 12
2.1.2. Policies on management of solid waste and plastic waste in localities 13
2.1.2.1. Policies of Ninh Binh province. 13
2.1.2.2. Policy in Da Nang City 15
2.1.3. Analysis of national policies on plastic waste management in tourism by topic groups. 18
2.1.4. Analysis of policy gaps at the central level 20
2.1.5. Specific gaps at local areas 21
2.1.5.1. Policy gaps and challenges in Ninh Binh. 21
2.1.5.2. Policy gaps and challenges in Da Nang city 22
2.2. Participation of stakeholders in solid waste generation chain of the tourism industry 23
2.2.1. Ninh Binh 24
2.2.2. Da Nang. 26
2.3. Assessment of the current situation of solid waste generation and management in Ninh Binh province 28
2.3.1. Current status of domestic solid waste generation in Ninh Binh province 28
2.3.2. Current status of plastic waste generation in tourism activities 30
2.3.3. Current status of plastic waste collection and treatment in tourism activities 33

2.3.4. Plastic waste flow analysis: generation – collection and loss to the environment 35
2.3.5. Knowledge, attitudes and practices of businesses and tourists 37
2.3.5.1. Knowledge, attitudes and practices of businesses 37
2.3.5.2. Knowledge, attitudes and practices of tourists 39
2.3.6. Cost of Inaction (COI) Analysis 40
2.3.7. Potential initiatives to improve the situation of plastic waste management 41
2.4. Assessment of Plastic Waste Generation and Management — Da Nang City 41
2.4.1. Current status of solid waste generation 41
2.4.2. Current status of plastic waste generation 43
2.4.3. Current status of plastic waste collection and treatment in tourism activities 44
2.4.4. Plastic waste flow analysis 45
2.4.5. Knowledge, Attitudes and Practices (KAP) of businesses and tourists 47
2.4.5.1. Knowledge, Attitudes and Practices: Enterprises 47
2.4.5.2. Knowledge, Attitudes and Practices: Tourists 50
2.4.6. Cost of Inaction (COI) Analysis 52
2.4.7. Potential initiatives to improve the situation of plastic waste management 52

3. Key Recommendations 54
3.1. Recommendations for Ninh Binh 55
3.2. Recommended recommendations for Da Nang 59
3.3. Implications of National-level policy recommendations 61
3.3.1. Evidence-based national policy orientation on plastic loss in tourism 61
3.3.2. Opportunities for policy adjustment in the period 2025–2026 62

References 63

Appendix 66
Appendix 1. Solid waste data results in Ninh Binh city 66
Appendix 2. Solid waste data results in Da Nang city 66
Appendix 3. Methods for analyzing survey data 66
Appendix 4. Dossier of the survey subject 67
Appendix 5. Business Survey Data 67
Appendix 6. Visitor Survey Data 67
Appendix 7. Green Tourism Initiatives and Models or Tourism to Reduce Waste 67
Appendix 8. List of national policies on waste management and tourism waste management 71

LIST OF FIGURES

Figure 1. DPSIR methodology 4
Figure 2. Research Map 6
Figure 3. Stakeholder diagram in plastic waste management in tourism activities 24
Figure 4. Waste composition by volume (Source: Waste Audit, December 2025). 29
Figure 5. Composition of plastic waste by volume 31
Figure 6. Generation rate of the top 5 types of plastic waste at different types of services (%) 32
Figure 7. Diagram of waste flows collected, transported and treated from tourism service establishments in Ninh Binh 33
Figure 8. Internal waste collection diagram of a 3-star hotel in Ninh Binh 34
Figure 9. Pathways of plastic waste in tourism. 36
Figure 10. Diagram of plastic waste flow in tourism in Ninh Binh province (tons/day). 37
Figure 11. Knowledge of disposable plastics. 38
Figure 12. Attitudes of businesses towards plastic reduction and green transition. 39
Figure 13. Willingness to pay for solutions to reduce plastic pollution. 40
Figure 14. Volume of solid waste generated in the tourism industry by month in 2024 (unit: tons/day) 42
Figure 15. Ratio of the volume of solid waste generated (left) and the composition of solid waste in the tourism service sector (right) 42
Figure 16. Ratio of sources of plastic waste generation (left) and plastic waste composition in the tourism industry (right) 44
Figure 17. Domestic solid waste collection diagram 44
Figure 18. Analysis of plastic waste streams in the tourism industry (tons/day) 46
Figure 19. Plastic waste flow diagram in Da Nang City (tons/year) 46
Figure 20. Attitude of businesses on actions to promote green behavior of tourists 48
Figure 21. Opportunities and difficulties when implementing green transformation and reducing plastic at enterprises 49
Figure 22. Measuring travelers' willingness and affordability for eco-friendly service 51

LIST OF TABLES

Table 1. Summary table of tourism indicators of Ninh Binh over the years (Revenue unit: Million VND; Visitor unit: Visitor). 7
Table 2. Revenue and total visitor arrivals of tourism in Da Nang (2022 - 2025). 8
Table 3a. Legal documents governing solid waste and plastic waste 10
Table 3b. Legal documents related to the tourism sector 11
Table 4. The role of key stakeholder groups in tourism management in Ninh Binh 25
Table 5. The role of stakeholders in tourism management 27
Table 6. Amount of plastic waste generated during 2019–2024 in Ninh Binh, calculated by total volume (tons/day) and per capita (kg/person/year) 29
Table 7. Solid waste generated per capita at tourism service establishments from waste audits (kg/day) 30
Table 8. Average volume of plastic waste generated by type of tourism service (kg/person/day) 30
Table 9. Volume of plastic waste generated per tourist (kg/day) 31
Table 10. Top 5 types of plastic waste audited in Ninh Binh 32
Table 11. Consumption of plastic bottle products by tourist group 40
Table 12. Volume of solid waste per capita of tourists (unit: kg/person/day). 43
Table 13. Per capita plastic waste generation by tourist type (kg/day). 43

ABBREVIATIONS AND ACRONYMS

ACCPP	ASEAN Cultural and Creative Provinces Partnership
ASEAN	Association of Southeast Asian Nations
BCC	Behavior Change Communication
COI	Cost of Inaction
CTN	Plastic Waste
CTR	Solid Waste
CTRSH	Domestic Solid Waste
DPSIR	Drivers – Pressures – State – Impact – Response
DRS	Deposit-Return System
EIA	Environmental Impact Assessment
EPR	Extended Producer Responsibility
F&B	Food and Beverage
GDP	Gross Domestic Product
GEF	Global Environment Facility
GPIP	Global Plastic Innovation Partnership
GSTC	Global Sustainable Tourism Council
HDPE	High-Density Polyethylene
IUCN	International Union for Conservation of Nature
JSB	Japan Supplementary Budget
KAP	Knowledge – Attitude – Practice
LCA	Life Cycle Assessment
M&E	Monitoring and Evaluation
MFA	Material Flow Analysis
MICE	Meetings, Incentives, Conferences, and Exhibitions
MONRE	Ministry of Natural Resources and Environment
MRF	Material Recovery Facility
NGO	Non-Governmental Organization
NPAP	National Plastic Action Partnership
ODA	Official Development Assistance
PET	Polyethylene Terephthalate

PPP	Public-Private Partnership
SMEs	Small and Medium-sized Enterprises
SUPs / SUP	Single-Use Plastics
TCVN	Vietnam Standard
UBND	People's Committee
UNDP	United Nations Development Programme
URENCO	Urban Environment Company
USAID	United States Agency for International Development
VEPF	Vietnam Environment Protection Fund
WABA	Waste Amount and Composition Analysis
WFD	Waste Flow Diagram
WFSA	Waste Flow and Stakeholder Analysis
WWF	World Wide Fund for Nature

EXECUTIVE SUMMARY

TOURISM IN VIET NAM AT A GLANCE:

22 million
international visitors in 2025

40,000+
accommodation establishments

Up to 6 million
direct tourism jobs by 2030

USD 40 billion
total tourism revenue in 2025

THE CHALLENGE

Viet Nam's tourism sector is growing rapidly and is central to national development. In 2025, the country welcomed about 22 million international visitors, with total tourism revenue exceeding USD 40 billion. The sector operates at significant scale, with about 40,000 accommodation establishments with nearly 800,000 rooms, nearly 4,000 international travel businesses, and 573 tourist attractions. By 2030, the industry aims to create 5.5–6 million direct jobs and about 10.5 million jobs including indirect employment.

However, the scale of rapid development and tourism expansion is resulting in a sharp increase in the amount of waste. Plastic consumption in Vietnam has increased rapidly, from 3.8 kg/person/year (1990) to 81 kg/person in 2019, significantly higher than the world average (46 kg/person) and that of Asia (39 kg/person). Disposable plastic products such as water bottles, food packaging, and eating utensils are commonly used in the tourism value chain, increasing pressure on the already overloaded solid waste management system in many localities.

Plastic waste accounts for about 12 percent of total solid waste and has a high risk of loss to the environment due to its difficulty in decomposing, uneven recycling value, and high dependence on the consumption and disposal behavior of people and tourists. By 2030, tourists are projected to generate about 349,400 tons of plastic waste.

Waste audit results from tourism establishments in Ninh Binh show that tourists staying overnight generate 1.08 kg of solid waste per person per day, while non-staying visitors generate 0.37 kg per person per day. In Da Nang, overnight tourists generate 2.01 kg per person per day – 2.2 times higher than residents (0.93 kg per person per day). Plastic waste generated per overnight tourist in Da Nang is estimated at 0.27 kg per day, with accommodation facilities and food and beverage establishments as the two primary generation points.

Tourism is a significant source of plastic waste generation, especially from bottled beverages, single-use packaging and convenience products.

THE SCALE OF THE PROBLEM:

12%
average share of plastic in total solid waste

81 kg
of plastic consumed per person per year in 2019

349,400 tonnes
of plastic waste projected from tourists by 2030

2 kg
of waste generated per tourist per day in Da Nang

2.2x
more waste generated by tourists than residents in Da Nang

~44 tonnes
of plastic waste leaks into the environment in Da Nang each year

Despite a relatively complete national policy framework on plastic waste management, the transformation of policy goals into effective action in the tourism industry still depends heavily on destination management and enforcement capacity.

In Ninh Binh, 66 percent of interviewed restaurants were unaware of and lacked a clear understanding of the regulations on the reduction and phase-out of single-use plastic products. Limited awareness of these policies was particularly evident among 1–2 star hotels and homestays, with 84 percent reporting insufficient understanding, followed by grocery stores at 80 percent.

In Da Nang, only 31–33 percent of enterprises were familiar with relevant environmental regulations. The primary barrier identified by businesses is the convenience of SUPs, cited by 87 percent of respondents in Ninh Binh, with 53 percent also highlighting the high cost of alternative products.

84% of budget accommodation in Ninh Binh did not understand single-use plastic regulations.

The absence of synchronization between source separation and collection, treatment, and recycling capacity at the local level remains a systemic bottleneck. In Ninh Binh, approximately 9 percent of plastic waste generated from tourism is not collected and leaks into the environment, amounting to approximately 0.45 tons per day. In Da Nang, the plastic waste environmental leakage rate is estimated at 0.75 percent (43.8 tonnes per year), with the majority found in inland water systems (52.7 percent) and as surface terrestrial litter (29.72 percent). The majority of leakage is composed of low-value, difficult-to-recycle materials including plastic bags, SUPs, and multi-layer packaging.

Plastic pollution imposes significant economic costs. In Ninh Binh, the total cost of inaction (COI) is estimated at approximately VND 606.74 billion per year – equivalent to around 3 percent of the province's total tourism revenue. In Da Nang, the total COI is estimated at VND 1,743.7 billion per year, equivalent to approximately 6.48 percent of total tourism revenue. In both cases, brand and reputation loss constitutes the largest component of total damages: in Ninh Binh it accounts for 93.8 percent of total COI; in Da Nang, 55.7 percent. These losses reflect the risk of long-term erosion of destination competitiveness if timely, coordinated, and systemic interventions are not implemented.

IF NOTHING CHANGES:

9%
of plastic waste from tourism in Ninh Binh leaks into the environment

43.8 tonnes
of plastic waste leak into the environment per year in Da Nang

~ USD 23 million
estimated annual cost of inaction in Ninh Binh

~ USD 66 million
estimated annual cost of inaction in Da Nang

93.8%
of Ninh Binh's cost of inaction comes from damage to its tourism brand and reputation

OPPORTUNITIES

A number of destinations have demonstrated that plastic reduction is achievable. In Ninh Binh, Thung Nham Tourist Area has invested in a pure water filtration system with a capacity of 500 m^3/day, sufficient to meet tourists' needs without plastic bottled water. Trang An tourist area management has issued regulations prohibiting tourists and service providers from using SUP bottles on the premises. In Da Nang, the Zero Waste model in Cu Lao Cham and Hoa Bac community-based tourism demonstrates the effectiveness of community consensus, SUP bans, and source separation in simultaneously reducing plastic leakage and sustaining local livelihoods. The Vietnam Zero Waste Tourism Network (VZWTN) demonstrated a 12 percent waste reduction by 2025.

Although 51 percent of businesses in Ninh Binh expressed support for the green transition, 92 percent had not yet taken any concrete actions. Over 90 percent of hotel and restaurant enterprises in Da Nang agree that plastic pollution affects urban aesthetics and destination attractiveness, perceiving it as a long-term economic and competitiveness risk.

In Ninh Binh, tourists generally indicated a high level of awareness regarding plastic pollution and its health impacts. 67 percent of surveyed tourists expressed willingness to pay more for environmental initiatives – with most (53 percent) comfortable paying up to 5 percent extra on their total bill.

67% of tourists surveyed in Ninh Binh are willing to pay more to support environmental initiatives.

Viet Nam has established a national target for 100 percent of tourist resorts not to use disposable plastic products by 2025, with 85 percent of plastic waste collected and recycled. Decree 08/2022/ND-CP sets a roadmap to prohibit the production and import of SUPs after 2030. Ninh Binh has set targets for 80 percent of coastal tourism accommodation businesses to eliminate disposable plastic products and non-degradable plastic bags, rising to 100 percent by 2030. Da Nang is operationalising a roadmap for reducing SUPs at coastal tourist zones from 2025, with complete elimination by 2030.

RECOMMENDATIONS

Four pathways to reduce plastic waste in Viet Nam's tourism sector

1. Strengthen policy implementation and compliance. Plastic reduction requirements for the tourism sector remain largely incentive-based and lack enforcement mechanisms. Mandatory regulations on green tourism and plastic-free tourism should be integrated into tourism licensing, accommodation rating standards, and destination operating rules. A clear enforcement roadmap and sanctions mechanism is needed, alongside inter-ministerial coordination between environment and tourism authorities. A standardized national monitoring system tracking plastic waste generation in tourism – including metrics such as kg of plastic per visitor-night and SUP reduction rates – is essential for evidence-based decision-making.

2. Improve waste management practices and infrastructure. The systemic bottleneck of non-synchronized source separation and collection infrastructure must be addressed. Investment is needed in upgraded collection infrastructure, expanded sorting and recycling facilities, and source-segregation systems at tourism destinations. Drinking water refill stations should be installed at attractions and transport nodes to reduce plastic bottle consumption. The role of informal waste collectors in the recycling value chain should be formally recognized and integrated, given their significant contribution: in Da Nang, informal collectors recover approximately 1.99 tonnes of plastic per day from tourism-related waste streams. The Zero Waste and community-based collection models piloted in Cu Lao Cham and Ninh Binh should be systematically replicated.

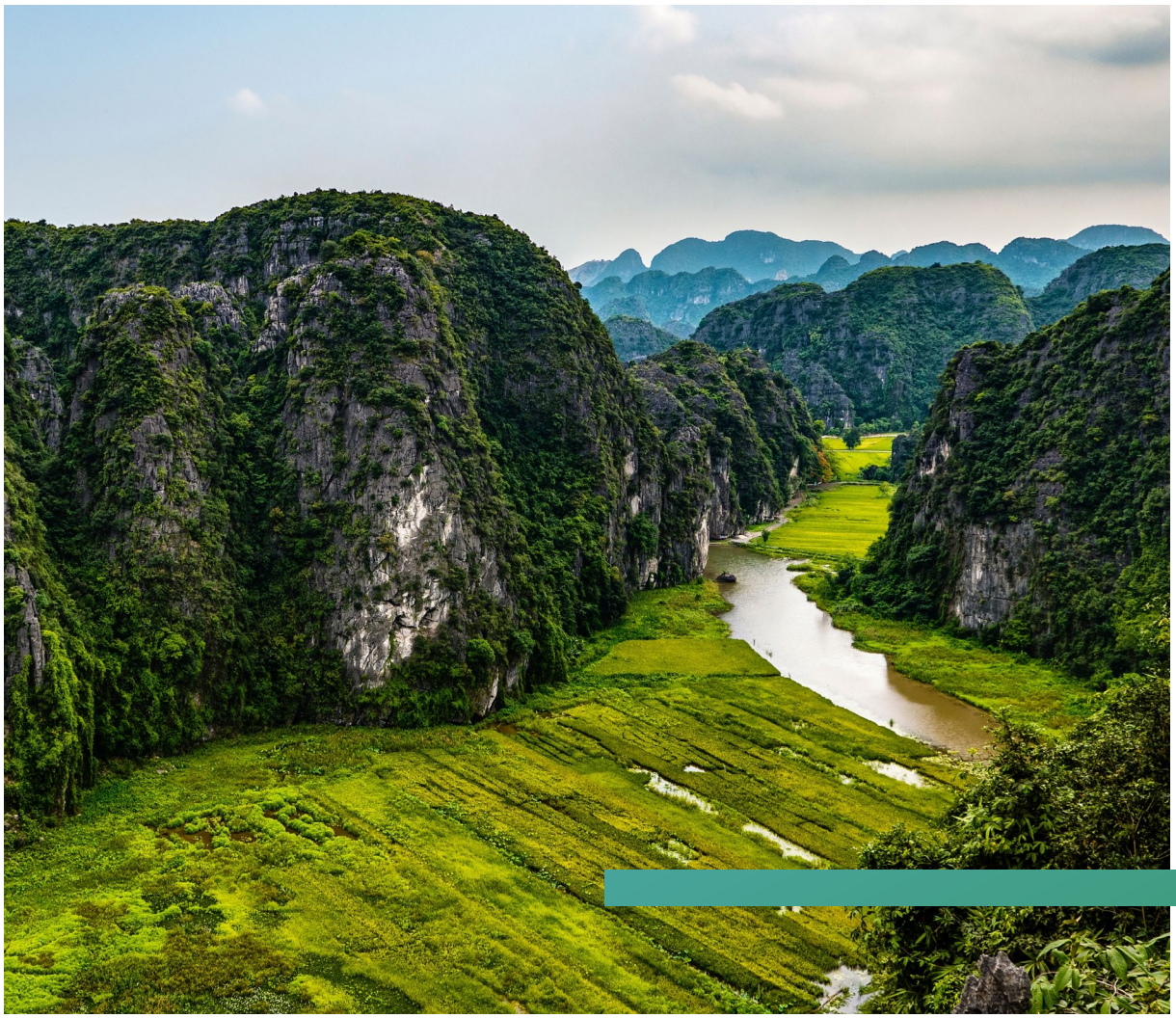
3. Develop financial instruments and incentive mechanisms. Current environmental incentive mechanisms are mainly geared towards waste production or treatment projects and do not adequately support tourism service providers. Financial barriers are the primary reason businesses have not yet transitioned: the cost of SUP alternatives is 2–3 times higher for small businesses. Reducing these barriers requires access to preferential green loans (the Vietnam Environment Protection Fund offers loans at 2.6 percent/year for waste treatment and green transition projects), targeted tax incentives for businesses with Green Tourism certification, and the development of environmental fee mechanisms. Stabilizing the income and working conditions of informal waste workers should be integrated into any financial package.

4. Raise awareness and promote behavioral change among businesses and tourists. Despite high awareness of plastic pollution – scoring above 4.2/5 in Ninh Binh business surveys –

actual behavior remains limited. In Da Nang, 81.6 percent of businesses still use SUPs; in Ninh Binh, 85 percent of businesses provide common SUPs. Among tourists, approximately 50 percent of both international and domestic visitors in Da Nang report using three or more disposable plastic products per day. Effective behavioral change requires not just communication campaigns, but the redesign of default options at service points: ensuring reusable alternatives are available, convenient, and affordable. Embedding plastic reduction criteria into staff training, destination communication, and supply chain procurement will be essential to closing the gap between awareness and practice.

Transitioning from a passive treatment model to a reduce-reuse-recycle approach requires appropriate databases and policy frameworks.

Linking sustainable tourism development with plastic waste management is an urgent requirement to protect the environment, maintain destination competitiveness, and ensure long-term livelihoods.



1. GENERAL INFORMATION

1.1. Background

Vietnam is the 16th most populous country in the world, with a population increasing from 85.85 million (2009) to 101.11 million (2024). Of this total, 38.2% reside in urban areas while 61.8% live in rural areas. Rapid urbanization and population growth have contributed to a continuous rise in municipal solid waste (MSW). In 2024, the country generated an estimated 68,000 – 70,000 tons of solid waste per day, including approximately 38,000 tons/day from urban areas and about 30,000 tons/day from rural areas.

In addition, plastic consumption in Vietnam has increased rapidly, from 3.8 kg/person/year (1990) (MONRE, 2020) to 81 kg/person in 2019 (IUCN, 2020), higher than the world average (46 kg/person) and that of Asia (39 kg/person). Plastic waste accounts for about 3–26% (average 12%) of total solid waste and has a high risk of loss to the environment due to its difficulty in decomposing, uneven recycling value and high dependence on the consumption and disposal behavior of people and tourists (World Bank, 2023).

In the context of tourist cities, many recent studies and reports show that tourism is a significant source of plastic waste generation, especially from bottled beverages, single-use packaging and convenience products (WWF & Vietnam Environment Administration, 2019). Draft General Report on the planning of Vietnam's tourism system for the 2021-2030 period, with a vision to 2045, forecasts that by 2030, tourists are projected to generate about 349,400 tons of plastic waste (VnEconomy, 2025)

Notably, plastic pollution has a serious impact on tourist destinations, especially coastal destinations and nature reserves. Pollution not only degrades the ecosystem, damages biodiversity, and affects the quality of the marine and coastal environment, but also directly affects the image, attractiveness of destinations, and visitors' experiences, posing risks to the national tourism brand and the livelihood of local communities.

During 2024 - 2025, Vietnam's tourism will enter a new growth cycle with the orientation of green and sustainable development. According to the Summary Report of the Vietnam National Authority of Tourism (12/2025), in 2025, Vietnam will welcome about 22 million international visitors, with total tourism revenue exceeding 1 1,000 trillion VND (about 40 billion USD), directly contributing about 8.8% of GDP. The scale of the tourism industry is increasing rapidly with about 40,000 accommodation establishments with nearly 800,000 rooms, nearly 4,000 international travel businesses, 573 tourist attractions, 64 provincial tourist resorts and 7 national tourist resorts. In addition to economic contributions, tourism is also an important livelihood-creation industry. By 2025, the industry has created jobs for millions of workers and is aiming for 5.5–6 million direct jobs and about 10.5 million jobs (including indirect) by 2030. With the characteristics of the general economy, tourism has a high spillover coefficient, in which each direct job in tourism creates about 1.5–2 indirect jobs in related industries such as agriculture, transportation and construction.

However, it is the scale of rapid development and this expansion that leads to a sharp increase in the amount of waste, especially disposable plastics, and puts great pressure on the waste management system in many localities. Disposable plastic products such as water bottles, food packaging, and eating utensils are being commonly used in the tourism value chain, increasing pressure on the already overloaded solid waste management system in many localities. Therefore, linking sustainable tourism development with waste management is an urgent requirement to protect the environment, maintain destination competitiveness and ensure long-term livelihoods. Transitioning from a passive treatment model to a reduce-reuse-recycle approach in the direction of a circular economy requires appropriate databases and policy frameworks.

In this context, UNDP Vietnam has launched the Baseline Assessment of Plastic Pollution in Vietnam's Tourism Sector (the "Report") under the

Global Plastics Innovation Program (GPIP), funded by the Japan Supplementary Budget (JSB) 2024, and conducted in collaboration with the Supporting Green Development (GreenU) social enterprise. The Report aims to build a scientific and practical foundation for strengthening policy frameworks and mechanisms to reduce plastic pollution in the tourism industry, using a life-long approach to plastic products. The survey was conducted in the two localities, Ninh Binh and Da Nang, presenting specific tourism archetypes of heritage and inland ecotourism and marine and urban tourism, for a comprehensive analysis of current challenges, opportunities and policy gaps in tourism management in Vietnam

1.2. Baseline assessment objectives

The baseline assessment aims to explore the current situation of plastic pollution in the tourism sector in Vietnam, therefore informing policies and practices for a more sustainable and plastic-free tourism in Vietnam. Specific objectives of the study include:

- Assessment of the current situation of waste generation and management: Analysis of the current situation of consumption of plastic products and waste generation in tourism activities; at the same time, assess the current status of collection, classification and treatment of solid waste including plastic waste, as well as related infrastructure in the tourism industry.
- Identify and map stakeholders: Identify the network of stakeholders involved in the management and direct generation of key waste in tourism activities, from generation and use to disposal, to understand their roles and impacts.
- Policy and Mechanism Analysis: Review relevant national and local policy frameworks, as well as drivers or barriers (policy, finance, behavior) for green transformation in solid waste management.
- Solution and roadmap proposals: Providing evidence-based insights and policy recommendations to support the transition to a zero-waste tourism model in 02 localities (Ninh Binh and Da Nang), implying policy recommendations towards green tourism development and a plastic free Vietnam.

1.3. Research objects and limitations

1.3.1. Research subjects/focuses

The study subjects included stakeholders in the local tourism industry in Ninh Binh and Da Nang, from procurement and use through collection and disposal of plastic products and solid waste. Key stakeholders include:

- Group of state management agencies from central to local levels
- Group of collection and treatment units (formal and informal)
- Tourism waste generators: businesses and tourism enterprises (hotels, restaurants, travel companies), service providers at tourist destinations and tourists

The research sites include:

- Ninh Binh province: Trang An, Tam Coc – Bich Dong, Bai Dinh, Den Dinh, Cuc Phuong National Park, Van Long.
- Da Nang City: Ngu Hanh Son, Son Tra, Hai Chau, Hoi An Dong, Hoi An Tay, Hoi An Ward.

1.3.2. Research limitations

Although designed with a rigorous methodology in mind, this study still has some objective limitations that should be considered when interpreting the results:

- **Lack of foundational data:** Much of the available data does not clearly separate residential household waste and tourism waste, leading to difficulties in establishing a completely accurate baseline data for the entire study area.
- **Challenges from the informal sector:** A large amount of recyclable waste is collected and disposed of by the informal sector (scrap collectors and bottle pickers). This group's

activities are often not documented in formal reporting systems, and it is difficult to quantify accurately entirely through conventional survey channels, which requires the use of estimates based on observation and consultation.

- **Geographical scope:** The study only focuses on two localities, namely Ninh Binh and Da Nang. Although these are typical representatives of different types of tourism, the results and specifications (emission coefficient, garbage composition) may not be fully applicable to other localities with different socio-economic characteristics nationwide.

1.4. Research approaches and methods

1.4.1. Approach

The study applied a systems approach through the integration of two core theoretical frameworks, DPSIR (Motivation – Pressure – Status – Impact – Feedback) and the Plastic waste Value Chain Framework, in order to comprehensively analyze the relationship between tourism activities – plastic generation – environmental leakage – impact – and intervention orientation according to the life cycle of plastics. At the same time, the study applied the interaction analysis between tourism factors (such as accommodation, dining, transportation activities) and the process of plastic generation (from production, use to disposal), thereby identifying leakage hotspots and proposing appropriate intervention measures.

a. DPSIR Model

The DPSIR method was employed to systematically assess the impacts of plastic pollution on the tourism industry in two research areas in a series of studies: Economic incentives create waste pressure, causing negative impacts on the current environmental and socio-economic situation. This requires management solutions. The model helps transform the collected data into strategic policy recommendations.

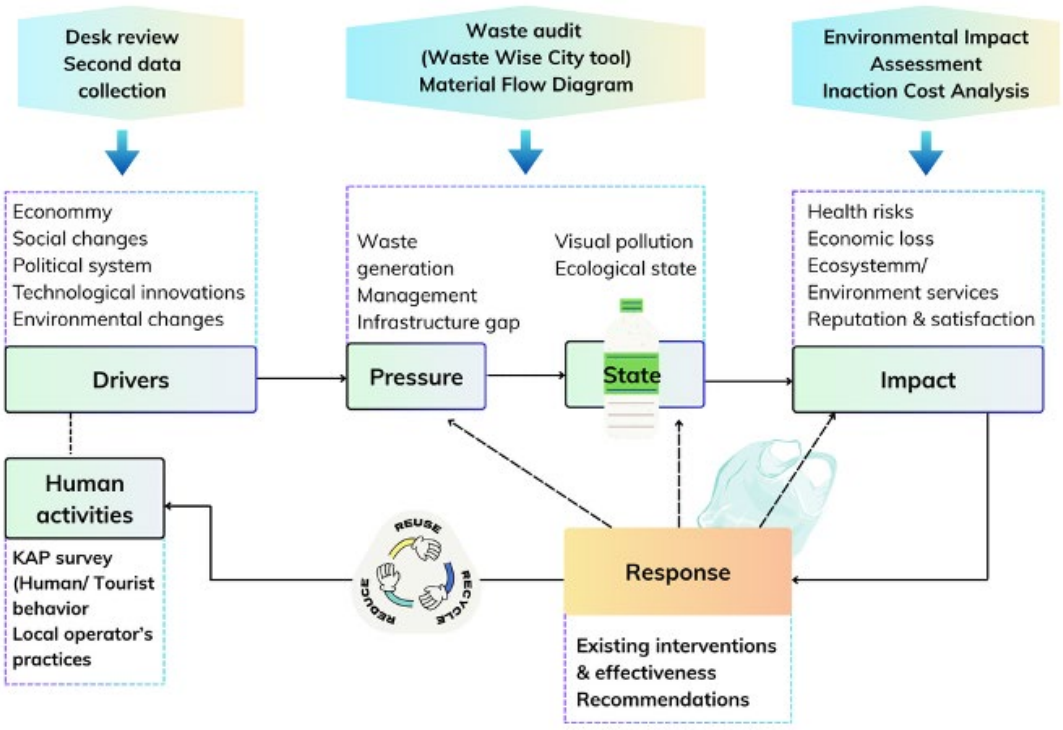


Figure 1. DPSIR methodology

Source: Gari, S., Newton, A., & Icely, J., 2014

Drivers: Tourism in Ninh Binh and Da Nang is driven by the national economic growth target, with tourism identified as a key economic sector according to Resolution 08-NQ/TW (2017) and the Vietnam Tourism Development Strategy to 2030. Policies that emphasize green transformation (such as Decision 1746/QD-TTg on ocean waste management) create a long-term motivation for the tourism industry to develop in the direction of high quality and environmental friendliness.

Pressures: The strong growth and high seasonality of tourism (peak summer and festivals) combined with the culture of convenience (the habit of using single-use plastic products – SUPs) has put great pressure on the environment and waste management systems, including increased plastic discharge at destinations, overload of collection and treatment in peak seasons and lack of synchronization of sorting and recycling infrastructure. Therefore, the study conducts a KAP (Knowledge-Attitude-Behavior) assessment of tourists and businesses (accommodation, catering services, travel), in order to identify the gap between awareness and behavior of reducing plastic waste in reality.

State and Impacts: Prolonged pressure degrades the environment. The status quo is measured by Waste Audit and Material Flow Analysis (MFA) to determine the volume generated, leaks, and actual recycling rates. In addition, the impact is quantified through the Cost of Inaction (COI) analysis, including economic losses (lost revenue, cleaning costs, domestic solid waste disposal), ecological and reputational/social losses, of which the risk of tourism brand deterioration is the most direct risk.

Responses and Closed Loop: Evaluate the effectiveness of current management solutions and initiatives, barriers to change, and then propose recommendations to help transform the tourism waste management system towards a circular economy.

b. Material Flow Analysis Framework

The method was applied in the status and impact assessment phase to determine the volume of solid waste in the waste management system in Da Nang and Ninh Binh. The method is based on the principle of mass conservation to monitor the inflow – outflow of plastic material from sources of plastic material generated during tourism activities to the final treatment stages. Specifically, MFA was used to:

- Determining the amount of plastic generated from major tourism activities (accommodation services, catering, tourist attractions, ...);
- Trace the path of waste through the following stages: generation, collection, classification, recycling and treatment or disposal;
- Determination of the rate of loss to the environment;
- Estimate the contribution of the tourism industry to local plastic waste pollution;
- Provide a quantitative basis for simulating improvement scenarios (e.g., increasing sorting rates, expanding recycling collection).

Input data for MFA was aggregated from secondary data, field surveys, in-depth/group interviews, waste audits, and tourism business survey results, helping to build a comprehensive picture of the plastic life cycle in the tourism context in Ninh Binh and Da Nang according to the plastic value chain framework.

1.4.2. Research methods

a. Secondary literature research

Secondary literature research was carried out to synthesize and analyze existing information related to domestic solid waste management and plastic waste in the tourism industry. The selected documents include: (i) legal documents, strategies, and policies on waste management, circular economy, and sustainable tourism; (ii) reports and technical documents of international organizations and research agencies on waste/plastic management, MRF, MFA, and recycling value chains; (iii) statistics and specialized reports; and (iv) domestic and foreign studies and case studies. The review combines content analysis to determine the current status, roles of stakeholders, and information gaps that need to be filled through primary research.

b. Field Survey

b.1. In-depth interview

In-depth interviews were conducted to assess the current situation of waste generation, collection, classification, and treatment in tourism activities. The research team interviewed 35 representatives in Ninh Binh and Da Nang and at the central level, including state management agencies; tourism associations; formal and informal collection units; accommodation, catering, and travel businesses; and a number of agencies and organizations at the national level such as the Research Institute of Culture, Arts, Sports and Tourism, the National Administration of Tourism, and research experts in the tourism industry.

b.2. Knowledge - Attitudes and Behavior (KAP) questionnaire survey

The KAP survey was conducted with 258 tourism businesses and 216 tourists in the two localities. Samples were selected using purposive sampling at key tourist destinations. The questionnaire was collected directly and entered on the online platform; data was analyzed using SPSS.

The list of survey subjects is attached in Appendix 4.

b.3. Waste stream audit and analysis

The WFSA methodology was utilized to identify key generation points, stakeholder roles and the risk of plastic waste loss. Waste audits were carried out in accordance with TCVN 9461:2012 and the WABA method, combined with the Waste Wise Cities tool. The results formed the basis for MFA, Sankey diagram formulation, and plastic loss assessment.

b.4. Non-participation observation

Observation methods were used to document the actual collection activities, especially in the informal sector, and to assess the waste collection infrastructure at destinations.

b.5. Assessment of plastic pollution impacts

The study analyzes economic, environmental, and brand losses if no intervention is taken. MFA, EIA, and LCA tools are integrated to assess the plastic life cycle in tourism and provide scientific evidence for building green transition roadmaps, reducing plastic emissions, and supporting policymaking.

Details of methods and tools are in Appendices 4-5.

1.5. Research area

To ensure that the results of the study reflect the diverse and complex picture of the relationship between tourism and plastic waste in Vietnam, the study chose Da Nang and Ninh Binh as two typical cases. This choice is based on the representation of two mainstream tourism development models and differences in geographical characteristics and solid waste and plastic waste profiles.

The combination of Da Nang (representative of sea and large-city tourism) and Ninh Binh (representative of heritage and ecotourism) allows the research to carry out multi-dimensional comparisons, thereby proposing inclusive and feasible solutions to reduce plastic waste applicable to both types of the most popular destinations in Vietnam.

Specifically, the characteristics of each study area:

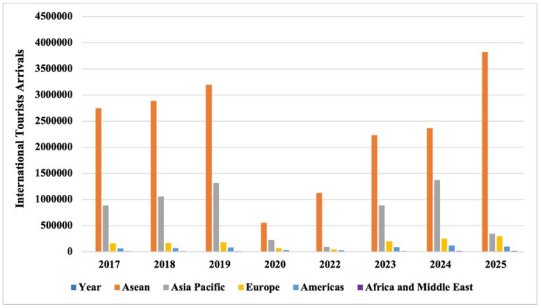


Figure 2. Research Map

1.5.1. Ninh Binh

Ninh Binh province, formed from the merger of Ha Nam, Nam Dinh, and the old Ninh Binh areas, covers an area of 3,942.6 km^2 with a population of about 4.4 million people and holds a strategic location in the southern part of the Red River Delta. With 129 commune-level administrative units, the province has a large population and tourism space, creating significant pressure on environmental infrastructure and waste management. As the only locality in Southeast Asia with the Trang An World Cultural and Natural Heritage, along with national parks, wetland reserves, and nearly 5,000 historical and cultural relics, the province hosts more than 70 tourist zones and attractions; 81 travel businesses; and a fast-growing network of accommodation, catering, and community tourism establishments. Eco-nature tourism and cultural-spiritual tourism are the two main types, besides the increasing trend of homestays, agritourism, and outdoor events.

Following the post-COVID-19 recovery, the number of visitors reached 19.4 million per year, including more than 2.2 million international visitors. Rapid growth, high seasonality, and the distribution of destinations in ecologically sensitive areas (caves, wetlands, national parks) increase the generation of plastic waste and pose challenges in collecting, classifying, and controlling losses into the environment.

These conditions make Ninh Binh a typical area for analyzing the generation, management, and loss of waste in the tourism value chain, especially as the province pursues “green tourism” and reduces plastic emissions.

1.5.2. Da Nang

Da Nang city, formed from the merger of Quang Nam and the old Da Nang city areas, covers an area of 11,859.6 km^2, with a population of more than 3 million people and 94 commune-level administrative units. It is the largest centrally administered municipality in Vietnam, strategically positioned in terms of logistics with two international airports (Da Nang and Chu Lai) and a well-developed tourism infrastructure. The newly expanded spatial footprint encompasses the “golden triangle” of heritage destinations — Hoi An, My Son, and Cu Lao Cham — establishing the foundation for a large-scale regional ‘mega-destination’.

Tourism constitutes the principal economic sector, anchored by four strategic pillars: (i) coastal and premium resort tourism along the My Khe – Cua Dai corridor; (ii) heritage and cultural tourism at Hoi An and My Son; (iii) MICE tourism and international events; and (iv) ecotourism and community-based tourism in the western hinterland. This development model generates a high density of accommodation facilities, beachfront resorts, food and beverage

Table 1. Summary table of tourism indicators of Ninh Binh over the years[1] (Revenue unit: Million VND; Visitor unit: Visitor)

Year	Ninh Binh		Notes
	Total visitors	Total revenue (USD)	
2024 (before the merger)	15,355,547	13,389,351	Including data from Ha Nam, Nam Dinh and the old Ninh Binh provinces
2025 (after the merger)	19,400,000	21,238,000	

Source: (Ninh Binh Statistics Department, 2025) (Institute For Tourism Development Research, 2025) (Ministry of Culture, Sports and Tourism, 2025) (Nam Dinh Provincial People’s Committee, 2025)

1 *Data after the merger of provinces*

establishments, large-scale events, and complex service supply chains.

In 2025, the city received over 17 million visitor arrivals (approximately 8 million international tourists), with estimated tourism revenues of VND 70,000–72,000 billion. The rapid pace of growth, high volume of international visitors, and distinctive consumption patterns at resorts, events, and heritage sites significantly increase the generation of municipal solid waste (MSW) and plastic waste, particularly in coastal and island areas.

These characteristics make Da Nang an exemplary site for analyzing the generation, collection, and leakage flows of plastic waste within a large-scale tourism value chain, while also enabling an assessment of solid waste management challenges in the context of developing a regionally integrated 'mega-destination'.

Table 2. Revenue and total visitor arrivals of tourism in Da Nang (2022 - 2025)

Year	Da Nang		Notes
	Total Visitor Arrivals	Total revenue (million VND)	
2023	12,618,000	45,110,000	Includes data from former Quang Nam Province and former Da Nang City.
2024	16,289,000	57,240,000	
2025	~17,343,000	71,600,000	

2. KEY RESULTS

2.1. Policy analysis

2.1.1. National-level policies in tourism plastic waste management

2.1.1.1. Legal system and policy system

The national legal system currently includes the Law on Environmental Protection (2020) and the Law on Tourism (2017) as the legal basis for waste management in general and plastic waste in particular in tourism. These regulations require tourist zones and attractions to comply with environmental standards and classify and treat waste in accordance with the law. Although the current Tourism Law does not stipulate separate mandatory provisions on 'green tourism' or plastic-free tourism, the orientation of sustainable tourism development is still expressed through guiding documents and tools implemented under the law, especially the integration of environmental protection criteria into the rating system of accommodation establishments, residences, management of relics and organization of festivals.

Law on Environmental Protection 2020 and documents under related laws

The national legal system currently includes the Law on Environmental Protection (2020), the legal basis for waste management in general and plastic waste in particular in tourism, providing a roadmap to reduce SUPs, a financial mechanism – disposal responsibility, and a long-term orientation on the circular economy. A list of policy documents and content is provided in the table below.

Table 3a. Legal documents governing solid waste and plastic waste

Legal Document	Key content related to plastics/travel
Law on Environmental Protection (LEP) 2020	Regulates waste generation and management at the national level.
Decree 08/2022/ ND-CP	Detail the implementation of LEP2020, focusing on domestic solid waste, plastic waste and the responsibilities of waste generating entities. Sets a roadmap to restrict SUPs, including: • From 2026: limit non-degradable plastic bags • After 2030: prohibit the production and import of SUPs (except for special cases).
Decree 05/2025/ ND-CP (amending Decree 08/2022/ ND-CP)	This Decree adjusts, supplements and clarifies a number of regulations guiding the implementation of the Law on Environmental Protection 2020, especially related to waste management and responsibilities of organizations and enterprises. In particular, the document continues to strengthen the requirements for classification of domestic solid waste at source, strengthen the waste management mechanism in the direction of circular economy and clarify the responsibilities of parties in waste collection, transportation, and treatment.
Decision 687/QD-TTg (2022)	The Prime Minister approved the Circular Economy Development Project in Vietnam, aiming to transform the growth model towards efficient use of resources and emission reduction. Encourage sustainable product design, recycling, reuse, and waste reduction, especially in large consumer industries such as packaging and plastics. This is the basis for promoting plastic reduction and circular models in production and services, including tourism.
Decision No. 450/ QD-TTg (2022)	The Prime Minister approves the National Environmental Protection Strategy to 2030, with a vision to 2050. The main goal is to proactively prevent and control pollution, improve environmental quality, conserve nature and biodiversity.
Decision No. 1316/ QD-TTg (2021)	The Prime Minister approved the Scheme to strengthen plastic waste management in Vietnam. Target by 2025: 100% of supermarkets and commercial centers use environmentally friendly plastic bags; 85% of plastic waste is collected and recycled; reduce 50% of plastic waste at sea and 100% of tourist resorts do not use disposable plastic products.

Legal Document	Key content related to plastics/travel
Decision No. 1658/ QD-TTg (2021)	The Prime Minister approved the National Strategy for Green Growth for the 2021-2030 period, with a vision to 2050, orienting the transformation of the development model towards low emissions and efficient use of resources. Strategies to promote sustainable production and consumption, develop a circular economy and reduce environmental pollution. This is an important basis for integrating the goal of reducing plastic waste and green transformation in economic sectors, including tourism.
Directive 33/CT-TTg (2020)	The Directive requires strengthening the management, reuse, recycling and reduction of plastic waste nationwide. Emphasize the restriction of the use of single-use plastic products in state agencies, commercial centers, supermarkets and tourist areas. At the same time, it promotes the development of a circular economy and enhances the responsibility of businesses in reducing plastic waste.
Decision No. 1746/ QD-TTg (2019)	The Prime Minister promulgates the National Action Plan on ocean plastic waste management by 2030. The main goal is to reduce ocean plastic waste by 50% by 2025, 75% by 2030, use 100% environmentally friendly plastic bags at shopping malls and supermarkets, and prevent plastic waste from going to sea.
Decision No. 491/ QD-TTg (2018)	The Prime Minister approves the adjustment of the National Strategy on integrated solid waste management to 2025, with a vision to 2050. The main goal is to increase reuse, recycling, limit landfills, towards sustainable waste management, environmental protection and circular economy development.

Tourism Law 2017 & Tourism Sector Mechanism

The tourism sector has shown an early leadership in environmental protection, especially at tourism destinations, even before the issuance of LEP2020. Although the Law on Tourism 2017 has not mandated 'zero plastic waste', the sustainability factor has been integrated through existing tools such as the Green Lotus Label 2012, Environmental Criteria at Monuments 2015. These frameworks incorporate environmental requirements into accommodation rankings and festival management regulations as shown in the table below.

Table 3b. Legal documents related to the tourism sector

Legal Document	Key content related to plastics/travel
Tourism Law 2017	Orientation for sustainable tourism development; require destinations/tourism establishments to comply with environmental regulations (there is no separate mandatory clause on "green tourism/zero plastic").
Green Lotus Label (Decision 1356/QD-BVHTTDL, 2012)	The voluntary certification program issued by the Ministry of Culture, Sports and Tourism aims to encourage tourist accommodation establishments to adopt environmentally friendly practices and use resources efficiently. The evaluation criteria consist of 5 levels, focusing on contents such as energy and water saving, waste management, pollution reduction and raising environmental awareness.
Decision No. 4666/ QD-BVHTTDL (2015)	The set of environmental protection criteria at monuments/scenic spots: requires the collection and treatment of solid waste (including solid waste) of at least 80%, and classification at the source is encouraged.
Decision 4216/QD-BVHTTDL (2020)	Promulgating a code of conduct for environmental protection in cultural, sports and tourism activities, promoting communication and changing behavior.
Official Letter 47/BVHTTDL-KHCNMT (2023)	Direct units and localities to strengthen plastic reduction, towards limiting single-use plastic products in tourist areas/attractions.

Legal Document	Key content related to plastics/travel
TCVN 14249:2024 & TCVN 14250:2024	Voluntary standards to support accommodation establishments for sustainable management; emphasizing the control of solid waste and plastic in the direction of reduction – reuse – recycling.
VITA GREEN (2024–2025)	The set of green tourism criteria launched by the Vietnam Tourism Association; encourage the roadmap to eliminate SUPs, develop the "Zero Plastic waste" model.

2.1.1.2. Compatibility with the ASEAN Policy Framework and the Driving Force for Greening the Tourism Sector

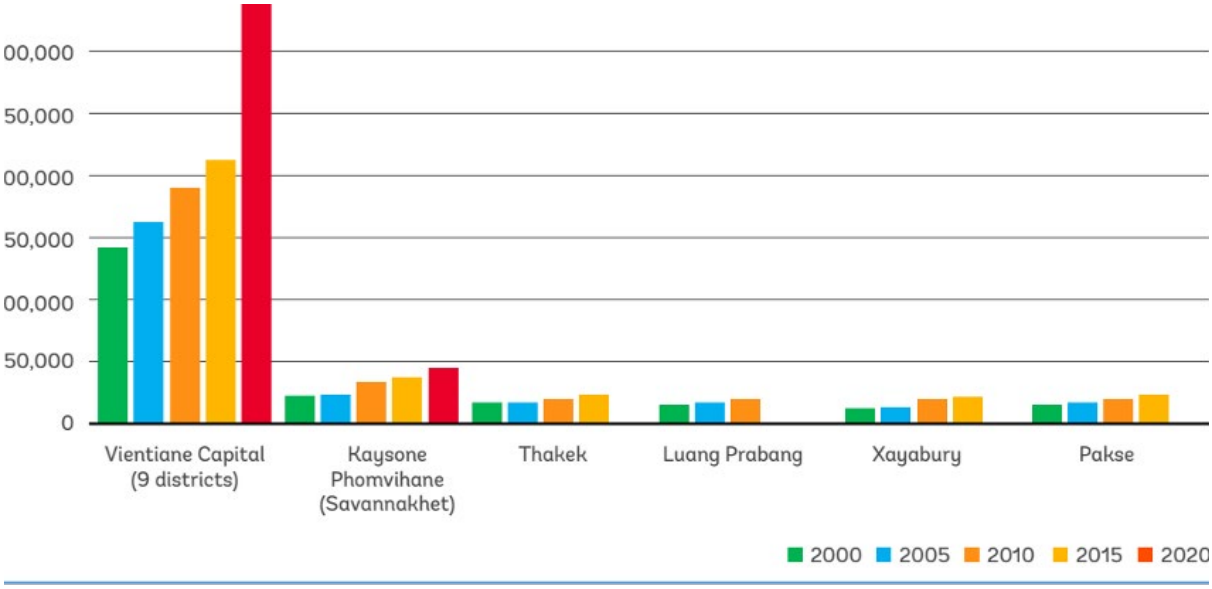
As one of the six key countries in the Global Plastic Innovation Program (GPIP), Vietnam views reducing plastic pollution in tourism as essential for both environmental responsibility and international competitiveness. With ocean plastic waste crossing borders and ASEAN positioning itself as "a common destination", Vietnam must align its environmental policies with regional partners, especially as Thailand and Indonesia advance their "green tourism" models. The assessment, specifically focusing on Ninh Binh and Da Nang, serves as important data for Vietnam to affirm its commitment and contribute its voice at regional dialogues. ASEAN has established a comprehensive framework to address plastic waste, highlighted by the ASEAN Regional Action Plan on Combating Marine Plastic Litter (ASEAN RAP) with 14 actions, based on 4 pillars: (i) policies and plans; (ii) research – innovation – capacity building; (iii) communication – education – community outreach; and (iv) private sector mobilization. These commitments continue to be strengthened through the ASEAN Green Economy Framework (2023) and regional dialogue mechanisms such as the ACCPP (2024).

Areas where Vietnam has aligned with ASEAN include:

- Integrate the goal of reducing marine plastic litter consistent with ASEAN RAP priorities.
- Strengthen behaviour change communication (BCC), for tourists, businesses and communities.
- Promote a life cycle and circular economy approach, emphasizing reduction of SUPs, reuse, and recycling.
- Expand public-private partnership (PPP), encourage corporate responsibility in plastic reduction and supply chain initiatives.
- Participate in regional cooperation and dialogue mechanisms related to ASEAN initiatives and the negotiation process of the Global Compact on Plastics.
- Improve data systems and monitoring, in line with ACCPP recommendations on enhancing regional plastic-waste data.

The ASEAN Tourism Policy Framework provides a strong motivation for Vietnamese businesses through a clear standardization roadmap, from participating in the ASEAN Tourism Awards to moving forward to sustainable Green Tourism Labels. ASEAN standards (Green Hotels, Homestays, Community Tourism, etc.) have become a prestigious measure of service quality associated with environmental protection, encouraging businesses to standardize their operations and invest in plastic waste reduction, and circular practices to maintain competitiveness in the region's sustainable tourism supply chain. Therefore, in alignment with the LEP2020 and the Law on Tourism and harmonising with ASEAN standards will be an important lever to advance this roadmap.

2.1.2. Policies on management of solid waste and plastic waste in localities



2.1.2.1. Policies of Ninh Binh province

Currently, Ninh Binh province has not issued a separate policy on plastic waste management as well as a separate waste management policy for the tourism industry, but integrates this content into the system of policies on solid waste management, environmental protection and sustainable tourism development. The Department of Agriculture and Environment is the focal point for waste management, coordinating with the Department of Tourism, the Department of Culture and Sports and the management boards of tourist zones and attractions in organizing the implementation.

Solid waste management, circular economy and reduction of SUPs in tourism

Overall, Ninh Binh has gradually localized national policies related to domestic solid waste management and plastic pollution reduction, especially through the implementation of the Law on Environmental Protection 2020, Decree 05/2025/ND-CP and Decision 1746/QD-TTg on the National Action Plan on Ocean Plastic Waste Management (the new Ninh Binh includes 03 provinces Ninh Binh, Nam Dinh and Ha Nam). The main contents include:

- Classification of domestic solid waste at source: Implement the regulations on mandatory municipal solid waste classification from January 1, 2025 according to the Law on Environmental Protection 2020, initially piloting it in key residential areas and tourist areas.
- In 2020, Ninh Binh province issued Decision No. 138/QD-UBND on the promulgation of an action plan on ocean plastic waste management to 2030 in Ninh Binh province.
- Ninh Binh Provincial People's Committee has issued Decision No. 61/2024/QD-UBND promulgating regulations on waste management in Ninh Binh province which outlines the waste finance mechanism: Step by step shifting from collecting average household fees to approaching "polluters pay", associated with the volume/volume of waste generated by coordinating with the collection unit, transportation and treatment of domestic solid waste shall determine the method of determining and statistics the volume of domestic solid waste in the area and disseminate it to the people as a basis for calculating the cost of waste collection, transportation and treatment.

- Plan 155/2025/QD-UBND on domestic solid waste management in Ninh Binh clearly states: tourist attractions; tourist accommodation establishments strictly comply with regulations on environmental protection; maintain a green – clean – beautiful landscape. Encourage units managing and exploiting tourist resorts, tourist attractions, and tourist accommodation establishments to promote activities to reduce, reuse and recycle plastic waste; at the same time, pilot and replicate the model of "Green tourism - no plastic bags" in tourist areas and attractions; historical-cultural relics and scenic spots contribute to improving the experience of tourists and promoting the image of green and sustainable tourism.
- On December 9, 2025, the People's Council of Ninh Binh province issued Resolution No. 44/2025/NQ-HDND on promulgating regulations on policies to support tourism development in Ninh Binh province in the period of 2025 – 2030. The Resolution stipulates financial support for items to strengthen support for tourism products and accommodation establishments for tourism for the new period, which allows support for renovation of facilities including many items and does not limit items on waste management.
- The province is in the process of developing a project on collection, transportation and treatment of domestic solid waste in Ninh Binh province in the period of 2026 - 2030 as a basis for implementing waste management activities of Ninh Binh province (after the merger) which clearly states: With the peculiarity that the province has substantial tourism potential and orientation to become a major tourism center at the national and international levels, the management of domestic solid waste plays a key role. This activity has a direct impact on the quality of the environment, the image of the destination and the sustainable socio-economic development of the province.

Circular economy policy: On April 15, 2025, the People's Committee of Ninh Binh province issued Plan No. 88/KH-UBND on the implementation of the circular economy by 2035. The plan identifies waste management – including domestic solid waste and plastic waste – as one of the priority contents of the province's action program to implement the green growth strategy. The development of this policy creates a legal framework to design financial mechanisms to support investment in waste treatment technology and reduce waste generation at the source, which has a direct impact on sustainable tourism activities in the province (Ninh Binh People's Committee 2025).

Regarding tourism certification, Ninh Binh currently does not have its own certification system or brand, but is using VITA GREEN Green Tourism Certification, which is a trademark developed and implemented by the Vietnam Tourism Association. In Ninh Binh, in the category of Tourist Destinations, Ninh Binh has 3 tourist areas honored at the Excellent level: Trang An Eco-tourism Area, Thung Nham Eco-tourism Area and Thien Ha Cave Eco-Tourism Area (Advanced level), Vietnam Wildlife Conservation Center (Advanced level). In the field of Tourist Accommodation Establishments, there are Ninh Binh Legend Hotel (Excellent), Hoang Son Hotel, Aquarius Garden Hotel (same Standard level). The Tourism Catering Establishments sector has Thanh Nga Luxury Restaurant and Jackie Chan Restaurant, both of which have reached the Advanced level.

Regarding green transformation: Ninh Binh determines that green transformation in tourism starts from environmental management and plastic waste reduction, associated with heritage and ecosystem conservation. The activities are mainly supported by a few projects organized by the Department of Tourism and the Vietnam National Administration of Tourism.

In summary, Ninh Binh's policy is relatively closely linked to the national framework and on plastic waste, which can be reflected in the synchronous goal:

- Ninh Binh sets a target of 80% of coastal tourism accommodation service businesses not using disposable plastic products and non-degradable plastic bags,

- By 2030, 100% of coastal tourism accommodation business establishments will not use disposable plastic products and non-degradable plastic bags.

Financial and investment incentives

In the post-merger context (from July 1, 2025), the national legal framework (Law on Environmental Protection 2020, Decree 08/2022/ND-CP on EPR) creates a foundation for financial and non-financial instruments to support tourism businesses to transition from a linear model to a circular economy. This is also in line with the orientation of Ninh Binh Provincial People's Committee in Plan No. 88/KH-UBND on implementing the circular economy to 2035 on strongly attracting resources from green credit, green bonds and other legal resources for investment projects in circular economy development.

Specifically, current financial incentives include:

- Low-interest preferential loans: The Vietnam Environment Protection Fund (VEPF) provides loans with an interest rate of only 2.6%/year for waste treatment, plastic recycling and green transformation projects. Businesses can use capital to install refill stations or directly support the transition to environmentally friendly products.
- Corporate income tax incentives: According to Decree 218/2013/ND-CP and its amendments, investment projects in the field of renewable energy and waste treatment are entitled to a 10% CIT reduction within 30 years, combined with tax exemption for the first 4 years.
- Updated policy support for finance and investment: The Vietnam's National Green Taxonomy (Decision No. 21/2025/QĐ-TTg)[1] and The Resolution 198/2025/QH15[1] offers significant incentives for green infrastructure businesses, including a 2% annual interest rate subsidy on loans for green and circular projects
- Fee incentive policy: Resolution No. 36/2025/NQ-HDND, whereby the local budget will support 100% of the funding for the collection, transportation and treatment of domestic solid waste and public waste from the collection point to the centralized treatment facility. This regulation helps reduce the financial burden on the community, organizations and businesses providing services at tourist destinations, creating favorable conditions to expand solid waste collection and treatment services in general solid and plastic waste in particular.

2.1.2.2. Policy in Da Nang City

Following the merger with Quang Nam Province on 1 July 2025, Da Nang City operates under a two-tier governance model with 94 commune/ward-level administrative units, continuing to implement the tourism development policies of both predecessor localities while operationalising the National Tourism Development Strategy to 2030. Tourism development priorities focus on post-COVID-19 recovery, raising enterprise awareness and responsibility, protecting destination image and environment, and pursuing sustainable tourism development — affirming tourism as the leading economic sector.

Within this overall orientation, the former Quang Nam area is distinguished by its green tourism strategy linked to biodiversity conservation and heritage value preservation, leveraging world cultural heritage sites and biosphere reserves (Quang Nam Provincial People's Committee, 2025). Green destination development schemes are being actively promoted, specifically:

- Former Da Nang: (i) Nam O Community Tourism Development Scheme; (ii) Community Tourism Development Scheme at Tho Quang – Man Thai Beach (Son Tra District); and (iii) Hoa Vang District Community Tourism Development Scheme.
- Former Quang Nam: (i) Conservation and Value Promotion Master Plan for My Son Sanctuary Complex (2021–2030, Vision to 2050); (ii) Scheme to Support Community Tourism Destinations in Quang Nam Province to 2025; (iii) Scheme for Investment Orientation and Development of Cu Lao Cham as a National Tourism Zone following Sustainable Development Guidelines.

Alongside spatial development schemes, the formulation of a Green Tourism Criteria Framework has been prioritised as a management and behavioural guidance tool. Notable examples include the 'Da Nang SMILE' criteria set, aimed at improving business culture, service standards, and environmental protection; and the Quang Nam (former) green tourism criteria framework, which has been applied and certified for a number of tourism enterprises.

Post-merger, the Da Nang Department of Culture, Sports, and Tourism, with support from the Swiss Sustainable Tourism Programme (SSTP), continues to refine the green tourism criteria in alignment with international Global Sustainable Tourism Council (GSTC) standards, supporting enterprises in plastic waste reduction and green community tourism development. Simultaneously, the city is formulating a post-merger Green Tourism Development Strategy for Da Nang, consistent with the vision of becoming a large, green, smart, and sustainable tourism city pursuant to Politburo Resolution 43.

Solid Waste Management and Single-Use Plastic Reduction in Tourism

In the context of tourism development, solid waste management and plastic waste reduction have been prioritised to ensure sustainability. The expanded two-tier management model extends plastic waste management coverage — particularly in rural and coastal areas from former Quang Nam — building on the national framework and focusing on developing an expanded 'Clean City, Blue Ocean' programme.

In terms of overall policy framework, Da Nang City proactively operationalises national instruments on solid waste management and plastic waste reduction through local regulations and roadmaps. Specifically, mandatory source segregation of MSW has been in effect since 1 January 2025; a roadmap for reducing single-use plastic products at coastal tourist zones from 2025, with complete elimination by 2030, is linked to the targets of a 50% reduction in marine plastic waste by 2025 and 75% by 2030 (Government Portal). These orientations are implemented in synchrony with the Extended Producer Responsibility (EPR) mechanism, in line with the national legal framework. Key provisions include:

- Aligned targets: The national target to reduce marine plastic waste by 75% by 2030, with emphasis on waste segregation and SUPs-free commitments, contributing to the National Municipal Solid Waste Management Strategy.
- Tourism focus: National requirements for the elimination of SUPs at coastal tourist zones from 2025 to 2030, with Da Nang operationalising these through specific targets:
  (i) 12 wards/communes (former Da Nang): 70% of tourist F&B establishments and 20% of food retail businesses to eliminate SUPs by 2025; integration with low-carbon tourism objectives. (Da Nang City People's Committee, 2021).
  (ii) 82 wards/communes (former Quang Nam): 90% of tourist sites/facilities to eliminate SUPs by 2025; linked to Hoi An heritage conservation and plastic waste reduction to attract sustainable tourism (Quang Nam Provincial People's Committee, 2020).

Business Green Transition Support Mechanisms

Financial incentives and investment mechanisms

In the context of the post-merger (from 1 July 2025) green economic transition of Da Nang – Quang Nam, the national legal framework (Law on Environmental Protection 2020; Decree 08/2022/ND-CP on EPR) provides the foundation for financial and non-financial instruments supporting tourism enterprises in transitioning from a linear to a circular economy model. Specific current financial incentives include:

- Preferential low-interest loans: The Vietnam Environment Protection Fund (VEPF) provides loans at a rate of only 2.6%/year for waste treatment, plastic recycling, and green transition projects. Enterprises may utilise these funds to install refill station systems or subsidise the transition process to biodegradable packaging — a measure that contributes to reducing the plastic leakage rate (0.75%) and achieving 100% waste collection in the tourism sector.

- Corporate income tax incentives: Under Decree 218/2013/ND-CP and amendments, investment projects in renewable energy and waste treatment receive a 10% corporate income tax reduction for 30 years, combined with a 4-year tax exemption at the outset.
- Land rent and infrastructure fee waivers: At the Da Nang Free Trade Zone, green projects receive land rent reductions of up to 50% for the first 10 years, pursuant to Decision 18/2023/QD-UBND of the Da Nang City People's Committee.

However, these mechanisms have not been optimally utilised due to the lack of sector-specific guidance for the tourism industry and SMEs, resulting in access rates of only approximately 20–30%, according to a 2024 report by the Ministry of Natural Resources and Environment (MONRE).

Technical Support Mechanism

Da Nang City has progressively developed a green transition roadmap for the tourism sector, centred on plastic waste minimisation and a shift towards low-carbon tourism. Technical assistance activities focus on awareness raising, source segregation training, SUPs reduction at accommodation facilities and destinations, sharing of green tourism models, and introduction of environmentally friendly solutions to tourism enterprises. In addition to the coordinating role of state management agencies, Da Nang receives support from international and non-governmental organizations including IUCN, UNDP, WWF, and USAID.

Institutionally, green transition support content in the tourism sector is primarily mainstreamed into: (i) the city's Green Tourism Development Plan; (ii) the Marine Plastic Waste Minimisation Programme; and (iii) pilot projects such as 'plastic-free hotels' and 'plastic-free restaurants'. However, the city has not yet issued a dedicated regulatory instrument directly governing support mechanisms for transitioning business models from single-use plastic products to environmentally friendly alternatives. Current support measures are primarily incentive-based, communications-oriented, and training-focused, while environmental criteria are mainstreamed into the green tourism assessment system; specialised financial policies to support SMEs during the transition process have not yet been established.

> *Quote from a representative of the Department of Culture, Sports and Tourism: "The level of enterprise participation in green transition and plastic reduction remains limited. The majority of enterprises have not moved beyond awareness-raising, while the implementation of specific, systemic actions remains unclear. One of the primary causes is the absence of sufficiently robust policy mechanisms to both incentivise and bind enterprises to the implementation of waste management measures".*

In this context, Da Nang is developing and operating the "Da Nang Green Tourism" Label to recognise, promote, and enhance the competitiveness of tourism service establishments that meet environmental and sustainable development criteria. However, no specific preferential policies currently exist on finance, taxes, or fees for establishments holding the Label, with support being largely limited to: (i) training and technical consultancy; (ii) prioritisation of communication and promotion; and (iii) facilitation of connections with international partners and project networks.

Monitoring System

In the tourism sector, annual inspections are conducted by the Ministry of Culture, Sports, and Tourism in coordination with the city's Department of Culture, Sports, and Tourism, focusing on travel agencies, accommodation facilities, and food and beverage establishments. Inspection content primarily covers physical infrastructure, human resources, environmental hygiene, and fire safety. For facilities holding sustainable tourism certification, compliance with environmental criteria is currently only assessed at the time of certification; no periodic monitoring mechanism or post-certification audit is in place, which undermines the long-term effectiveness of maintaining environmental commitments.

Regarding MSW/plastic waste management, CCTV surveillance systems have been deployed at collection points and along road networks in certain areas — notably in Ngu Hanh Son Ward with a security-integrated camera system to detect and handle illegal dumping. This solution has initially contributed to improved monitoring effectiveness and enhanced urban aesthetics. However, the city-wide monitoring system remains unsynchronised, particularly in rural areas; plastic waste leakage to the environment continues to originate primarily from domestic activities and service sector operations.

Overall, post-merger tourism policy has laid the groundwork for green tourism development and plastic waste management; however, significant shortcomings remain, including an unsynchronised monitoring system, the absence of post-certification compliance mechanisms, and a lack of dedicated support for small and medium-sized enterprises (SMEs) in meeting environmental requirements.

2.1.3. Analysis of national policies on plastic waste management in tourism by topic groups

Regarding waste management in general

Policy enforcement mechanism and sanctions: At the national level, Vietnam has established a relatively complete system of legal documents to orient and promote plastic waste management, in which the tourism industry is a priority sector due to the high consumption of single-use plastic products. Guiding documents such as Directive No. 33/CT-TTg of the Prime Minister: On strengthening the management, reuse, recycling, treatment and reduction of plastic waste in general, along with highly legally binding regulations such as Decree 08/2022/ND-CP and Decree 05/2025/ND-CP, has established a roadmap to limit and move towards stopping the production, import and use of single-use plastic products at hotels, tourist resorts, and commercial centers. At the same time, initially apply the mechanism of responsibility for recycling and financial contribution to waste treatment.

Strengths	Challenges
• High-level directive documents create enforcement pressure for ministries/sectors/localities. • Decrees 08/2022 and 05/2025 clearly stipulate the roadmap for restricting SUPs in tourism establishments. • The Ministry of Culture, Sports and Tourism has a mechanism for periodic/irregular inspection through the inspection system.	• Enforcement is still more about advocacy and administrative inspection, not closely associated with the licensing/ranking of accommodation establishments. • Some regulations are oriented, lacking a specific route for each type of tourism.

Guidance, targets and assignment of responsibilities to stakeholders: The national policy framework has established quantitative targets for reducing plastic in tourism, especially in coastal and island areas. Responsibilities are delineated at the framework level between the Provincial People's Committee, the Department of Culture, Sports and Tourism, the destination management board and tourism enterprises. A number of sets of criteria (Lotus Xanh, VITA GREEN, decisions of the Ministry of Culture, Sports and Tourism) support the transformation of policies into operational standards.

Strengths	Challenges
• Clear quantitative targets: 80% of coastal tourism destinations will not use SUPs by 2025; 100% by 2030. • The assignment of roles is relatively clear between the government – professional agencies – businesses – destinations. • The set of green tourism criteria supports practical implementation guidance.	• Lack of uniform technical guidance for each type (hotels, community tourism, festivals/events). • The obligations of SMEs are unclear, mainly voluntary/ incentive. • Changing the two-tier government model could slow the implementation process.

Solid waste and plastic waste monitoring system: Some sets of environmental criteria and reports have mentioned the requirement for solid waste monitoring and periodic reporting. However, there is currently no national-level standardized monitoring system dedicated to plastic waste in tourism; data is still scattered and lacks comparability between localities.

Strengths	Challenges
• Some national criteria have required monitoring of annual environmental protection collection rates and reports. • It is the initial foundation for building a monitoring system.	• There is no separate set of standard indicators for plastic in tourism (kg of plastic/passenger/night, SUPs reduction rate, etc.). • Lack of uniform reporting standards, fragmented data and difficulty in quantitatively evaluating.

Focus on the tourism sector

The tourism industry has been supported through communication and awareness activities on plastic reduction, including training, community campaigns and point models in some localities. However, these forms of support mainly focus on the aspects of social awareness and advocacy, while technical and financial support for the transformation of the operating model of tourism businesses is limited. Investing in systemic solutions such as reuse, refill, or recovery logistics remains a major challenge, especially for small businesses, medium-sized accommodation establishments, and community tourism.

Strengths	Challenges
• Many communication activities and pilot models help spread awareness and practice to reduce plastic. • The Ministry of Culture, Sports and Tourism has a role in coordinating and promoting the implementation at the destination.	• Support is mainly focused on communications, lacking technical and financial support for system transformation (reuse/refill, logistics recovery). • There is no separate national support program for tourism businesses to replace SUPs.

Technical and financial support for local governments: Localities can integrate plastic reduction into their environmental protection and sustainable tourism plans, and mobilize resources from national programs and international cooperation. However, there is no stable financial mechanism dedicated to plastic waste management in tourism.

Strengths	Challenges
• It is possible to mobilize resources from ODA and international partners. • There is a basis for integrating it into environmental protection and circular economy plans.	• Lack of long-term financial resources for sorting and collection infrastructure at the destination. • Capacity and resources among localities are uneven, especially in islands and remote areas.

Solid waste and plastic waste monitoring system: Some sets of environmental criteria and reports have mentioned the requirement for solid waste monitoring and periodic reporting. However, there is currently no national-level standardized monitoring system dedicated to plastic waste in tourism; data is still scattered and lacks comparability between localities.

Strengths	Challenges
• Some national criteria have required monitoring of annual environmental protection collection rates and reports. • It is the initial foundation for building a monitoring system.	• There is no separate set of standard indicators for plastic in tourism (kg of plastic/passenger/night, SUPs reduction rate, etc.). • Lack of uniform reporting standards, fragmented data and difficulty in quantitatively evaluating.

2.1.4. Analysis of policy gaps at the central level

General policy gaps (intersectoral)

The following policy gaps are systemic, affecting many sectors of consumption – services – urban areas, including the tourism industry.

(1) Gaps in data and tracking systems

There is currently no standardized, updated and interdisciplinary national database system on plastic waste. The available figures are mostly estimates or collected through short-term projects, lacking continuity and methodological inconsistencies. The lack of accurate quantitative data and real-time data limits the ability to make evidence-based policies, as well as making it difficult to assess the effectiveness of interventions at national and local scales.

(2) Gaps in financial mechanisms and mobilization of investment resources to realize objectives

Although plastic waste reduction targets have been established at the national level, the financial mechanism to realize these targets is limited. According to NPAP estimates, Vietnam needs about $8.5 billion over five years to achieve its goal of reducing plastic waste to the sea by 75% by 2030, while existing resources are still severely lacking. Notably, the current investment incentives mainly focus on the production and waste treatment sectors, which have not created a strong enough financial incentive for the consumption and service sectors (such as tourism) to reduce plastic at source. In addition, financial instruments such as green credit and green bonds, although regulated in the Law on Environmental Protection, are in fact difficult to access due to the high requirements for proving environmental efficiency and collateral. This makes it difficult for many small-scale plastic reduction initiatives to access preferential funding.

(3) The gap in technical infrastructure and final processing capacity has not met the requirements of the policy

A systemic bottleneck is the lack of synchronization between the sorting at the source and the collection, treatment and recycling capacity at the local level. Although garbage segregation is encouraged and gradually implemented, the percentage of plastic actually recycled remains low, with much of it still being landfilled or incinerated. This situation reflects a large gap between policy objectives and actual infrastructure conditions. Especially in localities where there is no modern treatment system, garbage after being reclassified by people and businesses is mixed up in the collection process, causing a loss of trust and a decrease in the community's motivation to implement.

Policy gaps that are directly related to the tourism industry

In addition to systemic restrictions, the tourism industry also faces specific policy gaps due to the nature of the service industry – concentrated consumption – depending on the destination.

(1) Technical standards for plastic reduction models in tourism

A major barrier to replicating refill and reuse models in the tourism industry is the lack of national technical regulations, especially related to food safety and hygiene. The current regulations are designed for a single-packaged manufacturing model, and there are no specific guidelines for drinking water systems and reusable items at accommodation facilities. This increases legal risks and the psychological apprehension of businesses, especially large-scale hotels. At the same time, the lack of clear definitions and technical criteria for "environmentally friendly products" in tourism increases the risk of "greenwashing", when plastic alternatives that have not been fully proven are still widely promoted and used.

(2) Financial policy design for the tourism service providers

The current environmental incentive mechanisms are mainly geared towards waste production or treatment projects, while tourism businesses act as consumers and generate waste. When investing in reuse/refill models, tourism businesses are not considered eligible for environmental investment incentives, leading to the inability to access preferential loans or tax exemptions. This creates a major barrier for small and medium-sized tourism businesses in the transition.

(3) The integration of the circular economy and Extended Producer Responsibility (EPR) into the tourism value chain

Although the circular economy and expanded producer responsibility mechanisms have been codified, the role of the tourism industry in these mechanisms is still unclear. Tourism businesses currently do not have an official participation mechanism or a means to benefit from the EPR fund when performing well in classification and collection, while the cost of environmental sanitation and garbage collection at the destination is still mainly borne by the locality and the management board. This reduces the motivation to maintain circular patterns at tourist destinations.

(4) Implementation and sanctions of tourism industry policies

Specialized tourism documents on environmental protection and plastic waste reduction are still inclined to encourage and advocate, while specific sanctions for violations at tourism establishments and destinations are rarely applied in practice. Many plastic reduction activities are still movement-based, dependent on communication campaigns or short-term support projects, lacking a long-term sustainability mechanism.

(5) The "Breaking Point" between Accommodation and Destination Plastic Reduction Efforts and Disposal Systems

In many tourist destinations, especially eco-tourism and community tourism areas, waste classification at the source has been implemented relatively well. However, due to the lack of appropriate treatment and recycling infrastructure at the local level, waste after sorting is still mixed or treated substandardly. This problem is especially serious in island tourist destinations and isolated areas, where the cost of transporting garbage to the mainland is very high and there is no appropriate logistics subsidy mechanism.

2.1.5. Specific gaps at local areas

2.1.5.1. Policy gaps and challenges in Ninh Binh

Although the national policy framework is relatively complete, there are still many gaps in the implementation in Ninh Binh, affecting the implementation efficiency:

- Legal – overall policy:
  - Green tourism and plastic reduction have not been fully integrated into the local tourism legal framework: The Law on Tourism 2017 and guiding documents do not have mandatory regulations on green tourism and plastic-free tourism. In Ninh Binh, environmental protection requirements in tourism mainly stop at the level of commitments or incentive criteria, which have not become mandatory conditions for businesses and resort management. The action plan for ocean plastic waste management is only concentrated in accommodation service providers in coastal areas, so establishments in prominent destinations such as Trang An, Bai Dinh, Tam Coc – Bich Dong or other inland points are not informed about regulations related to the use of single-use plastic products or encouraged to minimize plastic waste.
  - There is no specific policy on plastic waste management in tourism: documents such as Decision 138/QD-UBND (2020), Decision 61/2024/QD-UBND or Plan 155/2025/QD-UBND mention the reduction, reuse and recycling of plastic waste, but do not specify mandatory legal obligations for tourism activities, nor do they account for the distinct waste generation characteristics of the tourism industry (crowded destinations, waterway tourism, spiritual tourism).
  - The scope of adjustment of plastic reduction policies according to the national action plan and implementation decision in Ninh Binh is only focusing on target groups such as restaurants and hotels in coastal areas but missing key domestic tourist destinations.
  - In fact, Resolution No. 44/2025/NQ-HDND on promulgating regulations and policies to support tourism development in Ninh Binh province in the period of 2025 – 2030 is the latest document related to the tourism development orientation of Ninh Binh. However, the Resolution does not specifically

mention the content of environmental protection in tourism development, as well as on waste management in general and plastic waste in particular in the tourism industry in Ninh Binh.

- SUPs policies: SUPs reduction policies have been stipulated in legal and policy documents such as Decree 05/2025 and Circular 07/2025. However, according to a study by Nguyen Trung Thang et al. (2025), as well as the results of a survey on plastic waste in Ninh Binh at the end of 2025, SUPs is still commonly used in domestic tourist destinations of Ninh Binh, from tourists, businesses to the community, reflecting the gap between policy objectives and applied practices.
- Support mechanism: Lack of incentive and binding mechanisms for tourism businesses. Although Decree 08/2022/ND-CP restricts SUPs at tourism establishments from 2025, in Ninh Binh, there are not:
  - — Financial support package for businesses to convert to environmentally friendly products;
  - — Environmental fee incentives;
  - — Clear sanctions for SUPs violations in tourism. Therefore, many small accommodation establishments and community tourism business households still depend on SUPs.
- Enforcement and monitoring: Enforcement and monitoring activities are weak. The national targets on plastic waste reduction have not been concretized into quantitative targets for each tourist area. Monitoring activities are mainly based on periodic administrative inspections, lack of regular monitoring mechanisms and community involvement.
- Lack of green transformation roadmap and green tourism certification: Ninh Binh has not issued policies on green transformation. At the same time, there is no mandatory set of criteria for "plastic-free tourism" or green tourism certification integrated with plastic management. Small businesses and community tourism models lack technical support to transform green supply chains. There is no consensus on the image of green tourism associated with plastic waste management.
- Institutions – coordination: Tourism and environmental management is still separate between the Department of Tourism and the Department of Agriculture and Environment. Lack of institutional coordination and building a green tourism image reduces the effectiveness of building a tourism image and unified communication to businesses and tourists

In conclusion, in Ninh Binh, the challenge lies not only in the lack of a specialized policy on plastic waste, but also in the fact that regulations at the national level have not been effectively translated into specific requirements for the tourism sector, which are binding, enforceable and measurable at the local level. Tourism is still not clearly reflected in solid waste management policies, when responsibilities between parties are separated without support and integration, incentive mechanisms are not strong enough, and enforcement measures are mainly advocacy rather than enforcement.

2.1.5.2. Policy gaps and challenges in Da Nang city

A systemic challenge is the absence of specific tools and guidance for plastic waste management, creating a gap between policy objectives and enforcement outcomes. This is evidenced by the 2025 target for the elimination of SUPs at tourist zones, which has not been fully realised. In Da Nang, SUPs remain prevalent at tourism facilities, resulting in unsynchronised source segregation and treatment infrastructure that has not kept pace with tourism growth.

- Strengthening the legal framework and policy mechanisms: The Green Tourism Criteria Framework covers 7 priority areas, with 33 certified enterprises; however, the absence of legal obligations has resulted in some facilities failing to comply with SUPs reduction and environmental protection requirements. Additionally, green practice certifications have not generated positive brand impact, nor have they been integrated into Vietnam's hotel star-rating criteria.

- Absence of integration between waste management and spatial planning for beach use: The permitting of dispersed food and beverage activities across the entire beach area increases the generation of small plastic waste items that are difficult to control. There is currently no clear zoning for: (i) areas designated for F&B and commercial services (with waste bins, segregation facilities, and supervision); and (ii) areas reserved for rest, recreation, and community activities with minimal waste generation. This gap in spatial-behavioural planning increases dispersed waste generation, particularly of microplastics and difficult-to-collect debris.

Every day, beach cleaning machines and municipal environmental workers operate continuously to maintain the aesthetic quality of Da Nang's beaches. However, cigarette filters, shampoo and body wash sachets, small plastic fragments, and drinking box straws frequently become embedded deep in the sand and, due to their small size, cannot be fully collected by machines or workers. We therefore hope that awareness-raising campaigns will be implemented to encourage tourists to avoid generating such waste." (Female URENCO worker in Da Nang, in-depth interview, 29 December 2025)

- Insufficient guidance and support tools: The transition to green operating models — including renewable energy, waste treatment, and energy-efficient equipment — requires significant capital investment, placing considerable pressure on SMEs. Da Nang requires location-specific economic and financial instruments (such as tax incentives and green loans) and guidance for enterprises and technology providers to facilitate investment in green infrastructure, particularly sustainable supply chain transition technologies.
- Monitoring and evaluation effectiveness: The smart tourism system with an online monitoring centre and AI cameras at tourist attractions supports visitor flow tracking and littering violation detection; post-merger monitoring enhancement and resource optimisation are needed; the ST4SD project supports the development of a transparent M&E system, though gaps remain in measuring the long-term impact of green tourism policies.
- Cross-locality and inter-sectoral synchronisation: Post-merger, Da Nang inherits the Green Tourism Criteria from former Quang Nam, promoting ST4SD public-private linkages for synchronised green tourism development. However, the green tourism implementation process continues to face disparities in capacity, awareness, and experience among enterprises across localities, leading to resource imbalances, inconsistent commitments, and uneven application of criteria — limiting the scalability of green models.
- Lack of unified green tourism and marine plastic waste management branding: The green tourism image between Hoi An and Da Nang remains ill-defined, lacking a common brand-building direction, which complicates communications and the alignment of environmental protection campaigns between the two localities.

2.2. Participation of stakeholders in solid waste generation chain of the tourism industry

The system of stakeholders in the management of plastic waste at tourist destinations is constituted by a network of diverse subjects, with multi-dimensional interactive relationships, covering the entire life cycle of waste, from production, circulation, consumption to collection, disposal and recycling. Based on their functions, tasks and roles in the waste management chain, stakeholders can be classified into four core groups of subjects, specifically as follows:

(1) The group of state management agencies and policy makers plays the role of establishing the

legal framework, coordinating and supervising the system;

(2) Group of production, business and waste generation: including tourism enterprises, business households and tourists - the group that directly decides the scale and characteristics of plastic waste streams;

(3) Waste operation, collection, treatment and recycling organizations: including formal units and informal sectors, responsible for operating the end-of-stream treatment system;

(4) Groups of support organizations and development partners: such as social organizations, NGOs and communities, which play a role in promoting initiatives, piloting models and raising awareness.

The value-chain approach allows for the identification of plastic waste material flows, leak points and the degree of linkage between actors, thereby serving as a basis for identifying appropriate policy and intervention levers in each local context.

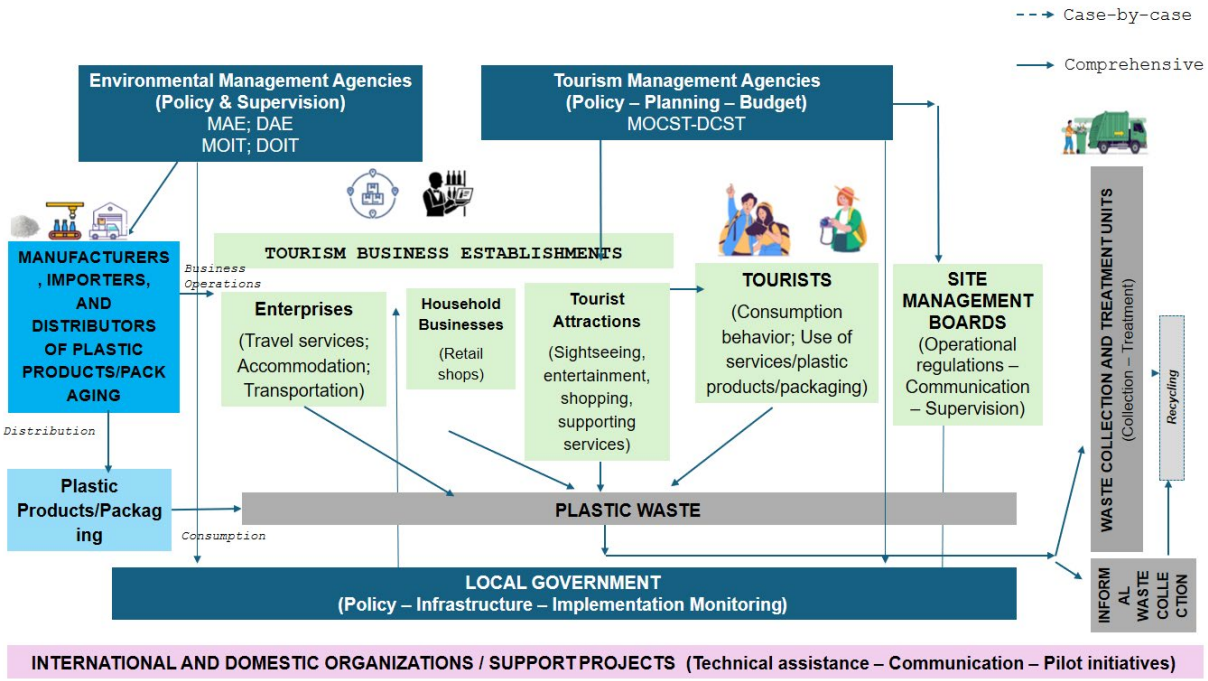


Figure 3. Stakeholder diagram in plastic waste management in tourism activities

This model was used as the basis for case studies in Ninh Binh and Da Nang to clarify systemic issues and identify potential interventions towards promoting the circular economy and reducing waste in the tourism industry.

2.2.1. Ninh Binh

The main stakeholders in the management of solid and plastic waste in tourism activities in Ninh Binh include parties in the governmental management chain, the chain of plastic waste generation in tourism activities and local domestic solid waste management stakeholders. In addition to the management by management agencies and local authorities, the provincial tourism association and its branches play an important role in the soft coordination mechanism on tourism activities. Recycling facilities and informal value chains are the recipients of recycled waste from tourism and transportation activities to collection and recycling facilities. In addition, social organizations, NGOs, and projects such as UNDP/GEF, which support and participate in activities to develop sustainable tourism in Ninh Binh.

Table 4. The role of key stakeholder groups in tourism management in Ninh Binh

Stakeholder Groups	Subject	General role in the tourism industry	Roles/Impacts on Solid Waste & Plastics Management
Provincial-level state management agencies	Provincial People's Committee; Department of Tourism; Department of Agriculture and Environment	• Tourism development orientation • To promulgate policies, master plans, plans and standards • Implementation monitoring	• Promulgating regulations and policies on plastic waste management • Integrating environmental objectives into tourism plans and plannings
Commune-level local administrations	People's Committees of communes/wards	• Administratively specific destination management including solid waste management	• Organizing and managing waste collection at tourist attractions • Supervising the implementation of environmental protection • Mobilizing and propagating to the community and business households
Management boards of tourist areas/attractions	Xuan Truong enterprises manage destinations; Van Long Ecotourism Service Cooperative, Other destination management enterprises (Thien Ha Cave); The Management Board of Cuc Phuong, Xuan Thuy National Park...	• Destination Operations Management • Ensuring the visitor experience	• Design and manage garbage bin systems, sorting • Regulations for transportation, boats, and restaurants within the destination premises • Visitor Media
Tourism service enterprises	Hotels, homestays, restaurants, tour operators, transportation	• Providing accommodation, catering, transportation, tour/travel services	• Sources of plastic generation (water bottles, amenities, packaging, etc.) • Capable of implementing mitigation at source (replacement, reuse)
Business households & tourism workers	Street vendors, boaters, drivers, souvenir stalls, groceries...	• Directly serving visitors • Providing plastic products to tourists	• Generating and supplying plastic products to customers • Directly affected by plastic ban/ reduction regulations
Visitors (domestic & international)	Visitors to Trang An, Tam Coc, Bai Dinh	• Deciding on consumption needs and behaviors	• Sources of plastic waste • Discharging/classification behavior determines performance
Waste collection – transportation – treatment unit	Environmental companies; Cooperatives/centers/ environmental sanitation teams	• Solid waste collection, transportation and treatment	• Deciding on the ability to sort – recycle - Often limited collection and sorting for recycling
Recycling facilities & informal value chains	Bottle tick collection establishments, garbage pickers	• Less direct participation in tourism	• Closing the plastic waste cycle
Social organizations, NGOs, projects	UNDP/GEF Provincial Tourism Association; MCD	• Technical, communication, pilot support	• Promoting plastic reduction models, sustainable tourism • Connecting communities and businesses in pilot models

In the chain of plastic generation in Ninh Binh's tourism activities, plastic will pass through all major links such as suppliers, services such as travel, destination management, catering services, accommodation, and transportation through the use of tourists. After passing through the user chain, plastic waste will be collected by environmental units, informal collectors and end up at the waste treatment area, recycling unit or discharged into the environment. In this chain, the input suppliers are the initial supply of plastic products including food packaging, drinking water bottles, straws, plastic bags and disposable amenities (brushes, razors, plastic slippers, small capacity bottles) that are included in the chain from the initial stage. Through the distribution units, it will reach the links of the chain of tourism service units and provide them to tourists before being disposed of and collected and treated by the environmental unit.

Each stakeholder has different motivations in promoting the management of plastic waste from tourism activities. In particular, the tourist attraction management board is the key actor. The results of field surveys and in-depth interviews show that waste is well managed in areas managed by enterprises with professional operation systems, including signing contracts with collection units, supervising waste collection and transportation at tourist areas, for example, in Trang An – Bai Dinh complex, Tam Coc – Bich Dong. However, the status quo is more limited in areas managed by local and community governments such as the Van Long Wetland Area.

The analysis shows that the "leverage points" of the most important factors to reduce plastic waste in tourism are concentrated at three levels:

(i) destination management agencies, which have a role in issuing and enforcing operating regulations;
(ii) tourism service providers, especially small and medium-sized accommodation and catering establishments – where the use of plastic is most intense; and
(iii) tourists, whose consumption behavior plays a decisive role in the volume and composition of plastic waste generated.

2.2.2. Da Nang

In Da Nang, the plastic waste generation chain in the tourism sector originates at the upstream materials supply stage (manufacturers and distributors), passes through the consumption stage (tourism service enterprises and tourists), and terminates at the collection and treatment system encompassing both the formal and informal sectors. The city maintains a relatively high plastic waste collection rate, reflecting the level of infrastructure investment and urban management capacity. Nevertheless, plastic waste leakage continues to occur due to non-technical factors, particularly consumer awareness and convenience-driven consumption behaviour. Furthermore, inter-stakeholder linkages remain fragmented, with the informal sector not yet fully integrated into the formal management system, resulting in unrealized recycling potential.

The roles and characteristics of stakeholders in the emission chain are described in detail in Table 5.

Table 5. The role of stakeholders in tourism management

Stakeholder Groups	Subject	General role in the tourism industry	Roles/Impacts on Solid Waste & Plastics Management
Provincial-level regulatory authorities	Sub-Dept. of Environment, Dept. of Culture, Sports & Tourism	• Guide tourism development • Manage, supervise, and promote sustainable tourism • Issue green tourism policies and criteria.	• Issue regulations on SUPs reduction • Promulgate green tourism development strategies; public-private partnerships to develop green tourism criteria for businesses • Allocate budgets and approve pilot models.
Local commune-level authorities	Commune/ward People's Committees	• Manage specific destinations • Coordinate local tourism activities	• Organize waste collection at tourist sites • Supervise disposal behaviour; community and business outreach
Tourism site management boards	Ngu Hanh Son Heritage & Scenic Area Mgt. Board; Bay Mau Coconut Forest Mgt. Board; Thanh Ha Pottery Village Mgt. Board	Manage and operate destinations; ensure visitor experience.	Deploy segregated waste bins and plastic waste reduction signage; enforce waste management regulations for businesses within the site; communicate 'plastic-free destination' messaging.
Manufacturer and supplier of the head	Manufacturers, importers, and distributors of plastic products/packaging	• Supply plastic products to businesses (food packaging, drinking water bottles, straws, plastic bags, single-use amenities)	• Indirect but large-scale source of plastic waste generation within the tourism value chain
Tourism service enterprises	Hotels, homestays, restaurants, travel agencies, ferry terminals	Provide accommodation, F&B, transport, and tour services	• Consume and generate SUPs and plastic packaging; distribute single-use plastic products; determine type and volume of plastic entering the market • Capacity for source reduction (substitution and reuse)
Business households & tourism workers	Small household businesses (homestays, guesthouses, small F&B), workers at tourism facilities	• Directly serve tourists • Generate local livelihoods	• Generate plastic waste from daily operations (plastic bags, plastic bottles) • Participate in waste collection fee schemes • Directly affected by plastic bans/reduction regulations
Tourists (domestic & international)	Visitors to Da Nang tourist sites (Hoi An, Ba Na Hills, My Khe Beach, Ngu Hanh Son, etc.)	End consumers with direct influence on the volume and characteristics of plastic waste generated at destinations	• Littering/waste segregation behaviour determines system efficiency • SUPs use, waste disposal, and compliance with segregation rules are heavily dependent on destination-level communication, guidance, and regulations

Stakeholder Groups	Subject	General role in the tourism industry	Roles/Impacts on Solid Waste & Plastics Management
Formal waste collection, transport & treatment entities	Urban environment companies (Da Nang, Hanoi, Hoi An, Quang Nam)	Collect, transport, and treat waste across the city	• Collect and transport plastic waste from tourist sites; preliminary source segregation; end-of-pipe treatment via recycling or landfilling • Currently limited plastic recycling technology
Recycling facilities & informal value chain	Scrap dealers; itinerant waste buyers/collectors	Collect and sort recyclable scrap; play a leading role in recovering high-value recyclable plastics	• Sort and store recyclable plastics; collect plastics at source from the tourism sector • Supply raw materials for recycling. Informal workers not yet fully integrated into the formal management system
Civil society, NGOs & development projects	Da Nang Tourism Association; support organizations (WWF Vietnam, East Meets West)	Provide technical support, communication, and pilot programmes	Promote plastic reduction models and sustainable tourism; support circular economy models; provide waste management policy advice; raise awareness; bridge policy-community-business linkages.

Analysis of the waste emission chain reveals that the linkage gap between the generation stage (tourists and small household businesses) and the collection-recycling stage — particularly the informal sector — is the primary driver of an estimated 10–15% plastic waste leakage to the environment. This finding indicates that the challenge lies not solely in infrastructure capacity, but principally in inter-sectoral coordination mechanisms under the leadership of the municipal People's Committee, economic incentives, and behavioural change. Accordingly, key leverage points in Da Nang include: strengthening multi-stakeholder cooperation across the value chain; effectively integrating Extended Producer Responsibility (EPR) mechanisms with local models such as Material Recovery Facilities (MRFs); and piloting deposit-return schemes to create economic incentives for recovery and recycling. If implemented in a coordinated manner, these interventions can provide the foundation for a sustainable transition to a plastic-free tourism model and circular economy.

2.3. Assessment of the current situation of solid waste generation and management in Ninh Binh province

2.3.1. Current status of domestic solid waste generation in Ninh Binh province

Current status of solid waste generation in Ninh Binh

According to the Ninh Binh Department of Agriculture and Environment, by 2025 the amount of domestic solid waste generated in Ninh Binh is estimated to reach approximately 2,519 tons per day, of which the collection rate in urban areas reaches 96%, while in rural areas it is about 91%. Based on aggregated data from 2021-2024, the average per capita waste generation in Ninh Binh is approximately 0.5 kg/person/day (WWF, 2022, and aggregated sources, 2024).

Regarding plastic waste generation, according to a WWF report (2022), the total amount of plastic waste generated in Ninh Binh in 2021 was approximately 221 tons per day. The average amount of plastic waste generated per capita in 2021 was 21 kg/person/year. It is estimated that the total amount of plastic waste generated will reach 229 tons/day in 2024 (aggregated sources, 2024), equivalent to an average annual plastic generation of 22 kg/person/year. Thus, the average amount of plastic waste generated is about 0.06 kg/person/day.

Table 6. Amount of plastic waste generated during 2019–2024 in Ninh Binh, calculated by total volume (tons/day) and per capita (kg/person/year)

Amount of plastic	Year		
	2019	2021	2024
Total amount of plastic waste/day (tons/day)	201	221	229
Total amount of plastic waste/per capita (kg/person/year)	20	21	22

(Source: WWF, 2022 and aggregated source, 2024)

Current status of solid waste generated from tourism activities

Waste generated data from tourism activities in Ninh Binh has not been systematically recorded in relevant period reports. To identify the composition and actual volume of waste generated by tourism service establishments, the research team conducted waste audit activities at 11 restaurants, hotels and destinations in Ninh Binh in December 2025. As a result, in seven days of continuous auditing, 945.87 kg of waste were recorded during the audit activity. Organic waste accounts for the highest proportion, representing 74% by weight and 48% by volume. Plastic waste accounts for 15%, other waste accounts for approximately 6%, while materials such as paper, metal, and glass represent less than 3% each.

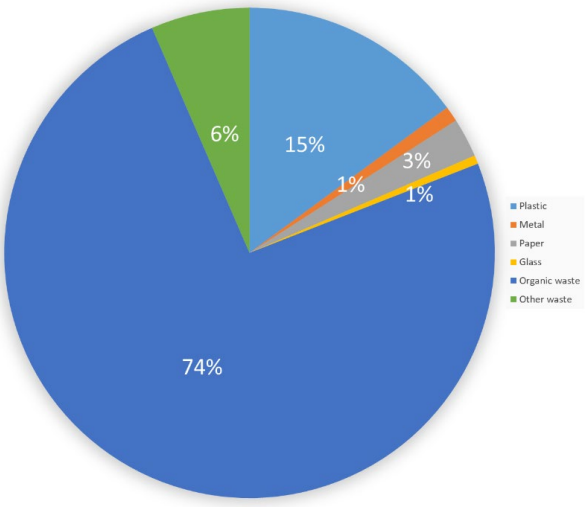


Figure 4. Waste composition by volume (Source: Waste Audit, December 2025)

Based on the audit results and extrapolation analysis, solid waste generated from tourism activities is about 27.24 tons/day (accounting for about 1% of the total solid waste). If only calculated in the tourism-concentrated areas of old Ninh Binh in 2024, this rate is about 2% (12.3 tons/day from tourism compared to 593 tons/day). By source, food and beverage service (F&B) establishments are one of the main waste-generating sources, accounting for 17.26% of the total solid waste volume generated by the tourism industry. Accommodation establishments account for approximately 69.78%, with most of the waste generated in accommodation services in the sub-3-star segment with about 63.51%.

Waste is generated primarily by tourists. In-depth interviews and observations at the audit sites showed that the proportion of local visitors accounted for less than 10% of visitors at the audited destinations and restaurants and almost 100% were tourists at hotels. The number of staff working at tourism service establishments accounts for approximately 1% of the total number of visitors. Therefore, this study will focus on analyzing the amount of waste generated from tourism activities in general, including groups of tourists and other components accompanying tourism services.

Each type of service has a different volume of solid waste generated per capita. Accommodation establishments generate the highest amount of waste per capita of about 0.71 kg/person/day, followed by restaurants and destinations. Each tourist staying overnight uses not only accommodation services but also other services such as sightseeing and dining at restaurants. Therefore, the total amount of waste generated per staying visitor is 1.08 kg/person/day, while the amount of waste generated by the group of non-staying visitors is 0.37 kg/person/day. Although a small portion of waste is generated from transport and tour activities, in this study we focus on the main emission groups above.

Table 7. Solid waste generated per capita at tourism service establishments from waste audits (kg/day)

STT	Type of Service	Staying visitors	Non-Staying visitors
1	Accommodation Service Establishments (Kg/person/day)	0.71	–
2	Attractions/public (Kg/person/day)	0.05	0.05
3	Food service establishments (Kg/person/day)	0.32	0.32
Total (Kg/person/day)		1.08	0.37

Thus, the volume of waste generated by tourists (both staying and non-staying) is approximately twice that generated by local residents (an average of 0.5 kg/person/day). Tourism activities generate approximately in Ninh Binh about 27.24 tons/day, equivalent to 20% of the total daily amount of solid waste in 6 communes and wards with high tourism density in Ninh Binh including Nam Hoa Lu Ward, Tay Hoa Lu Ward, and four communes includes Gia Van, Gia Tran, Gia Hoa, and Gia Hung (133.4 tons/day). In the old Ninh Binh, the amount of solid waste from tourism (12.3 tons/day) accounts for about 10% of the volume of these 6 communes and wards (according to statistics of the Department of Agriculture and Environment of Ninh Binh, 2025, and aggregate data, 2024).

With this situation, tourism-related waste poses a risk of overloading the local solid waste treatment system. According to a report by the Department of Agriculture and Environment of Ninh Binh, by 2025, the solid waste treatment plant in Trung Son ward, which receives most of the waste from the above communes, will be overloaded. While at the commune level, waste collection and treatment facilities are degraded and overloaded, leading to the risk of environmental pollution. In fact, there is still a leakage of plastic waste into the environment and great pressure for collection, recycling and treatment.

2.3.2. Current status of plastic waste generation in tourism activities

Volume of waste generated

The results of the waste audit show that plastic waste represents the largest share of non-biodegradable solid waste identified, accounting for 15% by weight and 36% by volume. In addition, waste such as metal, paper, and glass accounts for a low proportion of less than 3% in the waste composition. Staying visitors at 1-2 star hotels generates the highest amount of plastic waste per capita of about 0.1 kg/person/day and night. The 4-5 star hotels and tourist attractions generate the lowest amount of plastic waste of about 0.02 kg/person/day.

Table 8. Average volume of plastic waste generated by type of tourism service (kg/person/day)

Type of Service	Weight (kg) plastic waste/person/day and night
Restaurants	0.05
1-2 star hotels and homestays	0.10
3-star hotels	0.05
4-5 star hotels	0.02
Attractions	0.02

The 1-2 star hotels and homestays are also the largest group of tourist services in Ninh Binh. They accounted for 99% of the total number of accommodation service establishments. From the interpolation results, the amount of plastic accounts for not only 15% according to the audit results but can account for 18.5% of the total amount of waste generated (when taking into account the number of establishments) from tourism services in Ninh Binh.

The amount of plastic waste generated by tourists is 0.12 kg/person/day and the waste generated by non-staying visitors is about 0.07 kg/person/day. The total plastic waste generated per capita is generally 0.08 kg/person/day. When compared to WWF data, 2022 and 2024 show that the amount of plastic waste per capita of tourists is higher than that generated per capita by local people. This shows that tourists are still the main source of plastic waste, 30% higher than local people, increasing the risk of plastic waste pollution in particular and putting pressure on the solid waste management system in general in residential areas with tourist attractions.

Table 9. Volume of plastic waste generated per tourist (kg/day)

STT	Type of Service	Staying visitors	Non-Staying visitors
1	Accommodation Service Establishments (Kg/person/day)	0.06	–
2	Attractions/public (Kg/person/day)	0.02	0.02
3	Food service establishments (Kg/person/day)	0.05	0.05
Total (Kg/person)		0.12	0.07

Composition of plastic waste generated

In the composition of plastic waste generated from tourism facilities, PET plastic, drinking bottles, accounts for the largest proportion in volume with 38% (Figure below). The size of PET bottles observed is actually mostly 500ml bottles, the number of 350ml bottles accounts for a small proportion and 1.5 liter bottles accounts for a very small proportion. This reflects the common practice of using bottled drinking water when visiting tourist attractions in Ninh Binh. There are two main groups of plastics collected by the recycling purchasing unit, PET plastic and HDPE plastic, accounting for 39% of the total plastic waste generated.

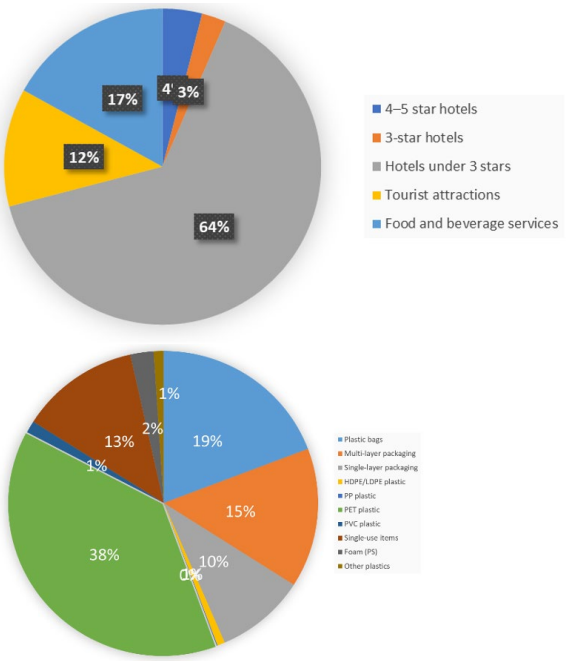


Figure 5. Composition of plastic waste by volume

The group of five types of plastic waste accounting for the highest proportion (table below) includes: PET, plastic bags, multi-layer plastic packaging, other SUPs and single-layer plastic packaging. In which, PET plastic is mainly drinking water and beverage bottles; plastic bags are soft PE plastic including grocery bags; single-layer and multi-layer plastic packaging mainly includes packaging of products such as confectionery, snacks, noodles and personal hygiene items such as shampoo and laundry detergent; disposables include single-use plastic cups, other single-use plastic products such as spoons, forks, single-use plastic personal utensils. This group of five types of plastic waste accounts for 94% by weight and 95% by volume of plastic waste discharged by tourism service establishments. This clearly reflects that the source of plastic generation

is mainly associated with drinking water, food and accommodation services.

Table 10. Top 5 types of plastic waste audited in Ninh Binh

STT	Plastic Type	Ratio to total plastic waste audited (%)
1	PET Plastic	38%
2	Plastic bags	19%
3	Multi-layer Plastic Packaging	15%
4	Other SUPs	13%
5	Single-layer plastic packaging	9%

There is a difference in the ratio of the five common types of plastics for different types of services. In the picture below, PET plastic mainly appears in tourist attractions, the rate far exceeds that of hotels and restaurants. In addition, restaurants are a type of use and generate at a relatively equal rate to all five common types of plastic waste, in which, plastic packaging (single and multi-layered) mainly arises in this type of service. At the hotels, plastic bags and PET are the two most popular types of plastics, which indicates that the hotels surveyed have not yet completely replaced drinking water bottle products in guest rooms with more environmentally friendly ones, and the use of plastic bags is still very popular.

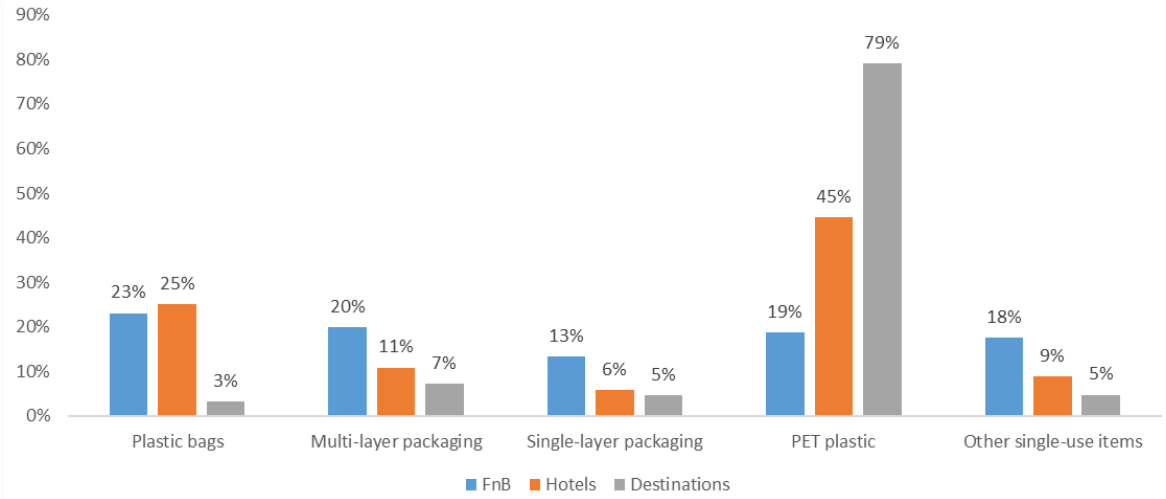


Figure 6. Generation rate of the top 5 types of plastic waste at different types of services (%)

When looking for the differences between the two typical types of tourism of Ninh Binh including nature tourism (such as Cuc Phuong National Park, Tam Coc - Bich Dong, Trang An) and spiritual tourism (such as Bai Dinh, Tam Chuc, Hoa Lu), it can be seen that the rate of generation of five types of plastic waste is relatively uniform in tourist areas with natural elements, while in the spiritual area, the main destinations generate a significantly higher amount of PET plastic waste than other types of plastic waste.

As for plastics, the obvious differences between types of services show the need for solutions to reduce plastic waste with a focus, tailored to each context (attractions, restaurants, hotels; nature and spiritual tourism), rather than applying the same model. Some suggestions from the audit results for the design of solutions and models for plastic waste reduction in Ninh Binh include:

- Consider solutions including policies and practical models for reducing PET waste at attractions;

- Promote alternatives to single-use plastic items, including plastic drinking water bottles and plastic bags, at hotels;
- Promote restaurant models to reduce plastic waste in Ninh Binh;
- Focus on supporting the plastic waste reduction model in small and medium-sized tourism enterprises, especially in the group with the highest plastic waste generation such as 1-2 star hotels.

2.3.3. Current status of plastic waste collection and treatment in tourism activities

Currently, the collection, transportation and treatment of plastic waste in particular and waste from tourism activities in general in Ninh Binh province are completely dependent on the infrastructure system for collecting, classifying and treating domestic waste. In the province, there are a number of popular forms of collection and transportation of domestic solid waste such as collection teams of communes and wards, units signing contracts with the commune People's Committees. As of 2025, in the province, there are 49 organizations and individuals participating in the collection and transportation of domestic solid waste, including 07 public business units, 34 enterprises, cooperatives and 08 individuals. In addition, there are 109 collection and transportation teams managed by the People's Committees of communes and wards participating in the collection and transportation of domestic solid waste, of which 60 teams collect domestic solid waste from households to gathering points and transfer it to transporting units (Department of Agriculture and Environment of Ninh Binh, 2025).

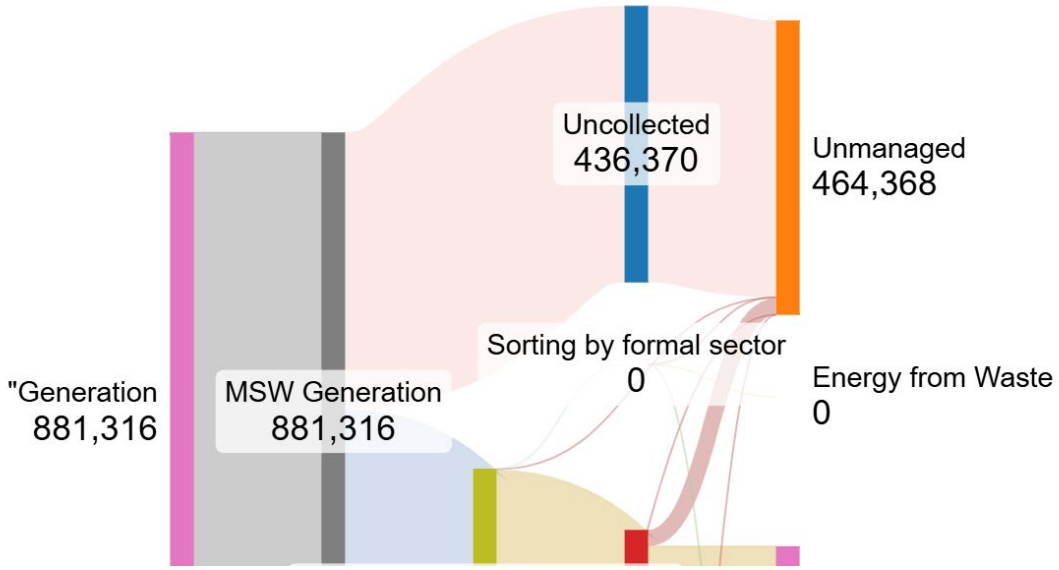


Figure 7. Diagram of waste flows collected, transported and treated from tourism service establishments in Ninh Binh

Characteristics of waste generation:

For all types of restaurants and hotels, waste is mainly generated from kitchens, rooms and receptions. Especially for 3-star hotels or higher, there are separate events and restaurants in the hotel. According to the survey results, only a small number of 4-5 star hotels comply well with the regulations on classifying waste into 3 types. However, the collection is still through the environmental unit, so it is difficult for them to link with the collection unit after classification. While for 1-2 star hotels and homestays, waste is mainly collected at households.

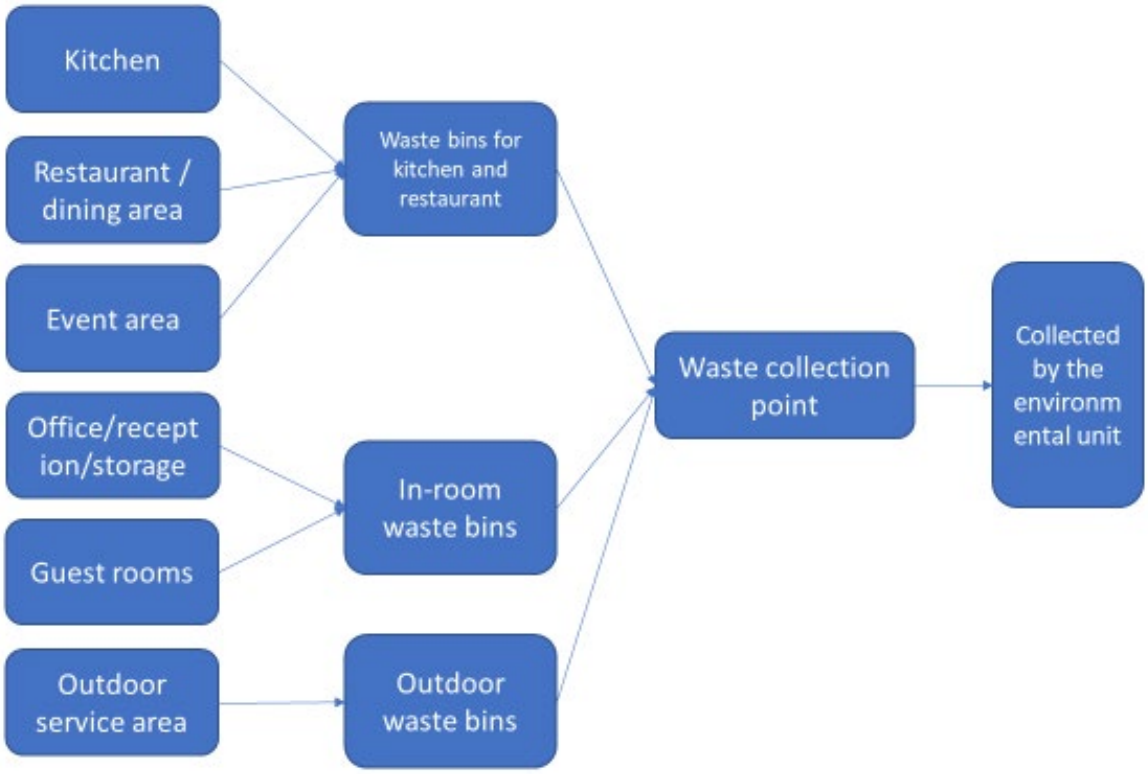


Figure 8. Internal waste collection diagram of a 3-star hotel in Ninh Binh

For tourist attractions surveyed in Ninh Binh including: Trang An - Bai Dinh, Tam Coc - Bich Dong, Hoa Lu Ancient Town, Cuc Phuong National Park, Thien Ha Cave, Van Long Wetland in communes and wards including Tay Hoa Lu Ward, Nam Hoa Lu Ward, Cuc Phuong Commune, Gia Van Commune. These areas will be collected and treated at the Ninh Binh Solid Waste Treatment Plant.

According to Mr. Ha Huy Loi, Director of Thien Ha Cave eco-tourism area: "Solid waste and plastic waste in tourism activities are still collected together with domestic solid waste and managed by the Ward People's Committee. However, although managers have very good expertise in other industries, they do not have expertise in tourism, so it will be difficult to know how and come up with appropriate waste management solutions for tourism."

Current status of collection and treatment

In fact, domestic solid waste (including domestic solid waste, non-recycled plastics and a small part of recycled plastic) is stored in waste bins or collection points of tourist establishments, then the environmental unit uses specialized vehicles to transport it to treatment plants for landfilling or incineration. For example, in the Cuc Phuong National Park area, the frequency of collection varies according to the seasons: the peak season (April - September) is about once per week, the low season is about once every two weeks. For waste that can be reused and recycled after being sorted and cleaned at households or domestic solid waste treatment facilities, it shall be transferred to informal waste collectors and scrap trading establishments for further classification and transfer to recycling establishments.

Recycling status

According to the results of in-depth interviews with informal collectors, scrap collection aggregators and environmental units, the current situation of plastic waste collection in tourism activities is quite similar to that of ordinary domestic waste collection. Valuable plastics such as PET bottles are sorted separately by facility staff or collectors to be sold to informal recyclers or scrap collectors. In addition to the official collection system, the informal group is very busy, especially in local tourist destinations due to the characteristics of generating waste that is easy to collect and recycle such as PET plastic (plastic bottles), metal (beer cans). These collectors resell the materials to scrap aggregation facilities. From these aggregators, plastic is accumulated (several tons per month) and transported to recycling plants in other provinces such as Thai Nguyen and Hai Phong to produce plastic pellets.

Supporting infrastructure

A number of key tourist areas in Ninh Binh have implemented measures to collect garbage at destinations such as Trang An and Van Long. However, the majority of waste is still unsorted at the source. In Trang An, Tam Coc - Bich Dong, Van Long, waste is still disposed of in mixed waste bins, while in the area of the road to Hoa Lu Ancient Capital, the collection infrastructure has deteriorated, and the waste bins are overloaded. This shows that the garbage sorting infrastructure is still limited and uneven among tourist attractions. In addition, a number of other points have been added to the infrastructure to support the reduction of plastic waste. For example, Thung Nham Tourist Area has invested in a pure water filtration system, with a capacity of 500 m^3/day, enough to meet the needs of tourists without the need for plastic bottled water. Or as in Trang An, the management board of Trang An tourist area has issued a regulation not allowing tourists and service providers to use single-use plastic bottles on the premises. However, these spots are quite specifically managed by businesses and have support from GEF's project while other tourist attractions receive relatively limited institutional and financial support.

2.3.4. Plastic waste flow analysis: generation – collection and loss to the environment

Of the total waste generated from tourism activities (27.24 tons per day), plastic waste accounts for approximately 18.5%, equivalent to 5.04 tons per day. Plastic waste is generated primarily by two major groups: overnight visitors and same-day visitors. It is collected by local waste collection units as well as informal waste collectors.

According to the results of the Waste Flow Diagram (WFD) analysis, approximately 47% of the recovered plastic waste consists of high-value recyclable plastics, primarily PET and HDPE. Conventional plastic waste is sorted by facility staff and subsequently transferred to collection teams. A portion of the recyclable plastic waste generated by tourism service establishments is collected by the informal sector, while the remainder is handled by local environmental service units. However, the majority of plastic waste is still treated through landfilling or incineration under the existing waste management system currently operating in Ninh Binh Province.

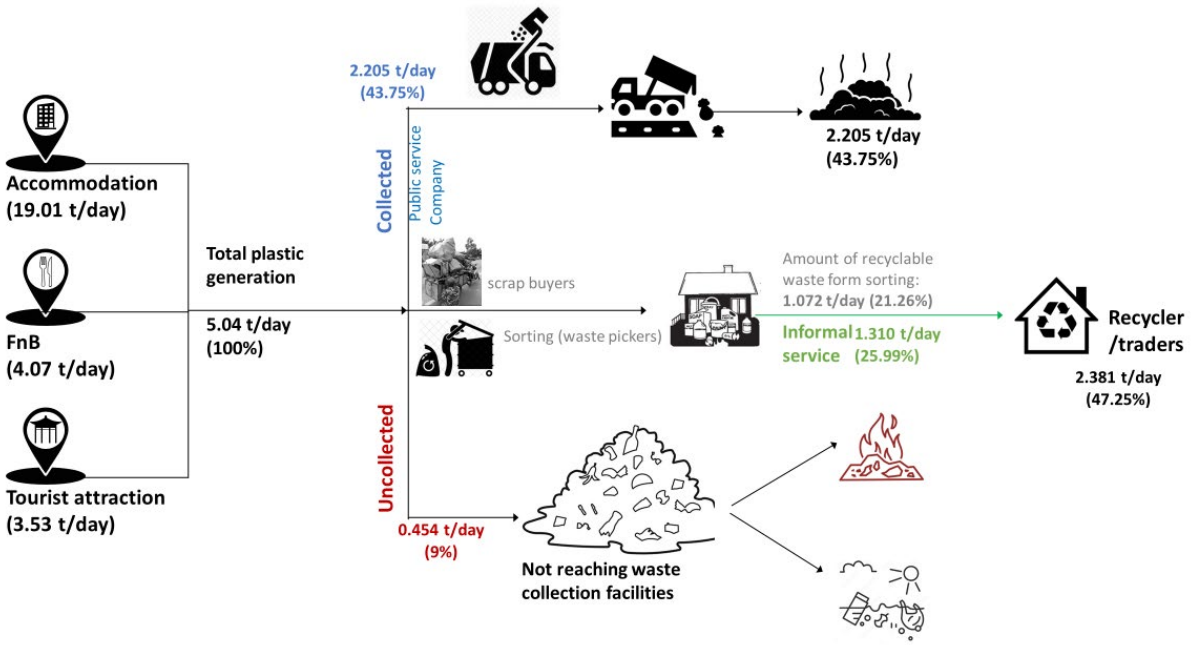


Figure 9. Pathways of plastic waste in tourism

The proportion of recyclable waste transferred is distributed as follows: 55% to the informal sector and 45% to the formal sector. On average, approximately 1.31 tons per day are collected by the informal sector. An additional 1.07 tons per day are collected by formal collection units, separated at waste generation points within the tourism area.

Plastic Waste Leakage (Sources, Volume, and Main Material Types)

Based on the results of in-depth surveys and interviews, plastic waste leakage from tourism activities in Ninh Binh arises from several key sources:

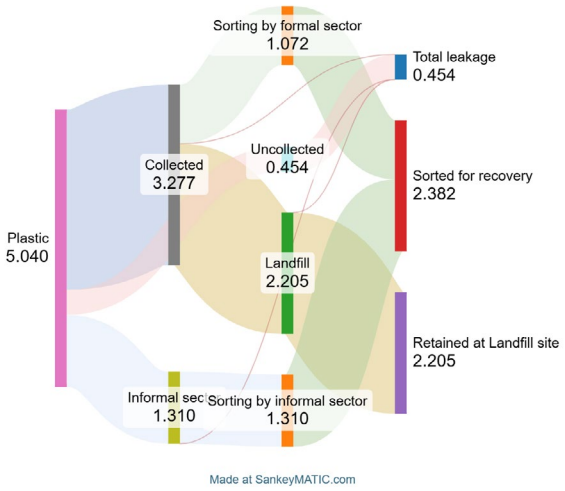
- Leakage from the portion of solid waste that is generated but not collected.
- Leakage originating from tourist attractions with ineffective waste management systems.
- Leakage from spontaneous or unregulated tourism activities that operate outside formal travel systems and licensed tour operators.
- Leakage resulting from limited awareness among tourists and tourism service providers regarding proper waste management practices.

The majority of plastic waste leakage into the environment occurs due to gaps in the formal collection system during tourism activities. Similar to the rural waste collection rate in Ninh Binh (approximately 91%), it is estimated that around 9% of the total plastic waste generated from tourism is not collected and therefore leaks into the environment. This corresponds to approximately 0.45 tons per day. This volume of leaked plastic represents about 2% of the total solid waste generated from tourism activities in Ninh Binh.

The main types of plastic waste that leak into the environment include plastic bags, single- and multi-layer packaging, and smaller quantities of single-use cups. According to the business survey results, 95% of business representatives indicated that plastic waste leakage is primarily caused by tourists, while the remaining cases are attributed to overloaded public waste bins. These findings are partially supported by field observations and photographic evidence collected during site visits.

Although the volume of plastic waste leakage is relatively small, it negatively affects the tourism image of Ninh Binh. Plastic waste can be observed along tourist routes and around key attractions. In some locations, waste overflows from collection points and is dispersed by wind and surface water currents. Part of this leaked waste enters surrounding natural areas, affecting landscape quality—for example, in the Van Long lagoon wharf area—while some accumulates around public waste bins before being scattered by wind and surface runoff. Despite representing a limited proportion of total waste, this visible leakage has a disproportionate negative impact on the environmental aesthetics and overall tourism image of Ninh Binh.

Figure 10. Diagram of plastic waste flow in tourism in Ninh Binh province (tons/day)



2.3.5. Knowledge, attitudes and practices of businesses and tourists

2.3.5.1. Knowledge, attitudes and practices of businesses

The survey was conducted with 133 businesses and households providing various types of tourism services in Ninh Binh, including 44 accommodation establishments ranging from homestays to hotels rated three stars and above. Among the respondents, 93% were enterprises or micro-business households. In terms of customer profile, 59% primarily served domestic tourists, 20% focused mainly on international visitors, and 21% served both domestic and international tourists.

Knowledge of SUPs

The survey results indicate a high level of corporate awareness regarding the impacts of plastic pollution. On a Likert scale from 1 to 5, the average scores ranged from high to very high. Specifically, the level of understanding of SUPs reached 4.1/5, while overall awareness of plastic pollution scored above 4.2/5. However, respondents demonstrated comparatively lower levels of understanding regarding the indirect impacts of plastic pollution, particularly its effects on ecosystems, waste leakage pathways into the environment, and implications for sustainable tourism.

However, awareness of relevant policies remains limited, particularly regarding government decrees on restricting SUPs in the hospitality sector, including hotels and restaurants, as well as national targets for reducing marine plastic waste. Among the surveyed restaurants, 66% reported that they were unaware of or did not understand regulations related to the reduction and prohibition of single-use plastic products. Policy awareness was even lower among smaller accommodation providers: 84% of 1–2 star hotels and homestays indicated that they did not understand these regulations. Similarly, 80% of grocery shop respondents lacked knowledge of the relevant policies. In addition, the interviewed businesses reported limited access to information on sustainable tourism and green tourism initiatives aimed at reducing plastic waste.

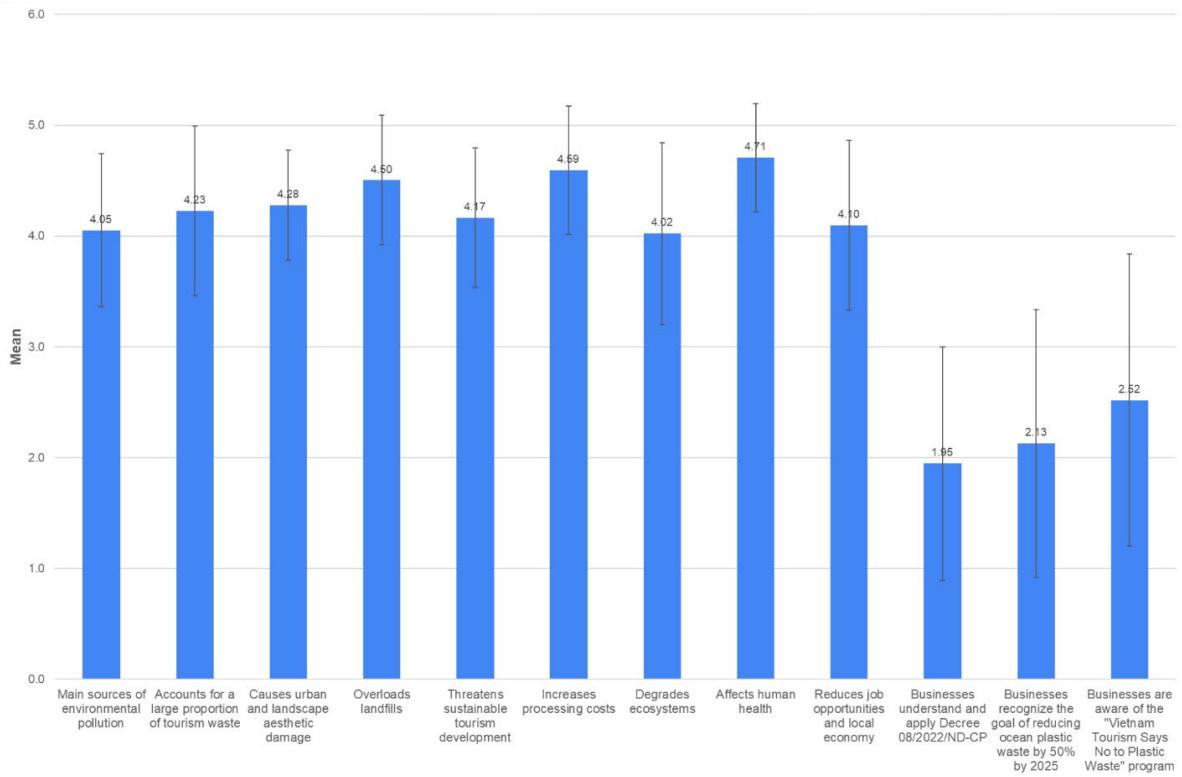


Figure 11. Knowledge of disposable plastics

Approximately 95% of surveyed businesses and business households provide single-use plastic products, of which, more than 85% provide common SUPs such as PET bottles, plastic bags, foam boxes, and water cups. For example, regarding PET bottles, 43% of respondents use more than 500 plastic bottles per month; notably, approximately 7.5% use more than 2,001 products per month, equivalent to 67 PET plastic products per day.

Attitudes towards plastic reduction and green transition

In addition to providing plastic products, businesses and business households have limited demand for green transformation. Although 51% of businesses expressed support for the green transition, 92% of respondents had not yet taken any concrete actions towards it. Demand for switching to environmentally friendly products or providing reusable items remains low, which may be attributed to barriers such as limited access to information, insufficient investment capacity, and a lack of suitable alternative products.

Businesses have not been proactive in informing customers and employees about the use of single-use plastic products. The results of the survey showed that the score was only low (2.1 – 2.6) on the Likert scale in terms of front-desk guidance for customers and staff training on plastic reduction. This indicates a general lack of engagement among businesses and business households with single-use plastic issues, particularly within tourism activities in Ninh Binh.

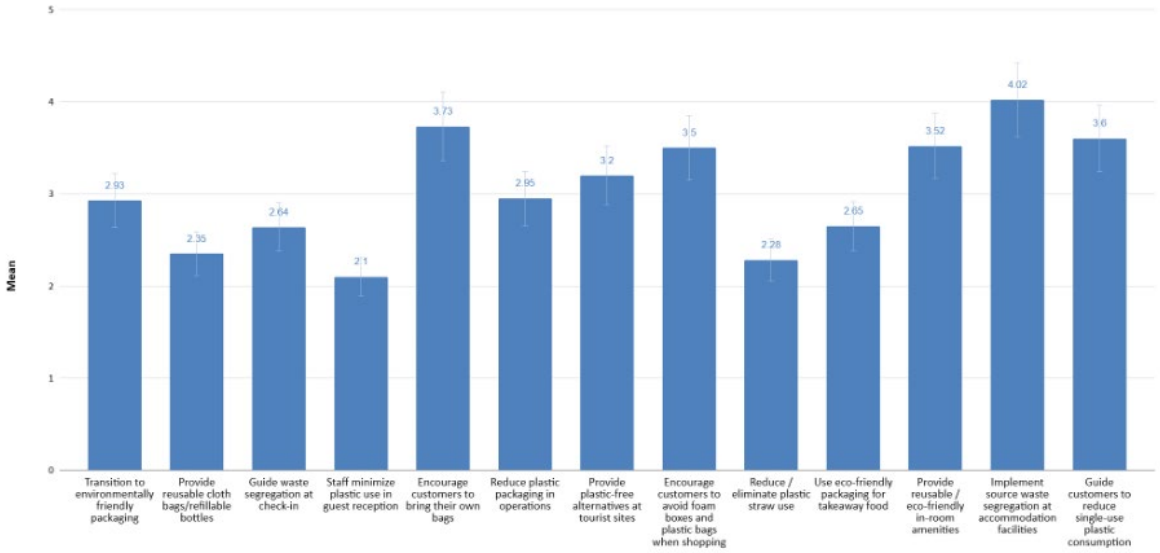


Figure 12. Attitudes of businesses towards plastic reduction and green transition

At tourist attractions, the management and control of single-use plastic consumption remain limited. Although some businesses have begun introducing alternative products and recommending reduced use of SUPs, implementation is still modest. Across attractions, catering services, and hotels, efforts to limit SUPs are applied only to a limited extent. These measures primarily include the provision of more environmentally friendly amenities, such as biodegradable toothbrushes and combs, rather than comprehensive reduction strategies.

Green transition needs and barriers

Despite expressing appreciation for government policy support and demonstrating initial awareness of the benefits of green transformation, businesses rated their overall readiness for green transition at a moderate level. The primary barrier identified by businesses is the convenience of SUPs, cited by 87% of respondents. In addition, 53% highlighted the high cost of alternative products as a significant obstacle, while 30% pointed to challenges related to changing established consumption and operational habits. To promote green transition, businesses showed strong consensus (average scores ranging from 4.2 to 4.6 on a 5-point scale) regarding the need for supportive measures. These include tax reductions, financial subsidies, and participation in programs and training initiatives related to green transformation in tourism activities in Ninh Binh.

2.3.5.2. Knowledge, attitudes and practices of tourists

Overall Perception of Plastic Pollution

The results of the KAP (Knowledge, Attitudes, and Practices) survey conducted with 103 domestic and international tourists in Ninh Binh indicate a high level of awareness regarding plastic pollution and its health impacts, with an average score of 4.4/5 on the Likert scale. However, knowledge of relevant policies and actual waste segregation practices remain limited.

Plastic usage behavior

In practice, up to 72% of surveyed tourists reported using more than three plastic water bottles or other disposable items per day while visiting Ninh Binh. Among them, international tourists demonstrated higher consumption levels, with 68% using more than three water bottles per day, compared to 27% of domestic tourists. These findings are consistent with the study by Nguyen Trung Thang et al. (2025), which reported an average consumption rate of 3.64 bottles per visitor per day.

Table 11. Consumption of plastic bottle products by tourist group

Visitor Groups	>3 products/ day	<3 products/ day	Total
Domestic Visitors	27%	73%	100%
International Visitors	72%	28%	100%

Tourists' attitudes toward plastic use

In addition, tourists' practical behaviors related to reducing SUPs remain limited. This includes low levels of reusable water bottle use, inconsistent waste segregation, and limited efforts to avoid single-use plastic products. Furthermore, the majority of tourists consider shopping to be an essential part of their travel experience, which may contribute to additional plastic consumption. A positive finding is that tourists in Ninh Binh generally demonstrate good compliance with proper waste disposal, with most respondents reporting that they dispose of waste in designated bins. Regarding financial support for environmental initiatives, all surveyed tourists expressed some level of willingness to pay, with 67% indicating agreement. Among them, 53% were willing to pay an additional amount of less than 5% of the total service cost of their trip.

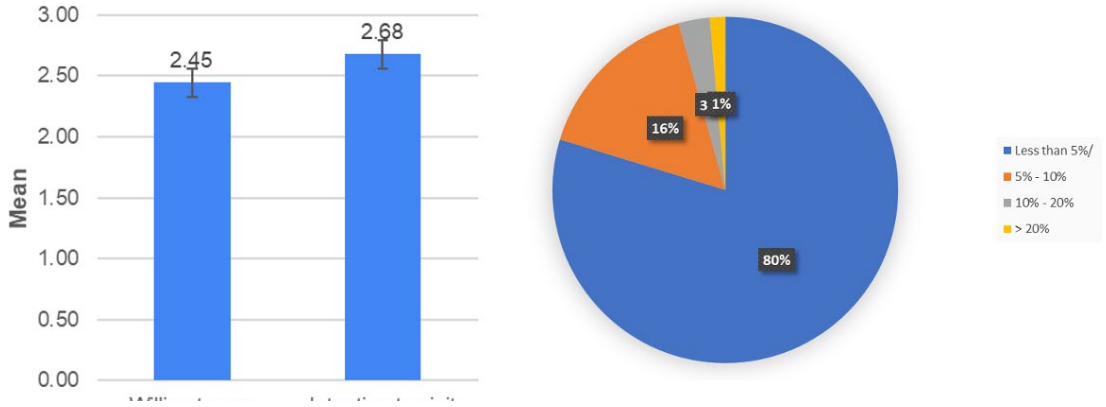


Figure 13. Willingness to pay for solutions to reduce plastic pollution

2.3.6. Cost of Inaction (COI) Analysis

Plastic waste pollution is generating a significant cost of inaction (COI) for Ninh Binh's tourism sector, estimated at approximately VND 606.74 billion per year—equivalent to around 3% of the province's total tourism revenue. The COI assessment comprises three main categories of damage: (i) direct economic losses, (ii) environmental degradation costs, and (iii) tourism brand and reputation loss.

Estimated Direct Economic Loss

Direct economic losses are estimated at approximately VND 37.5 billion per year (equivalent to about 0.18% of total tourism revenue). These losses are primarily driven by waste collection costs (approximately VND 28.45 billion per year) and additional labor expenses (around VND 7.15 billion per year), as well as expenditures related to drainage system repairs and supplementary cleaning services. This reflects the growing operational burden placed on tourism businesses, particularly in eco-river tourism areas, where waste management demands are higher due to environmental sensitivity and visitor concentration.

Estimated Environmental Damage

Based on audit data, approximately 409 tons of plastic waste are generated annually from tourism activities, of which around 146 tons are estimated to leak into the environment. The total treatment cost for this volume is estimated at approximately VND 129 million per year. Using emission factors (tons of CO_2 per ton of plastic) derived from the study on the climate impact of virgin plastic production published by Lawrence Berkeley National Laboratory (Karali et

al., 2024), total associated emissions are estimated at approximately 2.6 million tons of CO_2 per year. PET bottles and SUPs account for the largest share of these emissions. Although environmental damage represents a relatively small proportion of the total COI in monetary terms, its impacts are long-term and cumulative, including water pollution, ecosystem degradation, and biodiversity loss.

Estimated Brand and Reputation Loss

Brand and reputation loss constitutes the largest component of total damages, estimated at approximately VND 569.18 billion per year (accounting for about 93.8% of total COI). With a tourism scale of approximately 19.4 million visitors and total annual revenue of around VND 21,238 billion (Ninh Binh Statistics Sub-Department, 2025), even a modest 5% decline in visitor numbers or spending due to destination image deterioration linked to plastic pollution could generate substantial economic losses—particularly among international visitors, who are generally more sensitive to environmental quality.

Overall, the Cost of Inaction (COI) analysis demonstrates that plastic waste pollution is not merely an environmental issue but a strategic economic risk for Ninh Binh's tourism industry. While direct economic and environmental losses may be partially mitigated through short-term management and operational measures, brand and reputation losses pose a far more significant threat. These losses reflect the risk of long-term erosion of destination competitiveness if timely, coordinated, and systemic interventions are not implemented.

2.3.7. Potential initiatives to improve the situation of plastic waste management

In Ninh Binh, initiatives enhancing plastic reduction and tourism-related waste management have been implemented across community businesses and destination groups, creating conditions for building up the provincial "Green Tourism" model. Another label, "Green House" for residential areas in core heritage areas not only contributes to collecting and recycling plastics and cleaning the landscape, but also creates a fund to support disadvantaged communities, thereby associating environmental protection with humanistic values. Regarding tourism enterprises, facilities such as eco-resorts have invested in single-use plastic replacement systems and waste separation at source, showing effectiveness when there is a long-term strategy and the right infrastructure. In addition, at major destinations such as Tam Coc – Bich Dong and Thien Ha Cave (Galaxy Grotto), local communities and site management companies play a key role through direct monitoring mechanisms, behavior-oriented infrastructure design and pressure from the tourism supply chain. Meanwhile, the eco-tourism model associated with agriculture in Thung Nham opens up a circular economy approach, connecting production – consumption, and on-site experience. Overall, these examples show that effective plastic reduction in tourism requires three elements working together: infrastructure investment, active community involvement, and strong commitment from businesses. Details of initiatives and models are in Appendix 7.

2.4. Assessment of Plastic Waste Generation and Management — Da Nang City

2.4.1. Current status of solid waste generation

Statistical data on MSW generation in Da Nang for the period 2019–2025 reveals a clear correlation between tourist arrivals and total MSW generation. When tourism peaked in 2019, MSW generation was at a high level; the COVID-19-induced decline period (2020–2021) coincided with a sharp drop in MSW; and from 2022 to 2025, as tourism recovered rapidly, MSW generation increased at a commensurate rate. This confirms that tourism is not only the leading economic sector but also a source of MSW generation with systemic implications for urban environmental infrastructure. Seasonal analysis shows that MSW increases significantly during peak tourism months (February and September), reflecting the 'seasonal surge' characteristic of tourism cities, which places considerable strain on collection infrastructure (Figure 14).

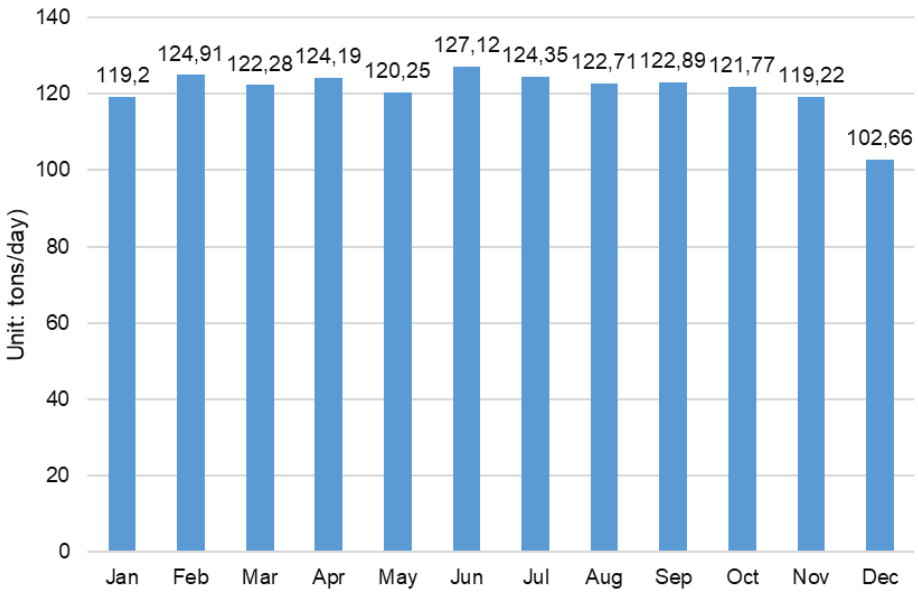


Figure 14. Volume of solid waste generated in the tourism industry by month in 2024 (unit: tons/day)

Research results indicate that MSW generated by tourism sector activities accounts for approximately 5.95% of Da Nang City's total domestic solid waste. Analysis by source shows that food and beverage (F&B) service establishments are the largest waste generator, accounting for 53% of total MSW generated by the tourism sector. Accommodation facilities follow, accounting for approximately 44.21%, with generation concentrated primarily at 4–5 star facilities. This reflects the relationship between service amenity standards, operational standards, and per-guest MSW generation rates. Research by Pham Phu Song Toan et al. (2018) conducted in former Hoi An City also found that larger hotels generate proportionally higher waste.

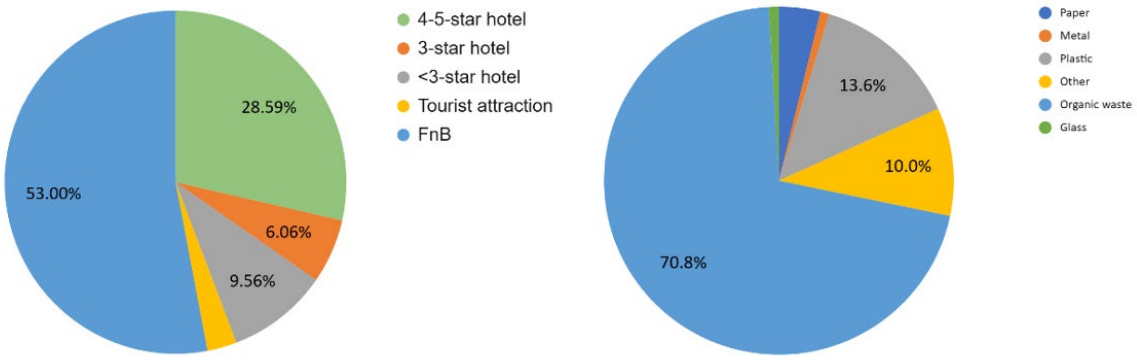


Figure 15. Ratio of the volume of solid waste generated (left) and the composition of solid waste in the tourism service sector (right)

Results show that per capita MSW generation for overnight tourists is 2.01 kg/person/day, with F&B services identified as the primary emission source, accounting for over half of total generation. Comparing this with the per capita domestic solid waste generation rate in Da Nang (0.93 kg/person/day) shows that tourist MSW generation is 2.2 times higher than that of local residents — reflecting the convenience-driven, high-packaging consumption model inherent to the tourism economy.

Table 12. Volume of solid waste per capita of tourists (unit: kg/person/day)

#	Tourism services	Staying visitors	Non-Staying Guests	Rate of Solid Waste per capita/ day Da Nang
1	Accommodation Service Establishments (Kg/person/day)	0.83	–	–
2	Attractions/public (Kg/person/day)	0.06	0.06	–
3	Food service establishments (Kg/person/day)	1.12	1.12	–
	TOTAL (Kg/ person/day)	2.01	1.18	0.93

2.4.2. Current status of plastic waste generation

According to survey results, the total volume of plastic waste generated by tourism activities in Da Nang City is estimated at approximately 15.98 tonnes per day, accounting for 13.56% of total solid waste from the tourism sector. On a per-visitor basis, plastic waste generation for overnight tourists is approximately 0.27 kg/day/person, while day visitors generate only 0.13 kg/day/person (Table 13). Overnight tourists therefore generate more than twice the plastic waste of day visitors. This disparity reflects the plastic consumption patterns associated with accommodation-based activities (bottled beverages, room amenities, individual packaging), in addition to food and beverage consumption.

By source of generation, accommodation facilities (0.14 kg/person/day) and F&B service establishments (0.12 kg/person/day) are the two primary generation points, while tourist attractions and public spaces contribute at very low levels (0.01 kg/person/day). This indicates that plastic waste in tourism is not evenly distributed but is concentrated primarily at direct service consumption spaces.

Compared with previous studies, plastic waste generation per tourist in Da Nang is lower than that recorded in Sam Son (approximately 0.4 kg/person/day), yet remains noteworthy relative to the average generation rate of local residents (0.16 kg/person/day). Specifically, overnight tourists generate approximately 1.7 times more plastic waste than Da Nang residents, while day visitors generate less. These results confirm that overnight tourists are the priority target group for plastic waste minimisation strategies, particularly through direct interventions at accommodation facilities and F&B establishments.

Table 13. Per capita plastic waste generation by tourist type (kg/day)

#	Tourism services	Staying visitors	Non-Staying Guests	Per capita plastic waste volume of Da Nang people
1	Accommodation Service Establishments (Kg/person/day)	0.14	–	–
2	Attractions/public (Kg/person/day)	0.01	0.01	–
3	Food service establishments (Kg/person/day)	0.12	0.12	–
	TOTAL (Kg/ person/day)	0.27	0.13	0.16

By generation source, accommodation facilities account for the largest share of plastic waste at approximately 54.19%, followed by F&B establishments at 42.8%. In terms of composition, SUPs and plastic bags represent the dominant fraction at approximately 23.7% — encompassing straws, cups, cutlery, single-use food containers, and comparable disposable items routinely used at restaurants, beverage outlets, tourist attractions, and take-away services. PET bottles rank second at 16.2%, driven primarily by packaged drinking water and ready-to-drink beverages consumed by tourists (Figure 16). These findings reflect the relationship between service amenity standards, tourist consumption behaviour, and plastic waste intensity — particularly at accommodation facilities and F&B establishments where high service frequency and routine reliance on SUPs drive disproportionately high generation rates.

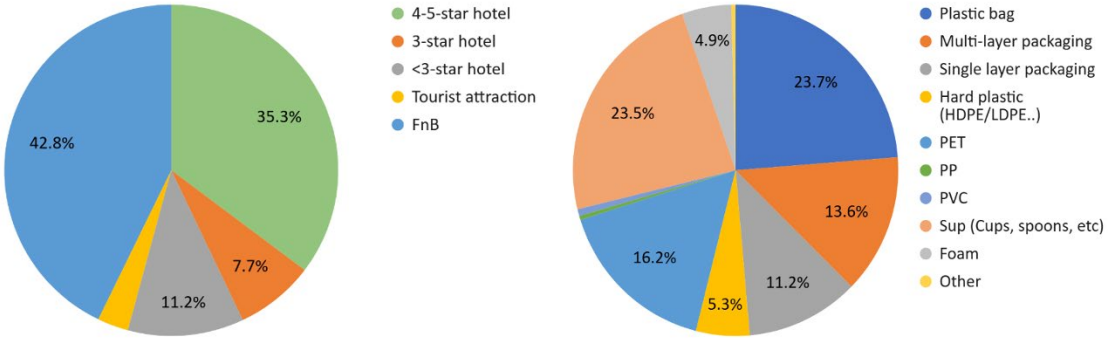


Figure 16. Ratio of sources of plastic waste generation (left) and plastic waste composition in the tourism industry (right)

2.4.3. Current status of plastic waste collection and treatment in tourism activities

Plastic waste generated from tourism activities is concentrated primarily at two source groups: (i) accommodation and F&B facilities; and (ii) tourist attractions and public areas. At these sources, source segregation has been implemented to a certain degree, with high-value recyclable plastics (PET, HDPE) typically separated from residual plastic fractions.

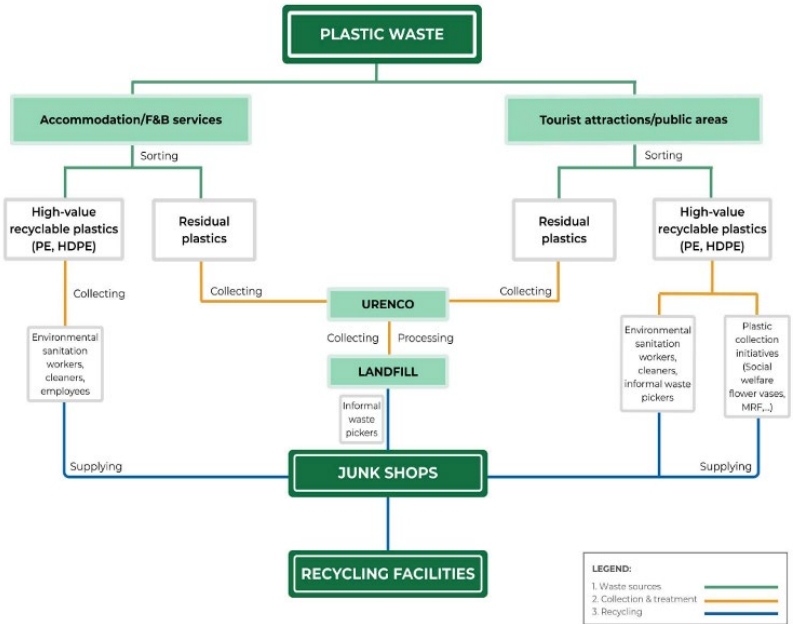


Figure 17. Domestic solid waste collection diagram

Characteristics of collection at the source: At hotels (3-star and above) and large restaurants, internal collection procedures are relatively well-defined — waste is collected from guest rooms, kitchens, and restaurants to temporary storage points by floor or functional area, before being transferred to the facility's centralised waste storage area. At these facilities, high-value recyclable plastics are typically separated proactively by housekeeping and sanitation staff for sale to scrap dealers. In contrast, at smaller establishments (guesthouses, small eateries, and small-scale services), source segregation is almost entirely absent; any recyclable plastic separation that does occur typically takes place at waste collection points, performed by itinerant waste buyers or environmental sanitation workers. At tourist attractions and public spaces, community-led initiatives by the Women's Union — including 'Green Houses', 'Social Welfare Flower Vases' (community-based plastic collection points), and MRF pilot stations — have established dedicated collection points for recyclable plastics; however, their coverage remains limited and contingent on sustained community engagement.

Current collection status: Following internal storage, plastic waste is collected together with domestic solid waste. Currently, urban collection and transport operations are carried out by 6 specialist units on a daily basis, using four primary collection modalities: (1) fixed waste bin collection on main roads with compactor trucks; (2) three-wheeled vehicle collection in alleys and lanes, transported to transfer stations before compaction using hooklift trucks; (3) small truck collection of waste bags placed directly in front of establishments on minor roads; and (4) direct compactor truck collection from large-volume waste generators under contract and along urban routes. To optimise collection routes and reduce transport time and costs, Da Nang City has deployed multiple modern waste transfer stations to improve MSW management efficiency and minimise environmental impact. The collection rate is consistently maintained at high levels: 99% in urban areas (former Da Nang) and approximately 98.5% (former Quang Nam).

Recycling status (for high-value plastics): Itinerant waste collectors, informal labour, and a portion of environmental sanitation workers play an important role in recovering recyclable-value plastics from the mixed waste stream. This collection occurs at tourism facility storage areas, public waste collection points, transfer stations, and even at landfill sites. Recovered plastics are sold to scrap dealers, further baled or processed into plastic pellets locally, before being transferred to recycling facilities in other provinces for remanufacturing.

Current treatment status: Plastic waste not recovered for recycling is transported with domestic waste to solid waste treatment facilities and is primarily treated by sanitary landfilling. Although this is a low-cost and common solution, available land for landfilling is progressively diminishing, increasing pressure on the existing treatment system.

Recyclable plastic recovery remains largely ad hoc, driven by individual facility initiative and the informal sector rather than any systematic mechanism. As a result, the majority of low-value and contaminated plastics enter the residual waste stream and are ultimately directed to landfill — leaving the actual recycling rate well below the sector's recoverable potential.

2.4.4. Plastic waste flow analysis

Plastic waste flow analysis results indicate that the formal collection system (URENCO) currently collects approximately 13.87 tonnes of plastic waste per day, equivalent to 86.8% of total generated plastic waste. The informal sector (itinerant waste collectors and waste pickers) participates in collecting approximately 1.99 tonnes/day, accounting for 12.45%. However, approximately 0.12 tonnes of plastic waste per day (0.75%) remains uncollected, fails to access the waste collection system, and is at risk of direct leakage to the natural environment — particularly in coastal areas and unplanned outdoor tourist sites.

Analysis of post-collection treatment flows shows that the majority of collected plastic waste continues

to be directed to landfilling, at approximately 13.57 tonnes/day. This reflects the limited effectiveness of plastic waste recovery and recycling in the tourism sector, despite the participation of both the formal and informal sectors in the collection process.

Field surveys show that urban environmental sanitation workers, accommodation/F&B facility staff, and informal sector actors focus primarily on collecting high-value plastic waste streams such as PET and HDPE bottles. Conversely, low-value plastic streams such as plastic bags and SUPs receive almost no priority segregation or source collection. Recovery of these plastic streams is recorded only on a limited scale, primarily at the Khanh Son solid waste treatment facility, where informal collectors re-sort from mixed waste after collection. Total plastic waste collected at this facility is estimated at approximately 1.63 tonnes/day.

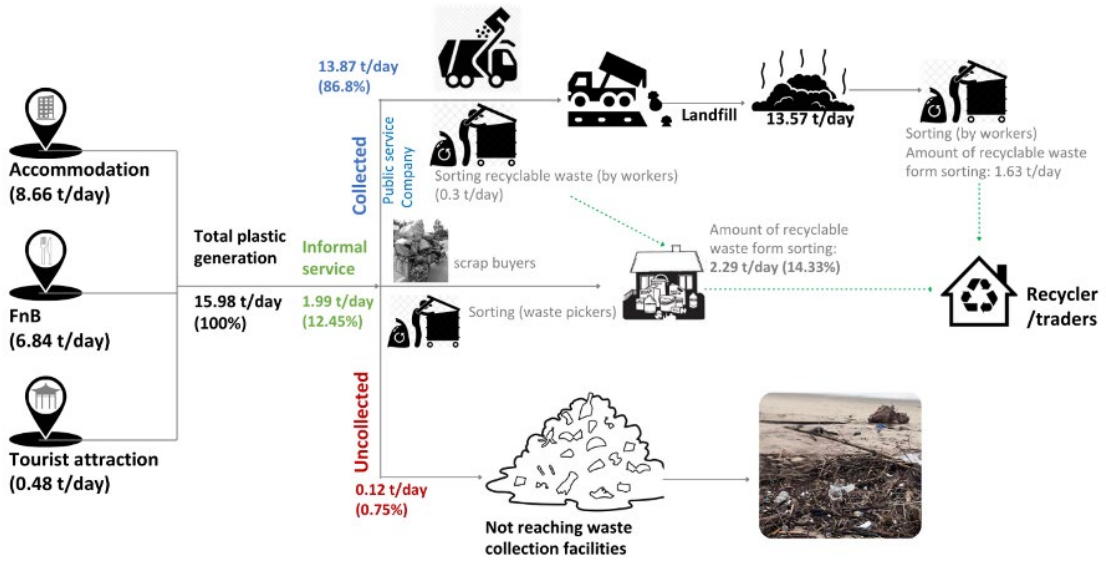


Figure 18. Analysis of plastic waste streams in the tourism industry (tons/day)

Plastic Waste Leakage: Pathways (Source, Volume, and Main Material Types)

According to the results generated by the Waste Flow Diagram (WFD) tool, the plastic collection and recycling rate within the tourism sector is estimated at 14.33% (approximately 836 tons per year) and the environmental leakage rate is 0.75% (43.8 tonnes/year) (Figure 19).

The majority of plastic waste leaking to the environment is found primarily in long-standing water systems such as rivers and lakes (52.7% of total leaked plastic waste) and exists as surface terrestrial litter (29.72% of total leaked plastic waste). These findings confirm that inland and coastal water bodies constitute the predominant sink for plastic leakage within the tourism waste stream.

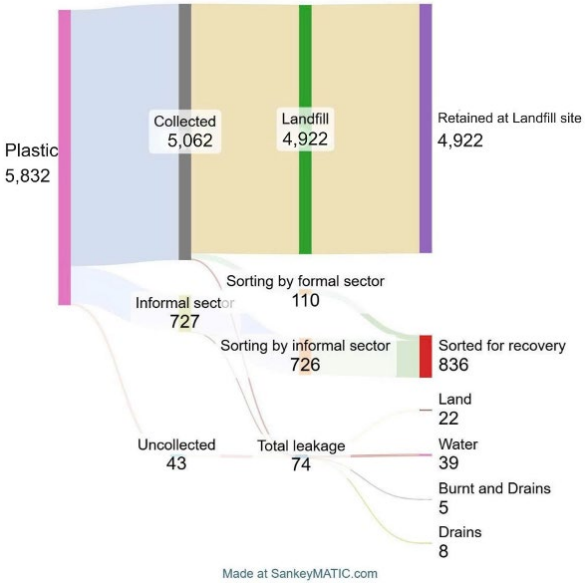


Figure 19. Plastic waste flow diagram in Da Nang City (tons/year)

(Source: Compiled from survey data of this study)

The flow diagram shows that plastic waste leakage is primarily associated with open-space, unplanned, and difficult-to-control tourism service activities, including F&B services, take-away food sales, and outdoor recreation and entertainment activities at public spaces. Unlike large accommodation facilities, these generation sources typically lack source segregation mechanisms and appropriate collection systems, increasing the likelihood of plastic waste being abandoned or dispersing to the environment prior to collection.

High-value plastics — notably PET and HDPE — are collected and recovered at relatively high rates, driven by active informal sector participation. Conversely, the leakage stream is dominated by low-value, difficult-to-recycle materials, including plastic bags, SUPs, and multi-layer packaging, which tend to accumulate in aquatic and coastal environments.

Field evidence from a USAID-funded LSPP project supports this pattern. In September 2022, GreenHub conducted solid waste composition monitoring at Tho Quang Ward beach — a high-density coastal tourism zone subject to direct exposure to wind, wave, and tidal forces. Analysis revealed that plastic bags and multi-layer packaging accounted for the largest share of leaked plastic waste at approximately 24%, followed by plastic fishing gear (nets and fishing lines) at around 15%, with single-use plastic items and plastic fragments each comprising approximately 8%.

These results are consistent with the broader plastic waste flow analysis for the tourism sector, confirming that low-value, lightweight, and readily dispersed plastics — systematically deprioritised in collection operations — carry the greatest risk of environmental leakage.

2.4.5. Knowledge, Attitudes and Practices (KAP) of businesses and tourists

The KAP survey was conducted with 125 tourism enterprises and 113 tourists in Da Nang to assess levels of knowledge, attitudes, and practices related to single-use plastic reduction and green transition. Results indicate that awareness and attitudes towards plastic pollution are generally high, while actual behaviour remains limited. This gap reflects structural barriers within the institutional and market environment, rather than being attributable solely to individual awareness factors.

2.4.5.1. Knowledge, Attitudes and Practices: Enterprises

The study surveyed 125 small and medium-sized enterprises (SMEs), with the following distribution by type: 56.8% hotels/resorts/homestays; 28.8% F&B services; 9.6% travel agencies; and 4.8% tourist attractions/amusement parks. The majority (84.8%) have been operating for less than 10 years, primarily serving international tourists or a mixed clientele (75.2%), reflecting dependence on international tourist flows. This KAP survey provides a basis for assessing KAP within a tourism-dependent economic context, and for examining how business practices and enabling conditions shape plastic waste generation across enterprise types.

Awareness of plastic pollution and the legal framework

The survey results show differentiated awareness levels regarding the impacts of SUPs by enterprise type. Overall, indicators related to environmental and economic impacts are rated highly (Mean >4.0; Cronbach's Alpha = 0.93). ANOVA analysis records statistically significant differences between groups ($F = 5.12$; $p = 0.003$), indicating that the operational characteristics of each enterprise type influence environmental awareness levels.

The agreement that 'SUPs account for a large proportion of tourism waste and cause long-term community impacts' reached 87.3% among hotels, 77.8% among restaurants, and 83.4% among travel agencies. This reflects a clear enterprise awareness of the direct link between tourism activities and plastic waste generation. Regarding economic impact, over 90% of hotel and restaurant enterprises agree that plastic pollution affects urban aesthetics and destination attractiveness (mean score 4.42–4.58). This suggests that businesses perceive plastic

pollution not only as an environmental issue but also as a long-term economic and competitiveness risk.

However, understanding of the environmental regulatory framework remains limited. The mean score for questions related to legal regulations reaches only 3.64–3.69, with the proportion of enterprises familiar with relevant regulations ranging from 31–33%, with no statistically significant difference between groups ($p > 0.05$). These results indicate a discrepancy between environmental awareness and familiarity with management tools, particularly among SMEs lacking a dedicated environmental management department.

Attitudes and behaviors towards plastic reduction and green transition

The level of business consensus on the orientation to reduce SUPs remained high, with an average score ranging from 4.06 to 4.83 on the 5-point Likert scale, with the travel agency group recording the highest level (Mean = 4.83). Scores related to encouraging environmentally friendly packaging and reducing plastic in internal operations were above 4.0, indicating that the primary barrier to green transformation does not lie in attitude or policy orientation.

However, the differences between business types reflect the specificity of the tourism value chain: travel agencies face less pressure on material and operating costs and therefore demonstrate higher commitment levels, while accommodation and catering businesses must weigh alternative costs and service hygiene requirements more carefully. These findings suggest that economic instruments such as environmental fees or green service price adjustments could be introduced without triggering significant resistance from businesses, but would need to be accompanied by technical and financial support mechanisms to ensure effective implementation.

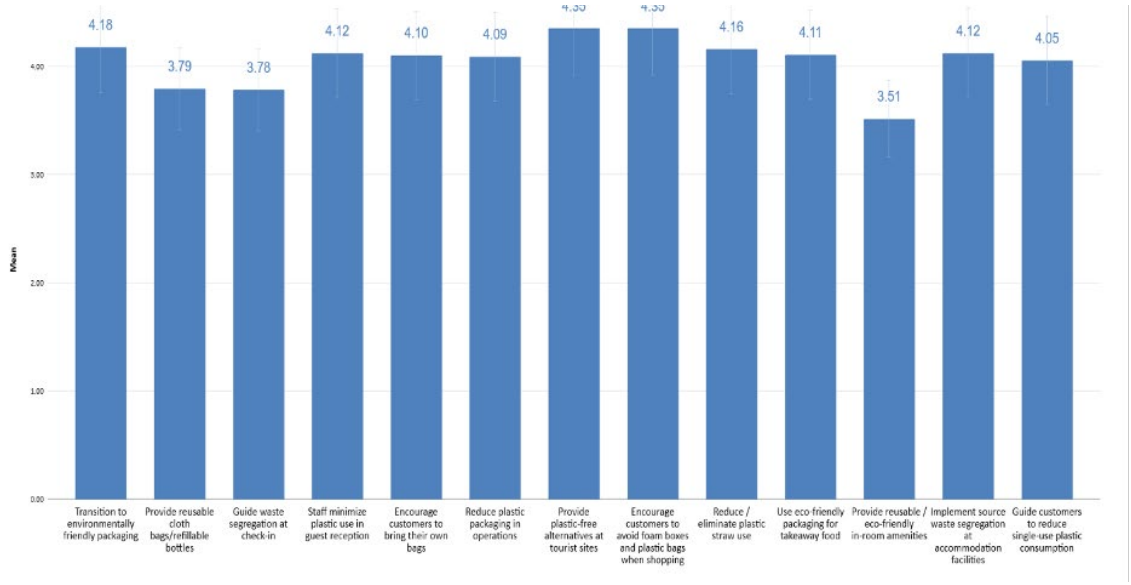


Figure 20. Attitude of businesses on actions to promote green behavior of tourists

Despite the positive attitude, the actual behavior shows a significant dependence on SUPs in direct operations. The analysis by business type shows that the hotel/resort/homestay and restaurant/catering group has the highest use of SUPs (Mean = 0.86 and 0.83, respectively, indicating frequent to very frequent use), reflecting the high-frequency material consumption characteristic of direct service provision. In contrast, travel agencies (Mean = 0.75, corresponding to moderate usage) and particularly tourist attractions (Mean = 0.33) recorded lower usage, as they do not directly

operate services that routinely consume packaged and disposable items. These figures reflect the gap between stated commitments and operational practice, stemming from sector-specific service characteristics, transition costs, and limitations in waste management infrastructure.

Overall, the results show that the foundation of pro-transformation attitudes is relatively clear, but the effectiveness of implementation depends on the design of tiered policies according to the type of business, combining economic tools with technical assistance to bridge the gap between commitment and operational behavior.

Green Transition Needs and Barriers

The data show that the level of support from tourists and the local community reached 83.3% among travel agencies and tourist attractions. Meanwhile, only 53.5% of accommodation enterprises reported receiving support from state policies. This disparity suggests that current green transformation dynamics are more strongly driven by market demand than by the policy framework.

The proportion of businesses that believe green transition can generate long-term cost savings remains below 50% in both the accommodation (42.3%) and restaurant (47.2%) groups, indicating that the economic benefits of green transformation have not yet been clearly demonstrated to those in direct service operations. Access to alternative product suppliers is also limited, particularly among travel agencies (8.3%) and accommodation providers (31%), reflecting a fragmented and under-developed sustainable supply chain. In contrast, demand for employee training is relatively high, with 83.3% in the travel group and 54.9% in accommodation, indicating that businesses recognise the need for capacity-building support to implement green practices effectively.

In general, the enabling conditions for green transformation are beginning to emerge; however, the pace and scale of adoption remain contingent on cost factors and the availability of alternative supply chains.

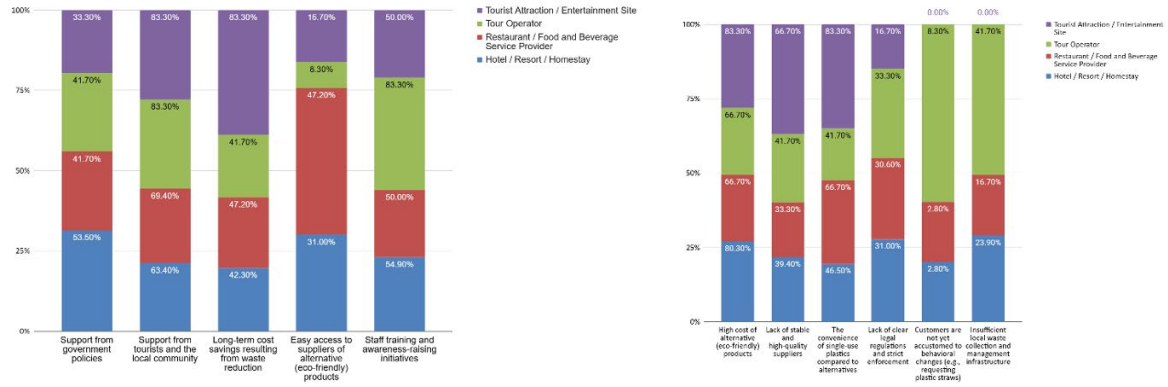


Figure 21. Opportunities and difficulties when implementing green transformation and reducing plastic at enterprises

The analysis data indicated that the cost of alternative products was the main barrier, with a recorded rate of 80.3% in the accommodation group and 83.3% in the attractions. This shows that financial factors play a central role in the decision to replace SUPs. Furthermore, the convenience of SUPs is a significant barrier in the restaurant group (66.7%). This factor is related to the service process, cleaning requirements and speed of service delivery. These barriers are interconnected: the absence of suitable alternatives reinforces the convenience and cost advantages of SUPs, which in turn entrenches

habitual usage and prevents market self-correction in the absence of policy interventions.

In summary, the KAP analysis reveals that businesses demonstrate a high level of motivation toward green transformation, as reflected in mean awareness and attitude scores exceeding 4 out of 5. However, implementation capacity remains constrained, particularly with respect to legal comprehension and financial resources. Concurrently, behavioral opportunities are restricted by prevailing market conditions, including elevated costs and the absence of a stable supply of sustainable alternatives. Within the COM-B theoretical framework, sustainable behavior is only reliably established when all three components — capability, opportunity, and motivation — are simultaneously fulfilled. Consequently, the observed gap between environmental cognition and actual behavior can be primarily attributed to insufficient enabling conditions rather than a lack of willingness.

2.4.5.2. Knowledge, Attitudes and Practices: Tourists

This study examined the levels of awareness and practice among visitors with respect to plastic pollution, with the aim of assessing the associations between perceptions, behaviours, and socioeconomic factors within the context of community-based ecotourism.

Awareness of plastic pollution

The survey results indicated that over 90% of respondents across both visitor groups recognised plastic pollution as a significant environmental problem at the study destination. Nevertheless, only approximately 50% of participants reported awareness of local plastic restriction regulations and programmes. This disparity highlights a substantive gap between general environmental perception and informed awareness of site-specific policy measures.

Plastic Use Behavior

In terms of consumption behavior, approximately 50% of both international and domestic tourists reported using three or more disposable plastic products per day, with domestic visitors recording a slightly higher rate (56%) compared to international visitors (48%). Additionally, both groups reported equivalent usage of plastic bags or packaging, exceeding five units per day. These findings suggest that single-use plastic consumption remains relatively high among both visitor groups and that usage patterns are broadly similar regardless of visitor origin.

Regarding compliance behaviour, over 90% of respondents in both groups reported disposing of waste appropriately. However, proactive behaviours — such as carrying reusable water bottles or participating in environmental clean-up activities — were notably less common among international visitors, at approximately 30%. This suggests that visitor environmental behaviour is largely confined to baseline regulatory compliance.

Regarding price mechanisms, approximately two-thirds of visitors expressed a preference for environmentally friendly packaging; however, only 44% of international and 70% of domestic tourists indicated that this factor directly influences their purchasing decisions. Willingness to pay a premium for plastic reduction services did not reach a majority. These results suggest that environmental considerations are not yet a primary criterion in consumption decisions. From a policy perspective, the application of environmental fees or surcharges on single-use plastic products should account for visitor payment acceptance. Additionally, providing clear information about destination-specific regulations may help bridge the gap between environmental perception and behaviour.

The study further examined the relationship between visitor characteristics and SUPs demand. ANOVA results revealed statistically significant differences in SUPs usage by age ($F = 3.67$; $p = 0.015$) and length of stay ($F = 2.76$; $p = 0.032$). Younger tourists and short-stay visitors reported higher plastic packaging consumption (mean: 2.66 bags/day), reflecting convenience-oriented consumption patterns characteristic of urban tourism.

Plastic Pollution Impacts the Travel Experience

The survey results indicate that plastic pollution adversely affects the quality of the tourist experience, particularly in coastal and ecologically sensitive destinations where plastic waste degrades landscape image and overall attractiveness. This suggests that plastic pollution represents not only an environmental concern but also a direct socioeconomic factor, undermining destination competitiveness and eroding international visitor confidence in the "green tourism" image.

The study further indicates that willingness to pay for plastic reduction activities was moderate, with a mean score of 3.60; specifically, 71.1% of tourists were willing to allocate less than 10% of their total trip expenditure to environmental protection activities. Despite high levels of awareness regarding the impacts of plastic pollution, willingness to pay remains limited — a pattern consistent with the well-documented "perception–behaviour gap".

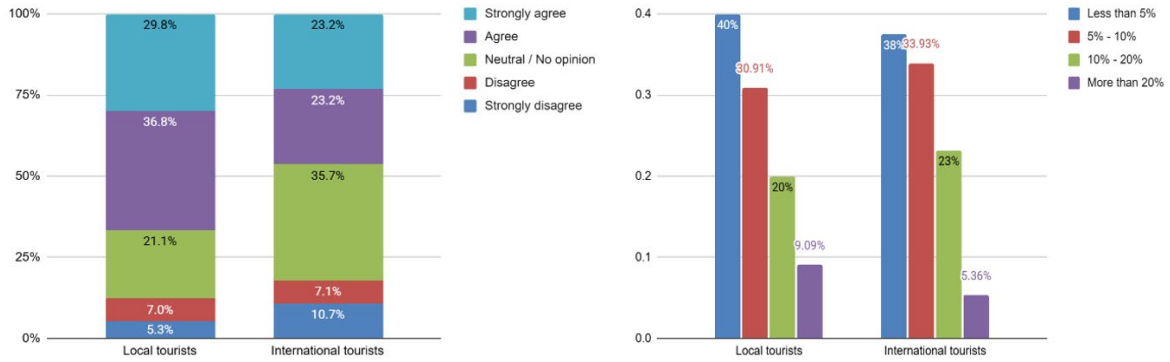


Figure 22. Measuring travelers' willingness and affordability for eco-friendly service

Independent t-test results indicate statistically significant differences between domestic and international tourists in several dimensions, specifically in awareness of plastic-related issues, consumption behaviour, and knowledge of local regulations and campaigns restricting single-use plastic use ($p < 0.05$).

Notably, within the COM-B framework, tourists demonstrated relatively high motivation to adopt green behaviours; however, opportunities remain constrained by inadequate supporting infrastructure. Waste sorting facilities averaged a low score of 3.69, and plastic alternatives at points of sale were not widely available. Many service establishments continue to offer SUPs as the default option — automatically providing plastic water bottles, straws, or bags without prior consent — while environmentally friendly alternatives remain largely inaccessible. Consequently, tourist consumption behaviour is substantially shaped by the service environment and choice architecture rather than personal intention alone. Without sustainable options that are available, convenient, and accessible, green behaviour remains difficult to sustain even among environmentally aware and well-intentioned visitors.

This context presents a challenge for destination management, requiring simultaneous intervention at two levels: enhancing visitor awareness and improving the practical conditions that make green behaviour convenient, including the implementation of community-level waste segregation. On this basis, it is recommended that communication campaigns be designed according to visitor segments, prioritising digital platforms for younger tourists and green experience programmes for longer-stay groups. Complementary practical measures are also needed to support behavioural adjustment, such as expanding the availability of plastic alternatives, facilitating waste sorting guidance, and integrating environmental protection into travel experience design.

2.4.6. Cost of Inaction (COI) Analysis

Plastic waste pollution imposes significant economic costs on Da Nang's tourism industry. The total cost of inaction (COI) is estimated at 1,743.7 billion VND per year, equivalent to approximately 6.48% of total tourism revenue, comprising three principal damage categories: direct economic losses, environmental damage, and brand depreciation.

Estimated Direct Economic Loss

Direct economic losses are estimated at 772.7 billion VND per year, representing approximately 3% of tourism revenue, arising primarily from waste collection, treatment costs, and associated labour expenditure; additional labour costs alone account for approximately 89.6 billion VND per year. This figure is comparable to that of established coastal destinations such as Bali, Indonesia, and Phuket, Thailand, where sanitation maintenance costs represent approximately 2–4% of tourism revenue. These findings indicate that plastic pollution imposes a substantial operational burden and undermines business efficiency if not addressed at the source.

Estimated Environmental Damage

Environmental damage is associated with approximately 5,892 tons of plastic waste generated annually, of which 74 tons leak into the marine environment. Equivalent emissions are estimated at 26,700 tons of CO_2 per year, comparable to the emissions of approximately 5,800 petrol-powered vehicles. This calculation applies an emission coefficient (tons of CO_2 per ton of plastic) derived from a study on the climate impact of virgin plastic production published by the Lawrence Berkeley National Laboratory (Karali et al., 2024). Although direct treatment costs are estimated at 3.7 billion VND per year, environmental impacts accumulate over the long term, consistent with marine ecosystem degradation documented in Bali and other coastal destinations across Southeast Asia (Trevor Chong, 2025). Without early intervention, ecological risks may exceed recovery thresholds and directly undermine ecotourism viability.

Estimated Brand and Reputation Loss

Brand and reputation loss represents the largest damage category, estimated at 971 billion VND per year, accounting for 55.7% of total COI. Given an annual visitor volume of 20.3 million and tourism revenue of approximately 27 trillion VND (Department of Culture, Sports and Tourism, 2024), a 5% decline attributable to destination image degradation caused by plastic waste would generate substantial financial losses. The visitor return-risk assessment score of 3.6 out of 5 indicates a measurable risk of declining loyalty, particularly among international visitors. Evidence from Bali suggests that systematic plastic reduction initiatives can reverse image decline and enhance destination value (Kurnia et al., 2022; Widhiarini et al., 2023).

In conclusion, the COI assessment demonstrates that plastic waste pollution constitutes not merely an environmental concern but a strategic economic risk. Brand losses account for the largest share of total COI, while direct economic and environmental losses reflect operational costs and accumulated ecological risks respectively. Without timely and coordinated intervention, the cost of inaction will continue to escalate, progressively undermining Da Nang's competitiveness relative to comparable coastal destinations in the region.

2.4.7. Potential initiatives to improve the situation of plastic waste management

In Da Nang, the green tourism agenda and the goal of eliminating SUPs across 100% of accommodation establishments and tourist attractions have been operationalised through a multi-stakeholder approach, incorporating local policy frameworks, the Tourism Association, and technical and financial support from international organisations. At the destination and community level, the Zero Waste model implemented in Cu Lao Cham and Hoa Bac community tourism demonstrates the effectiveness of community consensus, single-use plastic bans, and source separation in simultaneously reducing plastic leakage and sustaining local livelihoods.

At the project and technology level, initiatives such as “Closing the Loop” have generated quantitative data on plastic leakage and piloted recycling solutions, while partnership programmes with international associations support businesses in developing green commitments, certification criteria, and monitoring systems. At the enterprise level, zero-waste resort models, refill stations, and circular accommodation operations have demonstrated that green transformation can simultaneously enhance brand value and operational efficiency. Overall, Da Nang’s experience suggests that the combination of financial incentives, technical assistance, and public–private cooperation is a critical enabler of plastic pollution reduction and destination competitiveness improvement (Details of initiatives and models are in Appendix 7).

3. KEY RECOMMENDATIONS

Based on the results of the analysis of plastic waste flows and leakage in the tourism industry, the evaluation of the national policy framework and local implementation practices, and surveys on the knowledge, attitudes, and practices (KAP) of tourism businesses and tourists, the recommendations in this report are formulated using a multi-level, evidence-based approach. The analysis shows that although Vietnam has established a relatively adequate policy framework on plastic waste management, the transformation of policy goals and requirements into effective action in the tourism industry still depends heavily on the destination management model and enforcement capacity in each locality.

In this context, the recommendations are not proposed in a one-size-fits-all direction but are designed to concretize and "localize" current policy directions into feasible solutions that match the actual operating conditions of each tourist destination, while ensuring consistency with national targets on reducing plastic pollution and sustainable tourism development. The recommendation structure is divided into three mutually complementary levels: (i) specific recommendations for Ninh Binh – representing nature and heritage tourism destinations with high conservation pressure; (ii) recommendations for Da Nang – representing a cluster of urban-coastal tourism destinations and at the forefront of green tourism orientation; and (iii) policy implications at the national level to create a framework for orienting, coordinating, and replicating effective models of plastic waste reduction in the tourism industry nationwide.

Specifically, the local recommendations in this report are formulated according to four main intervention groups, fully reflecting the gaps identified: (i) strengthening policy implementation and compliance; (ii) improving waste management practices and infrastructure; (iii) developing financial instruments and incentive mechanisms; and (iv) raising awareness and promoting behavioral change among both tourism providers and visitors.

3.1. Recommendations for Ninh Binh

With the goal of developing Ninh Binh into the leading cultural-eco-religious-oriented tourism center in Southeast Asia and a model of green, smart, and civilized tourism, the recommendations for Ninh Binh focus on the following short-term objectives: (1) effectively manage plastic waste in tourism activities and achieve the target of reducing SUPs by 100% at tourist destinations by 2030 in line with the Action Plan for Ocean Plastic Waste Management; and (2) create strong incentives for small and medium-sized enterprises (SMEs) to participate in Ninh Binh's green transformation, including promoting the supply of and access to locally produced alternative products. In the long term, the province aims to become a green, smart, and civilized international destination.

From the results of policy analysis, field surveys, waste audits, and stakeholder consultations, the challenges in managing solid waste and plastic waste in Ninh Binh's tourism activities stem from gaps in policies and regulations; knowledge, attitudes, and behaviors; waste stream and infrastructure management; and institutions and capacity. These gaps collectively explain why plastic waste reduction in tourism remains ineffective. Although Ninh Binh has issued relatively comprehensive policies on solid waste management and plastic reduction, implementation and enforcement in the tourism sector are still limited. Cognitive and behavioral gaps are also significant. While some businesses and tourism workers are aware of the environmental impact of plastic waste, the momentum for behavioral change remains weak due to the lack of specific regulations, guidelines, and economic incentives. For tourists, the lack of alternative product options, information, and signage at destinations hinders sustainable consumption behavior.

The approach to implementing recommendations emphasizes the role of the management boards of tourist areas and attractions as the central enforcement unit. In the first phase, implementation focuses on strengthening and standardizing plastic waste management practices in destinations that already have initiatives or pilot models, thereby creating a foundation for replication. The reduction of SUPs is prioritized through easy-to-implement solutions integrated into daily operations and supported by unified guidance from management boards.

Subsequently, by integrating specific plastic waste management requirements from the Department of Tourism, the Department of Agriculture and Environment, and sanctions in service enterprise operations, destination rules, and tourist communication activities, Ninh Binh can gradually establish common behavioral standards, raise awareness, and change the behavior of both service providers and visitors. In the medium term, lessons learned will be integrated into the province's sustainable tourism development planning.

Recommended groups

Group 1: Promoting the implementation of regulations and policies on plastic waste

Groups	Gaps, inadequacies	Short-term recommendations	Medium-term recommendations (to 2030)	Implementing agency and resource mobilization for feasibility
Enforce and comply with policies	• No separate mandatory regulation on reducing plastic in tourism • Policy on restrictive SUPs, reducing SUPs mainly as an incentive • Lack of green transition roadmap in Ninh Binh's tourism industry	• The Department of Tourism promulgates the "Green Transformation Handbook" for tourism businesses • Develop sanctions and strengthen inspections, sanctions and support communication to promote enterprises to enforce regulations	• The Department of Tourism develops and promulgates policies on green transformation in the tourism industry in Ninh Binh • Develop a separate set of criteria for Ninh Binh Tourism, including waste criteria • Develop and implement tourism facility rating assessments including criteria for plastic use and waste reduction	Provincial People's Committee, Department of Tourism, Department of Agriculture and Environment, Destination Management Board Resources: provincial budget, mobilization of technical assistance from projects/NGOs
Institution and coordination of enforcement	Lack of mechanisms and coordination documents between the Department of Tourism and the Department of Agriculture and Environment in the management of solid waste in the tourism industry towards green tourism	• The Department of Agriculture and Environment shall coordinate with the Department of Tourism in promulgating a roadmap and guidelines for implementation to ensure the target by 2030 for 100% of coastal tourism accommodation service establishments not to use disposable plastic products and non-degradable plastic bags • The Department of Tourism shall coordinate with the Destination Management Board in promulgating criteria for reducing plastics, especially SUPs, into the regulations on operation of destinations		

Groups	Gaps, inadequacies	Short-term recommendations	Medium-term recommendations (to 2030)	Implementing agency and resource mobilization for feasibility
Institution and coordination of enforcement		• Pilot interdisciplinary compliance testing using SUPs at some tourist destinations • Standardize and concretize requirements for reducing SUPs and waste management in key tourist zones and attractions, and strengthening the coordinating role of destination management boards in organizing the collection, classification and connection to waste treatment systems		
Data and Monitoring	• Lack of monitoring data on plastic waste generated in the tourism industry	• Building a solid waste R database system in key tourism areas • Developing a mechanism for information and reporting on waste management in tourism activities in the province	• Applying a smart monitoring mechanism, based on the results of analysis of environmental indicators, especially waste leaked into the environment (environmental KPIs)	

Group 2: Waste management facilities and plans

Groups	Gaps, inadequacies	Short-term recommendations	Medium-term recommendations (to 2030)	Implementing agency and resource mobilization for feasibility
Waste management practices and infrastructure	• Ineffective source separation • Mainly collects high-value and easy-to-collect plastic waste such as PET, PP, HDPE • The recycling waste stream is not clear and closed	• Install drinking water stations/ refills at attractions and boat docks • Build a model hotel/ restaurant model of reducing plastic from the implementation experience of effective pilot models such as Emeralda's, Thien Ha Cave, Thung Nham Tourism Model • Standardize waste bins and classification signage at attractions • Strengthen coordination with local mass organizations (Women's Union, Youth Union) in waste management The Department of Tourism participates in and coordinates with the Department of Agriculture and Environment to build an infrastructure system for collecting and treating waste after classification in a synchronous manner. (should delete)	• Investment in classification infrastructure • Standardization of formal and informal collection chains in tourism plastic waste • Piloting and widely applying the circular economy model in tourism from Emeralda's lessons learned • Establish a Smart Waste Management System to link data with the Department of Agriculture and Environment and the Department of Tourism	Destination management boards, tourism businesses, environmental units Resources from enterprises participating in the PPP model, mobilizing project support

Group 3: Financial instruments to support the implementation of plastic waste management in the tourism industry

Groups	Gaps, inadequacies	Short-term recommendations	Medium-term recommendations (to 2030)	Implementing agency and resource mobilization for feasibility
Financial Instruments and Incentives	• SMEs lack resources for transformation • No specific financial incentives for plastic reduction • Cost of SUPs alternatives remains high	• Prioritize plastic-reducing enterprises in provincial tourism development support policies (e.g., 10% CIT exemption for "Green Tourism Label" enterprises) • Develop policies encouraging green shopping in pilot services • Implement preferential loans at 2.6%/year through VEPF for refill stations • Pilot 1% waste fee on revenue or entrance fees	• Apply environmental fees of ≤1% of tourism revenue to create a Recycling Infrastructure Development Fund • Develop tradable "Green Credit Certificates" linked to plastic and emission reduction performance • Include tourism-specific features in pay-as-you-throw fee systems • Encourage private investment in recycling infrastructure	Department of Finance, Department of Tourism, Provincial People's Committee Resources: Xuan Truong enterprises and provincial businesses

Group 4: Improving awareness and behavior

Groups	Gaps, inadequacies	Short-term recommendations	Medium-term recommendations (to 2030)	Implementing agency and resource mobilization for feasibility
Raise awareness and change behavior	• Tourists lack clear instructions at destinations • Small businesses do not prioritize plastic reduction • Communication messages are limited • 85% of businesses still provide SUPs • Grassroots officials lack capacity	• Destination communication (signage, behavioral reminders) • Practical training for business households and tourism workers • Develop capacity-building plans for small and micro enterprises (1–2 star hotels, homestays) • Publish regulations on the provincial tourism website • Launch direct campaigns (Challenges, plastic-free tours)	• Develop communication programs for students (future tourists) • Pilot the "Green Tour" model with strict waste management commitments (drawing on Thien Ha Cave experience) • Promote cooperative groups for recycling collection • Organize training for grassroots officials after administrative merger • Build a green tourism culture with no plastic waste • Integrate plastic reduction messaging into destination marketing • Promote use of recycled products in agritourism (drawing on Thung Nham experience)	Department of Tourism, Department of Agriculture and Environment, Destination Management Board, tourism association Resources: communication project, tourism promotion budget

3.2. Recommended recommendations for Da Nang

Based on the identified gaps, recommendations are organized around four pillars: (i) strengthening enforcement with targeted technical assistance; (ii) upgrading infrastructure and developing circular value chains; (iii) establishing financial incentives to reduce cost barriers for SMEs and alternative product manufacturers; and (iv) promoting behavioral change through green default mechanisms and market-based incentives, with differentiated timelines for short-term (1–2 years) and long-term (3–5 years) implementation. This approach targets a 30% reduction in SUPs use by 2030, a reduction in the Cost of Inaction (COI) (estimated at 1,743.7 billion VND per year), and advancement of the circular economy in tourism.

It should be acknowledged that Da Nang has already implemented several initiatives addressing plastic and solid waste reduction in the tourism sector. However, these models remain fragmented and lack coordination and standardization at the system level. The role of state management agencies and the City Tourism Association therefore needs strengthening to connect, standardize, and replicate effective practices. This is particularly urgent as the city is finalizing its draft Green Tourism Criteria — an official framework for evaluating and recognizing the sustainability performance of tourism businesses. The Tourism Association should be empowered as an intermediary to disseminate models, connect supply and demand for SUPs alternatives, and mobilize broader business participation. As market scale expands, the unit cost of alternative products is expected to decrease, removing the primary cost barrier for SMEs.

In the short term (first 2–3 years), the strategic priority is to integrate green tourism and plastic reduction objectives into existing initiatives and platforms. For example, the Trip-C application or the city's food and destination recommendation platforms could incorporate labeling and promotion of "green-certified venues." This leverages existing infrastructure while connecting environmentally conscious visitors with green businesses and stimulating sustainable market demand.

Recommendation 1: Accelerate enforcement of plastic waste regulations

Groups	Gaps, inadequacies	Short-term recommendations	Medium-term recommendations (to 2030)	Implementing agency and resource mobilization for feasibility
Institutions & Policies	• Lack of specific guidance and legal binding for Green Tourism Criteria • Inter-departmental supervision not synchronized after administrative merger • Coordination mechanisms unclear and not linked to responsibilities or resources	• Department of Natural Resources and Environment issues detailed guidelines on the roadmap to eliminate SUPs (70% of accommodation/dining establishments SUPs-free by 2027) • Department of Culture, Sports and Tourism promulgates the "Green Transformation Handbook" • Strengthen inspections, sanctions, and communication	• Promulgate the Da Nang Green Tourism Development Strategy 2026–2030, linking plastic reduction to tourism development • Integrate "Plastic-Free Tourism" criterion into hotel star ratings and licensing • Build unified brand "Da Nang – Green City, Green Ocean" • Deploy surveillance in key areas (Marble Mountains, Son Tra) using the Da Nang Smart City platform	• Pursuant to Decision 1746/QD-TTg and Decree 08/2022/ND-CP on plastic waste management • Mobilize existing inspection forces (Sub-Department of Environmental Protection, Inspectorate of the Department of Natural Resources and Environment) • Deploy surveillance systems in key tourist areas including Marble Mountains and Son Tra Peninsula • Leverage the Da Nang Smart City data platform to integrate waste management and green tourism monitoring

Recommendation 2: Proposals on waste management infrastructure/methods

Groups	Gaps, inadequacies	Short-term recommendations	Medium-term recommendations (to 2030)	Implementing agency and resource mobilization for feasibility
Waste Management Facilities & Methods	• Collection and recycling infrastructure limited; "Green Houses" degraded • Low collection rate for low-value plastics • Pilot models not replicated systematically • No continuous monitoring system • Limited MSW enterprises; no circular value chain	• Upgrade and replicate 54 "Green Houses" from Hoi An to Son Tra and Hoa Vang; train collectors and integrate into formal system • Expand source separation to all 94 wards/communes; install sorting bins at coastal attractions • Pilot community-based collection at Tho Quang – Man Thai beach • Develop MSW database and Smart Waste Management System	• Construct 2–3 new Material Recovery Facilities (MRFs) in Hoi An/My Son area • Establish interconnected digital platform linking departments and wards • Develop circular value chain via EPR mechanism • Scale up Zero Waste model from Cham Islands to other coastal destinations	• Scale up the Zero Waste model pioneered by the Cham Islands (implemented since 2011) to other coastal tourist destinations • Public–private partnership (PPP) cooperation with corporate partners (Coca-Cola, La Vie) within the EPR financial and technical support framework • Budget support from the Vietnam Environmental Protection Fund (VEPF) • Mobilisation of local human resources through the Women's Union and Youth Union

Recommendation 3: Recommendations for financial instruments and incentives

Groups	Gaps, inadequacies	Short-term recommendations	Medium-term recommendations (to 2030)	Implementing agency and resource mobilization for feasibility
Financial Instruments & Economic Incentives	• SUPs replacement cost 2–3 times higher for SMEs • Lack of stable financial support for small businesses • Unstable income for informal waste workers • Insufficient incentives for green transformation	• Establish funding mechanism through Environmental Protection Fund using EPR revenues (cover 20–30% of SUPs replacement for 1,910 sub-three-star establishments) • Preferential loans at 2.6%/year via VEPF for refill stations • Concessional loans (0–1%) with health insurance for informal waste workers • Pilot 10% CIT exemption for Green Tourism Label enterprises	• Apply environmental levy of ≤0.5% of tourism revenue for Recycling Infrastructure Development Fund • Develop a tradable Green Credit Certificate scheme • Integrate green finance with international sources (ADB, GCF, UNDP) • Formalize informal waste workers into regulated system	• Based on Decree 08/2022/ND-CP and VEPF guidelines on green credit for the service sector • Pilot implementation through the Vietnam Zero Waste Tourism Network (VZWTN), which demonstrated a 12% waste reduction by 2025 • Leverage Da Nang's established international cooperation partnerships (ADB, KOICA, UNDP) • The SME tourism business community has demonstrated readiness to participate when concrete tax and credit incentives are available

Recommendation 4: Enhancing awareness and behavioural change

Groups	Gaps, inadequacies	Short-term recommendations	Medium-term recommendations (to 2030)	Implementing agency and resource mobilization for feasibility
Cognition & Behavior	• Gap between awareness and behavior (81.6% of businesses still use SUPs; tourists use 3.28 plastic items/ day) • Lack of intrinsic motivation and incentives • No integrated culture-product-green tourism model • Fragmented communication	• Train pilot enterprises (drawing on Emic/La Siesta models) • Launch #DaNangGreen campaign (reusable bags/ bottles at airports, hotels, beaches) • Implement Zero Plastic Challenge with discounts and loyalty points • Mobilize businesses to sign progressive SUPs reduction commitments; pilot deposit–refund–reuse model	• Develop a green start-up model for culturally inspired plastic alternatives (Hoi An/Da Nang identity) • Establish green sightseeing routes with full Green Tourism Criteria certification • Organize environmental education through schools, Women's Union, Youth Union; integrate into community tourism in Hoa Bac and Thanh Ha	• Partnership with WWF, GreenHub, the Da Nang Tourism Association, and the Vietnam Zero Waste Tourism Network (VZWTN) • ST4SD media platforms are available to support and expand online campaigns • Strong socialisation potential: the Women's Union, mass organisations, and local tourism communities are well positioned to deliver sustainable education and communication programmes

3.3. Implications of National-level policy recommendations

3.3.1. Evidence-based national policy orientation on plastic loss in tourism

Quantitative results at the national level and in Ninh Binh and Da Nang reveal that plastic material flows in tourism are highly concentrated on only 5-6 product groups — mainly SUPs and short-term consumer packaging. This has important policy implications: instead of broad measures applied to all plastics, focus on priority product groups with high generation rates and high leakage risk.

The study also shows significant differences between generated volume and leakage risk. Materials such as PET bottles have high volume but good recovery rates, while soft plastics, bags, and laminated packaging have lower volume but higher leakage risk due to low collection and recycling value. This requires shifting from "volume-based management" to "risk-based and resilient management."

On this evidence, national policies on plastic management in tourism should be restructured around three major orientations: reducing source generation, strengthening the Extended Producer Responsibility (EPR) mechanism, and synchronizing sorting, collection, and recycling infrastructure.

First, reducing SUPs at source must be the top priority. Regulations currently remain at the incentive level and lack sufficient force. Priority product categories (small water bottles, plastic bags, straws, amenities, disposable food containers) should have a clear roadmap combining "on-demand" mechanisms, economic tools (environmental fees), and selective restrictions. These requirements must be integrated into green tourism criteria, accommodation rating standards, and destination regulations.

Second, the EPR mechanism must be strengthened and linked more closely with tourism. Prioritize completing the legal framework for post-use product recall, focusing on plastic bottles and aluminum cans. The Deposit-Return System (DRS) should be piloted in key destinations, with tourism businesses as return points and integration of informal collectors.

Third, overcome the "system breakdown" between source separation and mixed collection by standardizing color codes and symbols nationwide, ensuring compatible collection routes, and investing in infrastructure in sensitive areas (coasts, islands, ecological zones).

Additional measures include forming joint purchasing alliances through tourism associations, prioritizing reuse/refill models over material substitution, regulating tourist behavior via "zero SUPs" default options, and applying green public procurement for state-funded tourism events.

A uniform tracking data system is essential. Establish a minimum set of metrics and a "Plastic-free Tourism Index" for self-assessment and ranking. Review and amend the Law on Environmental Protection 2020 and the Law on Tourism 2017 to concretize responsibilities, integrate environmental criteria, and issue an interdisciplinary decree between the Ministry of Agriculture and Environment and the Ministry of Culture, Sports and Tourism.

Financial support policies (tax incentives, green credits, brand promotion) for "Green Tourism Label" businesses will create positive competition. Strengthen the role of social organizations, professional associations, and NGOs in communication, technical assistance, and community pilots.

3.3.2. Opportunities for policy adjustment in the period 2025–2026

The period 2025–2026 presents a critical "window of opportunity" to integrate these recommendations into ongoing institutional reforms. The Law on Environmental Protection 2020 is under review (strengthening decentralization, accelerating EPR, improving plastic recovery targets), and the Tourism Law is being revised to promote green tourism and digital transformation. National strategies on the circular economy and sustainable tourism to 2030 provide a foundation for alignment.

Overall, policy effectiveness would be enhanced by prioritizing high-impact product groups, shifting from end-of-pipe treatment to prevention, integrating EPR with destination management, and leveraging the 2025–2026 legislative revisions. This approach would reduce environmental pressures from tourism while strengthening Vietnam's international image.

(Source: Resolution No. 247/2025/QH15, December 2025, on the amendment of the Law on Environmental Protection during the 2025–2026 period; and Resolution No. 247/2025/QH15 on tourism.)

REFERENCES

1. Executive Committee of the Party Committee of Ninh Binh province. (2023). Policy to promote green and sustainable tourism development in Ninh Binh province. Ninh Binh, Vietnam.

2. Ninh Binh Newspaper. (2026). Ninh Binh tourism will collect more than 21,000 billion VND in 2025. Retrieved 01/01/2026.

3. Culture Newspaper. (2025). The project "Reducing plastic waste in Vietnam's tourism sector": The model will be replicated across the country. https://bvhttdl.gov.vn/news-2025012116460153.htm

4. Beaumont, N. J., Aanesen, M., Austen, M. C., Börger, T., Clark, J. R., Cole, M., Hooper, T., Lindeque, P. K., Pascoe, C., & Wyles, K. J. (2019). Global ecological, social and economic impacts of marine plastic. Marine Pollution Bulletin, 142, 189-195. https://doi.org/10.1016/j.marpolbul.2019.03.022

5. Politburo. (2017). Resolution of the Politburo on Tourism Development to become a key economic sector. Link: https://thuvienphapluat.vn/van-ban/Thuong-mai/Nghi-quyet-so-08-NQ-TW-phat-trien-du-lich-tro-thanh-nganh-kinh-te-mui-nhon-2017-338542.aspx.

6. Ministry of Natural Resources and Environment (MONRE). 2020. Report on the current state of the national environment in 2019. Hanoi: Ministry of Natural Resources and Environment.

7. Ministry of Culture, Sports and Tourism. (2026). The imprint of the ST4SD Project in sustainable tourism development in 2025. https://bvhttdl.gov.vn/news-20260110152416817.htm

8. Ministry of Culture, Sports and Tourism. (2025). Highlights of Vietnam Tourism in 2025. https://bvhttdl.gov.vn/nhung-dau-an-noi-bat-cua-du-lich-viet-nam-nam-2025-20260105143951138.htm.

9. Ministry of Culture, Sports and Tourism. Portal of the Ministry of Culture, Sports and Tourism. https://bvhttdl.gov.vn/

10. Government Portal. (2021). Decision No. 1316/QD-TTg of the Prime Minister: Approving the Scheme to strengthen plastic waste management in Vietnam. http://vanban.chinhphu.vn/default.aspx?pageid=27160&docid=203719

11. Government Portal. (2021). Decision No. 1316/QD-TTg of the Prime Minister: Approving the Scheme to strengthen plastic waste management in Vietnam. http://vanban.chinhphu.vn/default.aspx?pageid=27160&docid=203719

12. Government Portal. (n.d.). Decision No. 1658/QD-TTg of the Prime Minister: Approving the National Strategy for Green Growth for the period of 2021 - 2030, with a vision to 2050. Retrieved January 13, 2026, from http://vanban.chinhphu.vn/?pageid=27160&docid=204226

13. Vietnam National Tourism Administration. (2024). Tourism system planning for the 2021-2030 period, with a vision to 2045.

14. Vietnam National Tourism Administration. (2025). Vietnam's tourism is the world's leading growth. https://images.vietnamtourism.gov.vn/vn//dmdocuments/2025/thong_tin_du_lich_thang_12_2025.pdf

15. Ninh Binh Statistics Department. Website of the Statistics Department of Ninh Binh province.

16. Karali, Nihan, Nina Khanna, Nihar Shah (2024, Climate Impact of Primary Plastic Production, Lawrence Berkeley National Laboratory https://energyanalysis.lbl.gov/publications/climate-impact-primary-plastic

17. Gari, S., Newton, A., & Icely, J. (2014). A review of the application and evolution of the DPSIR framework with an emphasis on coastal social-ecological systems. Ocean & Coastal Management, 103, 63-77. https://doi.org/10.1016/j.ocecoaman.2014.11.013.

18. GreenHub. (2021). Project "Waste Reduction Enterprise Planning Framework towards Hoi An – Green Destination." GreenHub. https://greenhub.org.vn/ky-ket-va-cong-bo-khung-ke-hoach-doanh-nghiep-giam-rac-thai-huong-toi-hoi-an-diem-den-xanh-giai-doan-2021-2023-va-toa-dam-ve-kinh-te-tuan-hoan-giam-thieu-rac-thai-nhua-huong-toi-hoi-an-diem-d

19. Ninh Binh Provincial People's Council. (2025). Resolution No. 36/2025/NQ-HDND on funding support for the collection, transportation and treatment of domestic solid waste and public waste in the province. Ninh Binh, Vietnam.

20. IUCN (International Union for the Conservation of Nature). 2020. "Reducing waste volume through Extended Producer Responsibility: Getting started in Vietnam". Bangkok: International Union for the Conservation of Nature. https://www.iucn.org/news/viet-nam/202012/reducing-waste-volume-through-extended-producer-responsibility-getting-started-viet-nam

21. Kieu, T. K., Hoang, M., & Vo, X. (2019). Hoi An City Solid Waste Audit Summary Report 2020.

22. OECD. (2022). Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options (https://doi.org/1 0.1 787/de747aef-en).

23. Pham Phu, S. T., Hoang, M. G., & Fujiwara, T. (2018). Analyzing solid waste management practices for the hotel industry. Global Journal of Environmental Science and Management, 4.

24. Ninh Binh Department of Tourism a. (2025). Report on the results of tourism work in December 2025 and key tasks in January 2026.

25. Ninh Binh Department of Tourism b. (2025). In the first 6 months of the year, the number of visitors to Ninh Binh is estimated at over 7.2 million. Link: https://baoninhbinh.org.vn/6-thang-dau-nam-luong-khach-den-ninh-binh-uoc-dat-tren-7-2-446645.htm.

26. Ninh Binh Department of Tourism. (2026). Ninh Binh tourism will collect more than 21,000 billion VND in 2025. Link https://sodulich.ninhbinh.gov.vn/vi/tin-tuc-su-kien/du-lich-ninh-binh-thu-hon-21000-ty-dong-nam-2025-2537.html.

27. Da Nang Department of Tourism (2024), Summary of tourism data in 2024

28. Quang Nam Department of Tourism (2024), Summary of tourism data 2024

29. Elesolid wasteonic Journal of Environmental Economics. (2025). Website. Ha Nam tourism https://kinhtemoitruong.vn/Ngành aims to welcome 5.1 million visitors by 2025

30. Thanh Hung. (2025). Tourism affirms the important role and driving force of the economy. [Document: Vietnam Tourism Nam_kinh te.docx].

31. Da Nang City Party Committee. (2025). Socio-economic summary report 2025 and orientation to 2030.

32. Travel Statistics. (2025). Online Database of Tourism Statistics - Vietnam National Administration of Tourism: https://thongke.tourism.vn/

33. General Statistics Office. (2025). Press Release of 2024 Midterm Population and Housing Census Results.

34. Prime Minister. (2020). Decision No. 147/QD-TTg approving the Vietnam Tourism Development Strategy to 2030.

35. Prime Minister. (2024). Decision No. 509/QD-TTg of the Prime Minister: Approving the planning of the tourism system for the 2021-2030 period, with a vision to 2045.

36. Quang Nam Provincial People's Committee. (2020). Decision 1772/QD-UBND 2020 Plan for ocean plastic waste management to 2030 in Quang Nam. LAW LIBRARY. https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Quyet-dinh-1772-QD-UBND-2020-Ke-hoach-quan-ly-rac-thai-nhua-dai-duong-den-2030-Quang-Nam-455342.aspx

37. Quang Nam Provincial People's Committee. (2021). Decision 2596/QD-UBND 2021 Quang Nam Province Tourism Development Program to 2025. LAW LIBRARY. https://thuvienphapluat.vn/van-ban/Van-hoa-Xa-hoi/Quyet-dinh-2596-QD-UBND-2021-Chuong-trinh-phat-trien-du-lich-tinh-Quang-Nam-den-2025-488129.aspx

38. Quang Nam Provincial People's Committee. (2021). Decision 2596/QD-UBND 2021 Quang Nam Province Tourism Development Program to 2025. LAW LIBRARY. https://thuvienphapluat.vn/van-ban/Van-hoa-Xa-hoi/Quyet-dinh-2596-QD-UBND-2021-Chuong-trinh-phat-trien-du-lich-tinh-Quang-Nam-den-2025-488129.aspx

39. Quang Nam Provincial People's Committee. (2025). Plan 4163/KH-UBND 2025 to implement Official Telegram 34/CD-TTg to promote tourism development in Quang Nam. LAW LIBRARY. https://thuvienphapluat.vn/van-ban/Thuong-mai/Ke-hoach-4163-KH-UBND-2025-thuc-hien-Cong-dien-34-CD-TTg-thuc-day-phat-trien-du-lich-Quan Management Board of Cu Lao Cham Nature Reserve. (2023, September 22). Chàm Islands target "zero waste" – Management Board Of Cham Islands MPA. https://culaochammpa.com.vn/cham-islands-target-zero-waste/?lang=en

40. Quang Nam Provincial People's Committee. (2025). Plan 4163/KH-UBND 2025 to implement Official Telegram 34/CD-TTg to promote tourism development in Quang Nam. LAW LIBRARY. https://thuvienphapluat.vn/van-ban/Thuong-mai/Ke-hoach-4163-KH-UBND-2025-thuc-hien-Cong-dien-34-CD-TTg-thuc-day-phat-trien-du-lich-Quang-Nam-657474.aspx

41. Da Nang City People's Committee. (2025). Report on the socio-economic situation in 2025: GRDP reached 9.18%. Da Nang City web portal.

42. Da Nang City People's Committee. (2020). Plan 7513/KH-UBND 2020 to develop tourism in Da Nang city in the period of 2021 and 2025. LAW LIBRARY. https://thuvienphapluat.vn/van-ban/Van-hoa-Xa-hoi/Ke-hoach-7513-KH-UBND-

2020-phat-trien-du-lich-thanh-pho-Da-Nang-giai-doan-2021-2025-491483.aspx

43. Da Nang City People's Committee. (2021). Plan 122/KH-UBND 2021 to manage plastic waste in Da Nang's ocean until 2025. LAW LIBRARY. https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Ke-hoach-122-KH-UBND-2021-quan-ly-rac-thai-nhua-dai-duong-Da-Nang-den-2025-482519.aspx

44. UNDP, 2025, Report on Assessment of Plastic Scrap Demand for Domestic Production and Demand for Plastic Scrap Imported into Vietnam

45. UN-ESCAP. (2020). CLOSING THE LOOP ON PLASTIC POLLUTION IN DA NANG CITY, VIETNAM.

46. UOB. (2026). Vietnam Economic Outlook Report 2026.

47. People's Committee of Nam Dinh province. Nam Dinh province web portal. https://namdinh.org.vn/

48. People's Committee of Ninh Binh province. (2025). Plan No. 88/KH-UBND on implementing the circular economy to 2035 in Ninh Binh province. Ninh Binh, Vietnam.

49. People's Committee of Ninh Binh province. (2025a). Stipulating policies to support tourism development in the period of 2025-2030 in Ninh Binh province. Ninh Binh, Vietnam.

50. Tourism Development Research Institute. Website of the Institute for Tourism Development Research. https://itdr.org.vn/

51. Vinh, T. S., Thang, N. T., Van, N. T., & Herat, S. (2023). Reduction of Plastic waste in Tourism Activities in Sam Son City, Vietnam. International Journal of Environmental Science and Development, 14.

52. VnEconomy. (2025). Tourism deserves the name of Da Nang's key economic sector. https://vneconomy.vn/du-lich-xung-danh-nganh-kinh-te-mui-nhon-cua-da-nang.htm.

53. World Bank. (n.d.). Retrieved January 14, 2026, from https://documents1.worldbank.org/curated/en/099735106282212157/pdf/P1673070495c5c0870b80f063b827028ce2.pdf?referrer=grok.com

54. WWF (2019). Stop the flood of plastic. Effective measures to avoid single-use plastics and packaging in hotels.

55. WWF (2020). Plastic Reduction Handbook for Travel Agencies.

56. WWF (2022). Report on the situation of plastic waste generation in 2022

57. WWF. (2023). Plastic waste pollution and the tourism sector in Asia Pacific.

58. WWF-Vietnam. (2019). Basic study on the current status of plastic waste in Da Nang City.

APPENDIX

Appendix 1. Solid waste data results in Ninh Binh city

https://docs.google.com/spreadsheets/d/1SpvUjtvFPybIhc8SH0B7yBj5SggrFwZp?rtpof=true&usp=drive_fs

Appendix 2. Solid waste data results in Da Nang city

https://docs.google.com/spreadsheets/d/1lK1oZRhx4kAGDSiFJO2VbsZ6lKftaMm8/edit?usp=drive_link&ouid=115638862262309218185&rtpof=true&sd=true

Appendix 3. Methods for analyzing survey data

Survey data from businesses and tourists were entered and processed using IBM SPSS Statistics 22 according to the following standardised procedure:

1. Descriptive Statistics

- Describe the sample characteristics and key variables (demographics/types, plastic use behaviors, awareness, attitudes, willingness to pay, emissions, etc.).
- Usage indicators: frequency, rate (%), mean, standard deviation (SD), min/max.
- The Likert scale 1–5 is coded from 1 to 5; the aggregate variables are averaged.

2. Scale reliability assessment

- Use Cronbach's Alpha to check for internal consistency.
- Acceptance thresholds set at $\alpha \geq 0.6$; t α t: $\alpha \geq 0.7$.
- Satisfactory scales are used for further analysis.

3. Deductive analysis

Testing differences between groups:

- Chi-square for classification variables.
- Independent t-test (2 groups) and One-way ANOVA (≥3 groups), with Levene's Test and Post-hoc (Tukey) as needed.
- Significance threshold: $p < 0.05$.**Correlation Analysis (Pearson)**:
- Determines the degree and direction of the relationship between scale/continuous variables.
- Interpretation is based on the coefficient of r and p-value (<0.05).

Regression analysis:

- Multiple linear regression (and logistics if the dependent variable is classified).
- Assessed by R^2 (Adjusted R^2), F-test, Beta coefficient, p-value (<0.05).
- Hypothetical test: multilinear (VIF), residual standard distribution, variance homogeneity, Durbin-Watson.

4. Data processing and assumptions

- Missing values: listwise (ANOVA, regression), pairwise (correlation).
- Statistical significance: 95% ($p < 0.05$).
- Limitations on sample size or group distribution are noted when interpreting results.

Appendix 4. Dossier of the survey subject

https://drive.google.com/drive/folders/1uoeFcb1WZd4y3PGwv3OlgFzpp2KknJNG?usp=drive_link

Appendix 5. Business Survey Data

https://drive.google.com/drive/folders/1ZC_C4JKtCfLwWuXTR16RqLReztIRcGMw?usp=drive_link

Appendix 6. Visitor Survey Data

https://drive.google.com/drive/folders/1HwdEk1s08f3rUd1xjJXfw6rUVtWyRMBm?usp=drive_link

Appendix 7. Green Tourism Initiatives and Models or Tourism to Reduce Waste

Ninh Binh

Community model at the point near the tourist area- Green House

The “Green House” model in Ninh Binh is now not only a gathering point for humanitarian scrap of Hoa Lu women but has become an important link in the province’s “Green Tourism” ecosystem. Located in residential areas in the core and heritage buffer zones (such as Trang An, Tam Coc), these “houses” help collect and recycle tons of plastic waste every year, directly cleaning the tourist landscape. The image of people actively sorting garbage through this model has created a beautiful impression of a civilized and friendly destination in the eyes of international tourists. At the same time, the collected funds (more than 41 million VND) continue to circulate to support disadvantaged communities, creating sustainable human values – a core criterion of responsible tourism that Ninh Binh is aiming for.

Green tourism initiatives in progress

1. Enterprise Model: Emeralda Ninh Binh Eco Resort
Source intervention model in a high-end closed system.

- Approach:
  - Green operation: Orient the eco-resort in association with environmental protection, prioritizing internal alternatives.
  - Reduce plastic thoroughly: Replace plastic bottles with glass bottles (with their own bottling system), use bioplastic amenities/bio-destructible bags, tableware from natural materials (pressed foil).
  - Waste classification: Classify 3 lines (organic, recycled, other) at the source; recyclables are separated for the purchasing unit.
- Results: Synchronous waste operation system, less residual waste; maintain a high-end image to meet the group of environmentally conscious guests.
- Challenge: Large initial investment costs; there is a lack of stable alternative material suppliers, and the local recycling collection system is not in sync with the hotel's sorting process.

2. Community model: Tam Coc – Bich Dong tourist area
The management model is based on the local workforce (boaters).

- Approach:
  - Environmental gatekeeper: Mobilize 1,400 rowboats to participate in management. The boatman plays the role of a propagandist, directly reminding tourists not to throw garbage into the river and bring garbage to the wharf.
  - Multi-tiered collection: Arrange full-time staff to pick up floating garbage (2-3 times/week) in combination with a dense garbage bin system at stopovers and boat docks on the shore.
  - Results: Good control of floating garbage flow despite the large number of visitors and high seasonality; The sense of community and visitors is significantly improved thanks to the direct reminder mechanism.
  - Success factor: Direct involvement of indigenous peoples in the service supply chain and environmental protection.

3. Policy & Supervision Model: Thien Ha Cave Tourist Area
The model changes behavior through infrastructure design and pressure from the supply chain.

- Approach:
  - "Bring back waste" strategy: Minimize waste bins on the sightseeing route, only arrange gathering points at the pick-up area to force tourists to manage their own waste.
  - Financial Mechanism & Sanctions: Collect 1% of waste fees as environmental commitments; apply strict penalties to violations.
  - Pressure from the supply chain (B2B): Closely linked with travel agencies (especially international/ inbound tours). Travel agencies shall only pay when environmental standards are met; In contrast, the destination risks losing revenue if it receives negative feedback about the waste.
- Result: The amount of garbage generated is low, the awareness of tourists (especially international visitors) is very high.
- Lesson: Using trade pressure and "reverse" infrastructure design to shape tourist behavior.

4. Circular economy model: Thung Nham eco-tourism area
The model integrates Ecotourism and Organic Agriculture.

- Approach:
  - Responsible tourism: Developing on the basis of protecting ecosystems and human health.
  - Agriculture associated with tourism: Planning organic/near-natural farming areas right in the tourist area. Visitors experience the process of producing and consuming clean agricultural products on the spot (Farm-to-table).
  - Indigenous value chain: Develop OCOP products (such as Son Kim Cuc tea) with a closed process, creating a premise for the standardization of green packaging and plastic reduction in the future.
- Result: Creating in-depth tourism products; improve the economic value of local agricultural products and reduce negative impacts on the environment thanks to clean farming processes.

In summary, through the above analysis of typical cases, it can be seen that models of reducing plastic and waste in tourism activities have been implemented in Ninh Binh with different scales and approaches. In particular, each destination or tourism service establishment has a different way of doing things and achieving specific results. In which, some experiences can be considered to propose waste management in tourism activities in Ninh Binh as follows:

- The plastic waste reduction model is successful if it is pursued in the long term and has the right investment strategy. The case of Emeralda shows that reducing plastic must go hand in hand with infrastructure investment such as water refill systems and using water entirely with hygienic glass bottles. Replace plastic products with new environmentally friendly products.
- The local community is a key factor, a huge amount of resources need to be mobilized in the management and reduction of plastic waste in tourism activities. The way of doing things in Tam Coc – Bich Dong shows very clearly the role of the community. They are participants and beneficiaries in tourism activities. When they are the supervisors and communicators about plastic reduction, the effect will be very clear. This is completely applicable in models managed by localities and community cooperatives in Ninh Binh, especially in Van Long.
- Businesses participate in promoting the effectiveness of waste management in the tourism industry at destinations. The example at Thien Ha Cave shows the different way of doing this destination management business. Businesses proactively come up with regulations and policies on waste at the destination, in which “bringing garbage back” is a way to do it. The business has also selected customers in accordance with its strategy, thereby creating an effective way of doing things. This is also proven by the difference in the tourism model associated with agriculture of Doanh Sinh Tourism Trading and Service Joint Stock Company in Thung Nham. The natural approach of businesses in tourism has proven to be effective in reducing waste and creating high media impact.

Da Nang:
In alignment with the green tourism agenda and the Prime Minister’s directive to eliminate SUPs across 100% of accommodation establishments and tourist attractions, Da Nang has proactively developed policies and mechanisms to support and scale green transformation pilot models, with the involvement of the Tourism Association and technical and financial support from domestic and international NGOs. This multi-stakeholder approach strengthens grassroots capacity and establishes the foundation for replicating sustainable practices.
1. Destination & Community Level Management Model
These are models applied synchronously on a geographical scale, creating a common standard for both the community and visitors.

- Cu Lao Cham Biosphere Reserve ("Zero Waste" Model):
  - Background: Recognized as Vietnam's first "Zero Waste" model. The ban on the use of single-use plastic and plastic bags (SUPs) has been unanimously implemented by the government and the community since 2009.
  - Specific solutions: Replace plastic packaging with natural materials; distribute cloth bags and reusable water bottles to residents and tourists; thoroughly classify garbage at source in association with nature conservation.
  - Quantitative Results:
    - Reduce the loss of about 350kg of plastic waste in the first 2 years of the pilot.
    - By 2023, plastic bag waste will almost no longer be emitted into the environment.
    - Revenue from ecotourism reaches about 3.6 million USD/year, contributing 65% to the community's income.
- Hoa Bac Community Tourism (Da Nang):
  - Characteristics: Developing rural tourism in association with the indigenous culture of the Co Tu people.
  - Operating principles: "Community ownership – sustainable development – environmental friendliness".
  - Activities: Focus on reducing plastic waste through encouraging the use of natural materials, reuse and recycling in the entire process of serving visitors.
- Network of other green destinations:
  - The "Say no to plastic bags" models are also maintained in Kim Bong carpentry village, Bay Mau coconut forest eco-tourism area (Cam Thanh) and Tra Que vegetable village.

2. Project & Technology Level

Initiatives to provide scientific data, technical infrastructure and supporting policy frameworks.

- "Closing the Loop" project in Da Nang:
  - Implementing unit: UN-ESCAP (funded by the Government of Japan), in collaboration with the Da Nang Department of Natural Resources and Environment, IUCN, University of Leeds (UK) and IGES.
  - Scope: Focus on tourism hotspots in Son Tra, Marble Mountains and Thanh Khe.
  - Technology & Data:
    - Digital mapping applications, artificial intelligence (AI), and remote sensors for waste monitoring.
    - The survey results show that the amount of plastic waste leakage is 6,752 tons/year (accounting for 8.1% of total plastic waste), of which plastic bags account for the largest proportion (56.9%).
  - Recycling pilot: Invest 100,000 USD in recycling models (nylon, straws, cups, styrofoam). However, the new pilot recycling rate reached 6.1%, which is lower than the national average (10–15%), indicating the challenge of scaling.
  - Long-term goal: Increase the recycling rate to 90% by 2030, reduce marine plastic waste by 75%.
- Framework of the plan "Waste reduction enterprises towards a green destination in Hoi An":
  - Organization: Tourism Association, GreenHub and IUCN for the period 2021–2023.
  - Scale: Mobilizing the participation of 36 diverse businesses (restaurants, cafes, homestays, hotels).
  - Activities: Develop commitments to action, provide technical training, monitor plastic waste, and develop databases for replication.
- Swiss Sustainable Tourism Project (ST4SD) (2025–2027):
  - Focus on upgrading the set of criteria for accommodation establishments approaching GSTC international standards, training sustainable practices and building green accommodation brands.

3. Enterprise Level

Specific examples in applying the circular economy at the micro level.

- La Siesta Resort & Spa (Hoi An):
  - Model: Zero Waste Resort.
  - Action: Completely remove SUPs; using reusable glass bottles (helping to save 120,000 bottles/year); reuse gray water and use solar energy.
  - Collaboration: Participate in programs such as Go Green and LSPP (funded by USAID).
  - Economic and environmental efficiency: Achieved GSTC certification, reduced greenhouse gas (GHG) emissions by 25% and increased revenue by 20% from the green tourist segment.
- Emic Hospitality:
  - Operating in a closed cycle, focusing on waste sorting and reuse throughout the entire accommodation activities. The business cooperates closely with the locality to recycle and recover plastic waste.
- Hoi An Refillables:
  - The store model operates on the principle of "refill", providing essential products without plastic packaging. Serve as a sustainable consumption education point, helping to form the habit of reducing plastic at the source for the community

Appendix 8. List of national policies on waste management and tourism waste management

National Policy on Tourism Waste Management and Tourism Tourism	Link to access the policy
Group of documents on national strategies and action plans on plastic waste	
Law on Environmental Protection 2020	https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Luat-so-72-2020-QH14-Bao-ve-moi-truong-2020-431147.aspx
2022: Decree 08/2022/ND-CP guiding the implementation of a number of articles of the Law on Environmental Protection 2020. Decree 05/2025/ND-CP (amending Decree 08)	https://datafiles.chinhphu.vn/cpp/files/vbpq/2022/01/08-nd.signed.pdf https://datafiles.chinhphu.vn/cpp/files/vbpq/2022/01/pl-08-nd.pdf https://congbao.chinhphu.vn/van-ban/nghi-dinh-so-05-2025-nd-cp-43838.htm
Directive 33/CT-TTg (20/8/2020) on strengthening the management, reuse, recycling, treatment and reduction of plastic waste	https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Chi-thi-33-CT-TTg-2020-tang-cuong-quan-ly-tai-su-dung-tai-che-xu-ly-va-giam-thieu-chat-thai-nhua-450760.aspx?utm_source=chatgpt.com
National Action Plan on Ocean Plastic Waste Management to 2030 (Decision 1746/QD-TTg, 04/12/2019):	https://congbao.chinhphu.vn/van-ban/quyet-dinh-so-1746-qd-ttg-30130.htm
Scheme to strengthen plastic waste management in Vietnam (Decision 1316/QD-TTg, 22/7/2021):	https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Quyet-dinh-1316-QD-TTg-2021-phe-duyet-De-an-tang-cuong-cong-tac-quan-ly-chat-thai-nhua-482053.aspx?utm_source=chatgpt.com

National Policy on Tourism Waste Management and Tourism Tourism	Link to access the policy
Group of documents on the background strategy on solid waste management – environment – circular economy	
National Strategy on Integrated Solid Waste Management to 2025, with a vision to 2050 (Decision 491/QD-TTg, 2018)	https://congbao.chinhphu.vn/van-ban/quyet-dinh-so-491-qd-ttg-26373.htm
National Strategy on Integrated Solid Waste Management to 2025, with a vision to 2050 (Decision 491/QD-TTg, 2018)	https://congbao.chinhphu.vn/van-ban/quyet-dinh-so-491-qd-ttg-26373.htm
National Environmental Protection Strategy to 2030, Vision 2050 (Decision 450/QD-TTg, 2022)	https://congbao.chinhphu.vn/van-ban/quyet-dinh-so-450-qd-ttg-37033.htm
Circular Economy Development Project in Vietnam (Decision 687/QD-TTg, 2022)	https://congbao.chinhphu.vn/van-ban/quyet-dinh-so-687-qd-ttg-37263.htm
Green Growth Strategy 2021–2030, Vision 2050 (Decision 1658/QD-TTg, 2021):	https://congbao.chinhphu.vn/van-ban/quyet-dinh-so-1658-qd-ttg-34550.htm
Group of documents related to SUPs	
Law on Environmental Protection Tax (LEPT) - No. 57/2010/QH12:	https://congbao.chinhphu.vn/van-ban/luat-so-57-2010-qh12-3964.htm
2011: Decree No. 67/2011/ND-CP, detailing tax amounts, remittances and taxable objects under the Law on Environmental Protection	https://congbao.chinhphu.vn/van-ban/nghi-dinh-so-67-2011-nd-cp-3965.htm
Circular No. 07/2012/TT-BTNMT	https://congbao.chinhphu.vn/van-ban/thong-tu-so-07-2012-tt-btnmt-16407.htm
2014: Law on Environmental Protection No. 55/2014/QH13:	https://congbao.chinhphu.vn/van-ban/luat-so-55-2014-qh13-4894.htm
2018: Resolution No. 579/2018/UBTVQH14 No. on environmental tax:	https://congbao.chinhphu.vn/van-ban/nghi-quyet-so-579-2018-ubtvqh14-27523.htm
Directive No. 08/CT-BCT: Regulating the Government's role in reducing plastic waste in the industrial, commercial and health sectors	https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Chi-thi-08-CT-BCT-2019-tang-cuong-bien-phap-giam-thieu-chat-thai-nhua-trong-nganh-cong-thuong-418886.aspx?utm_source=chatgpt.com
The National Action Plan on Sustainable Production and Consumption for the period 2021-2030 has specific targets related to plastic waste	https://datafiles.chinhphu.vn/cpp/files/vbpq/2020/06/889.signed.pdf
II. Relevant legal documents of the Ministry of Culture, Sports and Tourism	
Tourism Law 2017	https://congbao.chinhphu.vn/van-ban/luat-so-09-2017-qh14-24241.htm
Green Lotus Sustainable Tourism Label (Decision 1356/QD-BVHTTDL, issued on 12/4/2012)	https://thuvienphapluat.vn/van-ban/Van-hoa-Xa-hoi/Quyet-dinh-1356-QD-BVHTTDL-danh-gia-va-cap-thi-diem-Chung-nhan-Nhan-Du-lich-138480.aspx
Decision 4666/QD-BVHTTDL on promulgating a set of criteria guiding environmental protection at historical-cultural relics and national scenic spots	https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Quyet-dinh-4666-QD-BVHTTDL-bo-tieu-chi-huong-dan-bao-ve-moi-truong-di-tich-danh-lam-thang-canh-quoc-gia-304248.aspx

National Policy on Tourism Waste Management and Tourism Tourism	Link to access the policy
Decision 4216/QD-BVHTTDL on the promulgation of the Code of Conduct for environmental protection in cultural, sports and tourism activities	https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Quyet-dinh-4216-Q%c3%90-BVHTTDL-2020-Quy-tac-ung-xu-bao-ve-moi-truong-trong-hoat-dong-van-hoa-460626.aspx
Official Letter No. 47/BVHTTDL-KHCNMT on promoting the management of plastic waste in cultural, sports and tourism activities.	https://sdl.hue.gov.vn/tin-chi-dao-dieu-hanh/day-manh-cong-tac-quan-ly-chat-thai-nhua-trong-hoat-dong-van-hoa-the-thao-va-du-lich.html
Decision No. 78/QD-HHDLVN promulgating the Criteria for Recognition of Vietnam Green Tourism Destinations (VITA GREEN)	https://vita.vn/vi/news/hiep-hoi-du-lich-viet-nam-nang-tam-vita-green-thanh-nhan-hieu-bao-chung-du-lich-xanh-dat-gia-tri-giao-dich-quoc-te-231.html
Official Letter No. 670/BVHTTDL-KHCNMT (based on the guidance of Official Letter 8963/BTNMT-MT dated 20/12/2024) on the 2024 Environmental Protection Report and comments on the draft Environmental Protection Report nationwide	https://thuvienphapluat.vn/chinh-sach-phap-luat-moi/vn/ho-tro-phap-luat/chinh-sach-moi/77403/huong-dan-ve-bao-cao-cong-tac-bao-ve-moi-truong-tren-pham-vi-ca-nuoc-nam-2024
TCVN 14249:2024: Tourism and related services – Sustainable management system for accommodation establishments	https://images.vietnamtourism.gov.vn/vn/dmdocuments/2025/tcvn_14249-2024.pdf?utm_source=chatgpt.com
TCVN 14250:2024: Tourism and related services – Guidelines for developing technical requirements on environmental protection for accommodation establishments	https://images.vietnamtourism.gov.vn/vn/dmdocuments/2025/tcvn_14250-2024.pdf?utm_source=chatgpt.com
Joint Circular 19/2013/TTLT-BVHTTDL-BTNMT: This is a framework for environmental guidance in tourism activities. Circular guiding environmental protection in tourism activities (role of state management, inspection, environmental protection model in tourism, etc.)	https://bvhttdl.gov.vn/van-ban-quan-ly/1934.htm?utm_source=chatgpt.com
Decision 1066/QD-BVHTTDL (28/3/2018); This is a set of environmental criteria for tourism establishments in tourist zones/attractions, guidelines on environmental protection for tourism and service establishments in tourist areas/attractions: it is a "framework for inspection-evaluation-guidance" of environmental protection for businesses in destinations.	https://khcnmt-bvhttdl.vn/Documents/Legals/180605/Bo%20tieu%20chi%20BVMT%20du%20lich.pdf https://khcnmt-bvhttdl.vn/Documents/Legals/181204/Huong%20dan%20Bo%20tieu%20chi%20du%20lich.pdf
Official Letter 1857/BVHTTDL-TCDL (2019, this is the opinion directing the launch/orientation of the movement "tourism says no to plastic waste"	https://vietnamtourism.gov.vn/post/30761

[1] According to Clause 14, Article 3 of Decree 08/2022/ND-CP, single-use plastic products are products (except for non-replaceable attached products) including trays, food containers, bowls, chopsticks, cups, knives, spoons, forks, straws, and other eating utensils with plastic components that are designed and put on the market with the intention of being used once before disposal into the environment.

United Nations Development Programme
304 Kim Ma, Ngoc Ha
Ha Noi
Viet Nam

www.undp.org/vietnam
© UNDP 2026