Together we act for plastic waste reduction

PLASTIC SMARTCITIES

WWF

WORLD WIDE FUND FOR NATURE IN VIET NAM

THE PLASTIC REDUCTION JOURNEY *of* HUE CITY

HUE UNIVERSITY PUBLISHING HOUSE

Together we act for plastic waste reduction

World Wide Fund for Nature in Viet Nam

REFERENCE BOOK

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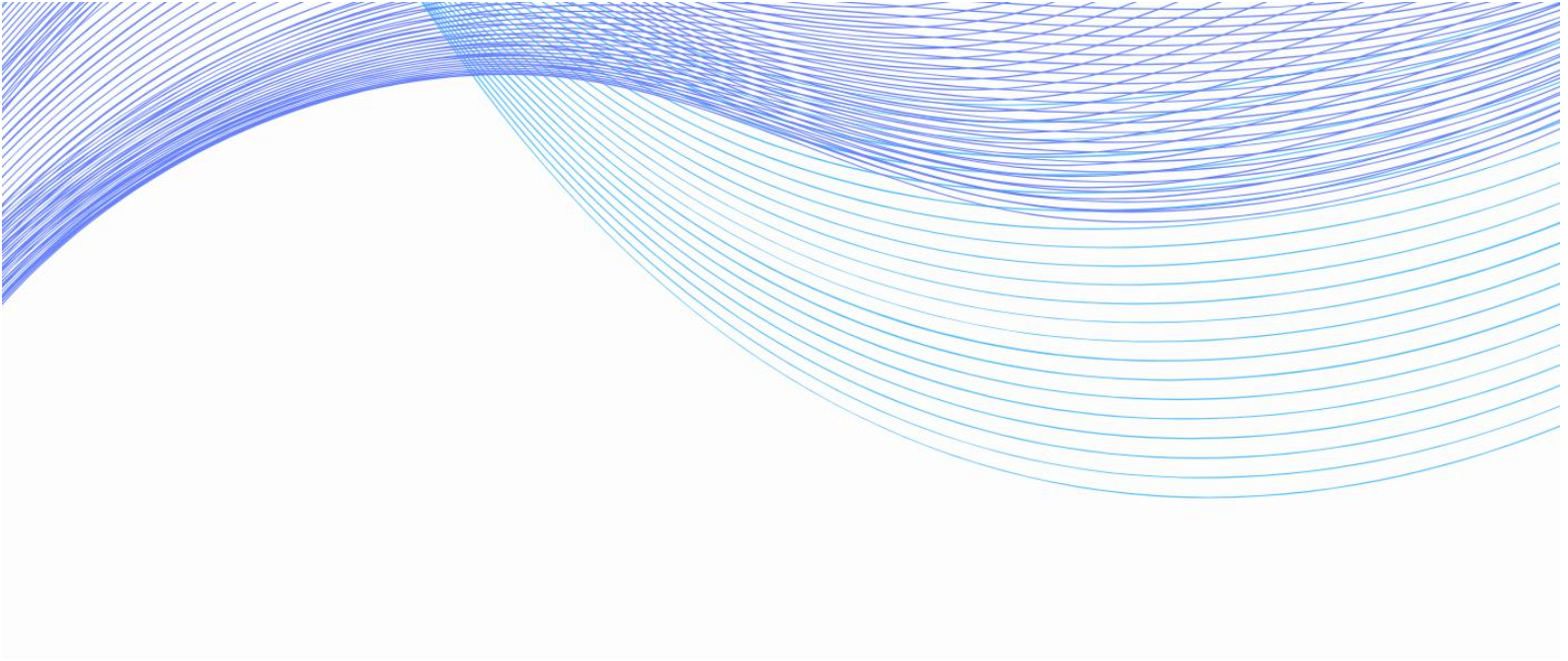


ACKNOWLEDGEMENTS

We would like to extend our heartfelt gratitude to all individuals and organizations who have accompanied us and contributed to the success of the “Hue – A Plastic Smart City in Central Viet Nam” Project (hereinafter referred to as the TVA Project). The Project has ignited a spirit of responsibility and fostered a shift in awareness and actions within the community regarding plastic waste.

We would like to express our special thanks to WWF-Norway, the main sponsor of the project through WWF-Viet Nam, as well as the People’s Committee of Hue City, the governing organization, and key governmental partners, mass organizations, political-social organizations, educational and research institutions, and local businesses. Your close coordination has created favorable conditions for the successful implementation of plastic reduction objectives.

Also, we appreciate the residents of Hue City who have enthusiastically participated in community activities, helping to raise awareness about the harmful effects of plastic waste and the importance of waste separation at source and reducing plastic in daily life. Thank you to the businesses and individuals who have taken the lead in changing consumption habits, rejecting or minimizing the use of single-use plastics, and choosing sustainable solutions that contribute to promoting a green and sustainable lifestyle within the community.

With the Project’s achievements, we believe that the spirit of plastic reduction will continue to be nurtured and widely spread, contributing to a greener, cleaner, and more beautiful Hue City for today and the future.

The Editorial Board

FOREWORD

In the context of global challenges posed by plastic pollution, the search for sustainable solutions and environmental protection has become more urgent than ever. In Viet Nam, plastic waste, particularly in urban areas and major cities, places significant pressure not only on the ecosystem but also on the health and quality of life of the community. Hue City, as a cultural, tourism, and historical centre, faces these challenges as well.

"The Plastic Reduction Journey of Hue City" was created to document and share Hue City's efforts in its journey to minimize plastic pollution, contributing to the development of a green and sustainable community through research, community initiatives, and environmental policies. This is not only a reference book but also a call to action for individuals and organizations to collaborate in creating a green, clean, beautiful, and sustainable city.

The book analyses the sources of plastic waste, their impacts on the environment, society, and human health, along with solutions, smart solid waste management systems, awareness-raising campaigns, programs encouraging plastic reduction, and best practices for effective plastic minimization that Hue city has implemented and continues to maintain. The lessons learned from Hue city not only contribute to local environmental protection efforts but also have significant applicability to other cities across the country.

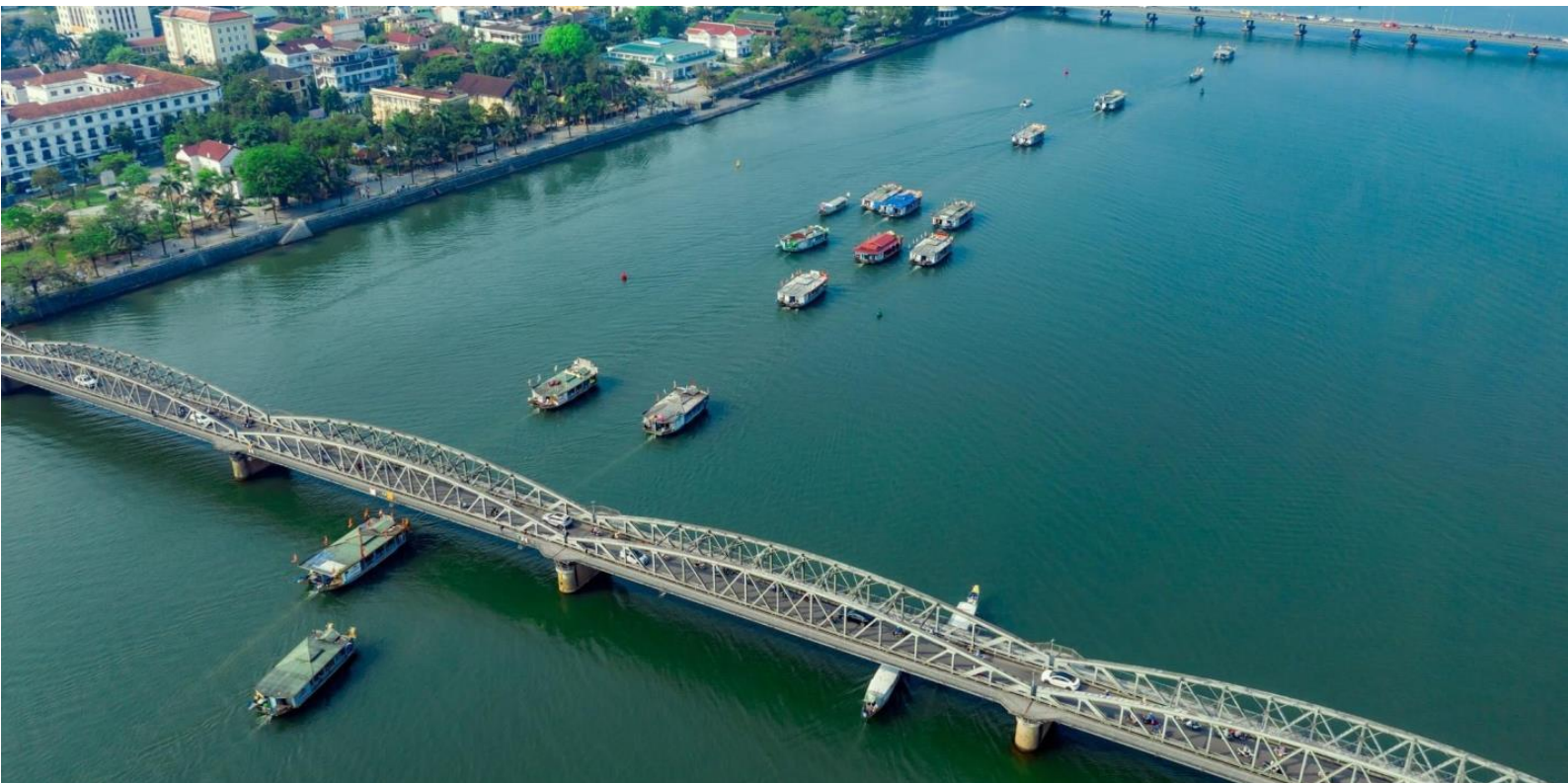
We would like to express our sincere gratitude to organizations, individuals, scientists, and the local community for enthusiastic collaboration, contributions and support throughout the implementation of this project. We hope that, with these joint efforts, Hue will become a model green city, committed to sustainable development and minimizing the impacts of plastic pollution in Central Viet Nam and across the country.

We are pleased to introduce this book to our readers!

Tran Song

Vice Chairman of the People's Committee of Hue City

Director of the Project Management Board for "Hue – A Plastic Smart City in Central Viet Nam"



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ABBREVIATIONS

AI	Artificial Intelligence
BioDF	Biodegradable Film
HEPCO	Hue Urban Environment and Public Works Joint Stock Company
Hue IOC	Thua Thien Hue Intelligent Operations Centre
NPIN	No Plastic in Nature
PAOT	Participatory Action-Oriented Training
PSC	Plastic Smart Cities
PSC Initiative	Plastic Smart Cities Initiative
PW	Plastic Waste
PWS	Plastic Waste Separation
3R	Reduce - Recycle - Reuse
5R1C	Refuse - Reduce - Reuse - Recycle - Replace - Collect
SOP	Standard Operating Procedure
SW	Solid Waste
TVA project	“Hue - A Plastic Smart City in Central Vietnam” project
WWF	World Wide Fund for Nature

LIST OF FIGURES

1. INTRODUCTION

1.1 Overview about the "Plastic Smart Cities Initiative"

Introduction to the "Plastic Smart Cities" Initiative

Plastic Smart Cities (PSC) is an initiative of the World Wide Fund for Nature (WWF) with an aim at connecting cities and tourist destinations for taking action in an effort to fight plastic pollution. Through this program, WWF supports localities to improve their capacity to achieve the goal of No Plastic in Nature (NPIN) by 2030.

Currently, in Asia alone, the PSC program is being implemented in 5 countries including Indonesia, Thailand, Philippines, China and Vietnam. With the ambition to make the PSC program a movement that countries around the world respond to and self-implement similar to Earth Hour, WWF calls on cities to commit to reducing plastic waste pollution in accordance with the goal of No Plastic in Nature, developing and sharing best practices on plastic waste reduction, aiming to achieve the number of 1,000 plastic smart cities in the world by 2030.

The PSC Initiative by the World Wide Fund for Nature (WWF) is fully aligned with Hue city. Thereby, the image of Hue city with the titles such as "ASEAN Environmentally Sustainable City"; "National Green City" and "Hue city: Heritage, Culture, Ecology, Landscape, Environmental Friendliness" will continue to be promoted to enhance its value in the eyes of tourists and international friends. At the same time, this initiative also contributes to improving people's living and working conditions, promoting local socio-economic development and implementing the United Nations' Sustainable Development Goals as well as Vietnam's international commitments.

Objectives and implementation progress

The roadmap for building PSCs in Vietnam follows a process as shown in Figure 2.

As of May 2024, Vietnam has 10 localities committed to becoming PSCs, including:

1. Phu Quoc City (Kien Giang Province)
2. Rach Gia City (Kien Giang Province)
3. Thanh Khe District (Da Nang City)
4. Tuy Hoa City (Phu Yen Province)
5. Tan An City (Long An Province)
6. Hue City (Thua Thien Hue Province)
7. A Luoi District (Thua Thien Hue Province)
8. Ha Tinh City (Ha Tinh Province)
9. Con Dao island (Ba Ria – Vung Tau Province)
10. Dong Hoi City (Quang Binh Province)

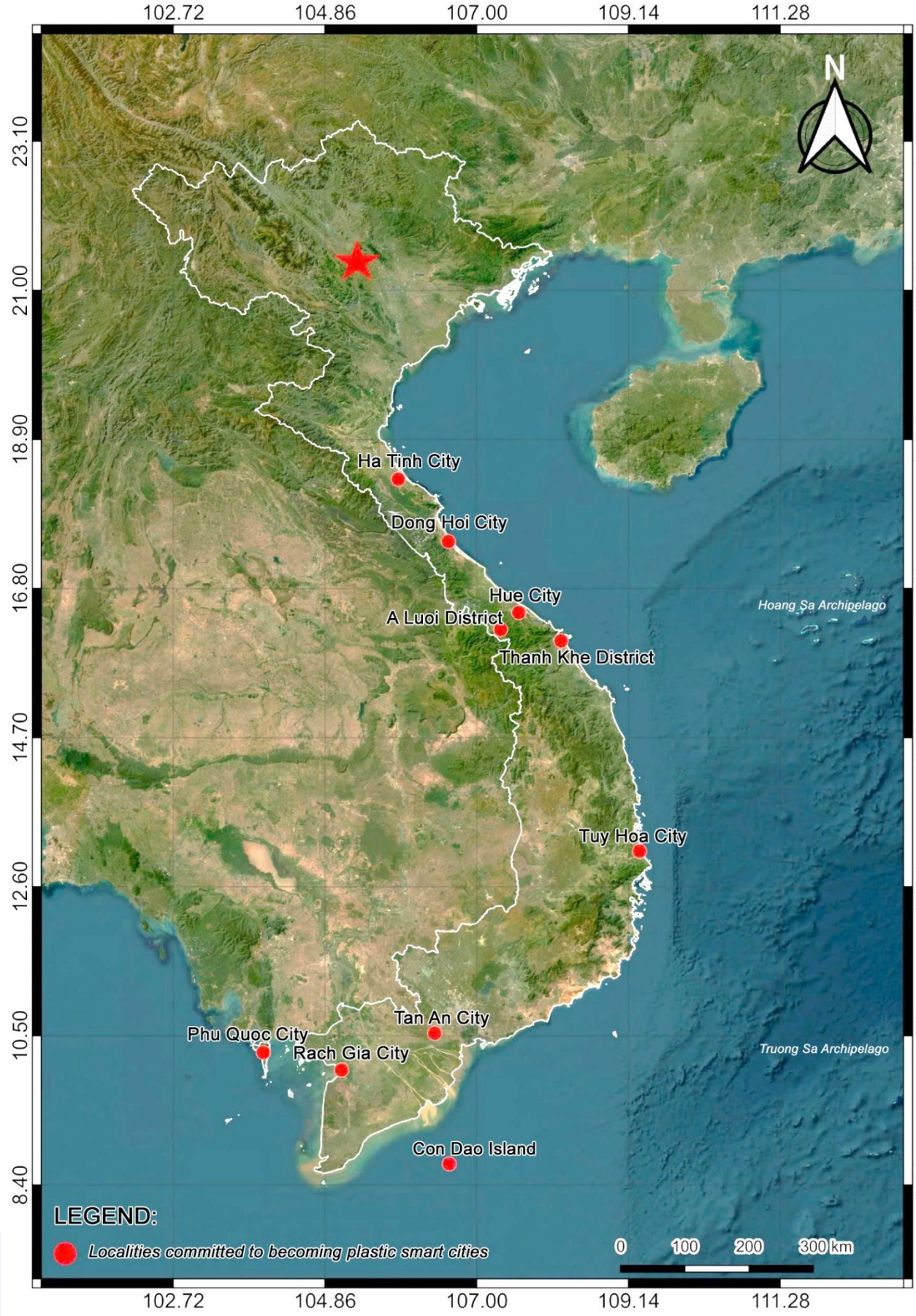

Figure 1. Ten localities committed to becoming plastic smart cities

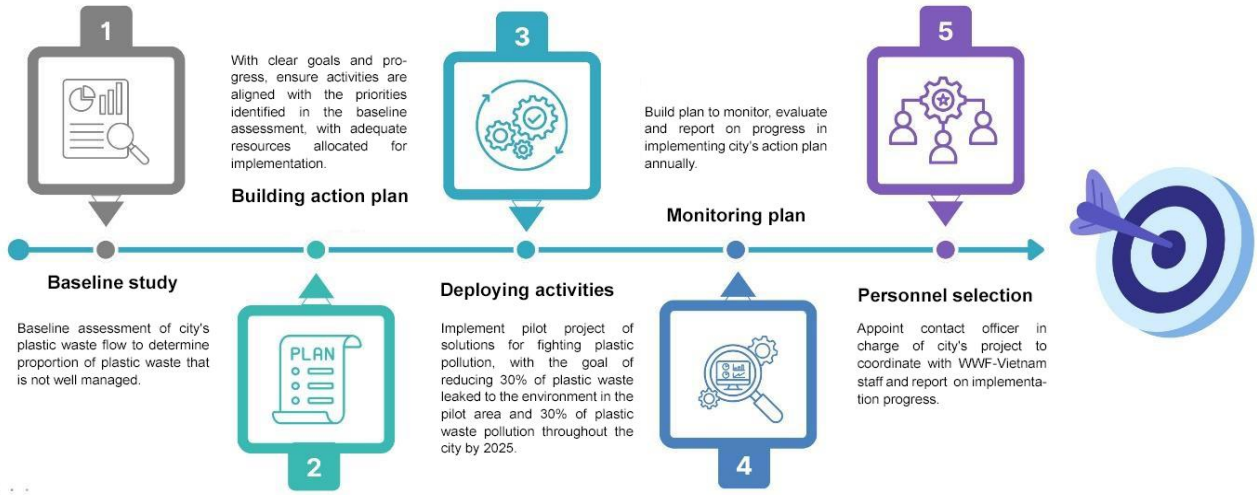

Figure 2. Roadmap for building plastic smart cities in Vietnam

In Hue City, the project "Hue - A Plastic Smart City in Central Vietnam" (hereinafter referred to as TVA project) funded by WWF-Norway through WWF-Vietnam, with Hue City People's Committee as the executive agency, has been implemented from 2021 to 2024. The overall objective of the Project is to support Hue city in protection of rivers and ecosystems of wetlands and coastal areas from being polluted by plastic waste. Within the framework of the Project, on November 11, 2021, Hue City People's Committee (CPC) signed a commitment to participate in the WWF's Plastic Smart Cities Program. Accordingly, the City is committed to full engagement of people, organizations and businesses in the area aiming at, by 2024, reducing 30% of plastic waste (PW) leakage into the environment, and No Plastic In Nature by 2030.

To achieve such objective, with the support by WWF-Vietnam, Hue City's People's Committee issued the Plan No. 1121/KH-UBND dated February 22, 2022 on organizing the deployment and management of plastic waste in Hue city to 2025, vision to 2030. The plan clearly states that plastic waste management is a part of integrated solid waste management and is a shared responsibility of society, with the State playing a leading role. This will be realized through increasing investment, promoting socialization and maximizing all possible resources. The deployment of the Plastic Waste Management Plan in the city is a key task of authorities at all levels, local departments as well as socio-political organizations with the active participation from organizations and individuals living and working in Hue city. Therefore, the engagement of all stakeholders is both a prerequisite and a key factor in ensuring the success of the project activities in particular, as well as the overall implementation of integrated solid waste management tasks and Plastic Waste Management Action Plan in Hue city in general.

Figure 3. Map of wards and communes participating in the TVA project

According to WWF (2021)[1], related stakeholder engagement is a comprehensive process aiming at developing close, constructive collaboration while identifying and managing risks in implementing environmental protection or natural resources conservation activities. This process also helps encourage positive outcomes, benefitting stakeholders and the environment. Stakeholder engagement will be the most effective when initiated at the earliest stages of designing an activity. Activities to connect stakeholders include information sharing, consultation, facilitation of effective and equitable participation for vulnerable people. The extent and scale of cooperation among stakeholders will vary depending on the type of activity, socio-political complexity, and potential risks and impacts of the activity.

[1] Foster, K./WWF (2021), Environmental & Social Safeguard, Standard on Stakeholder Engagement.

1.2 Urgency of Handling Plastic Waste Problem

Plastic Waste Pollution Globally and in Vietnam

Plastic waste pollution has become a serious problem globally, with millions of tonnes of plastic waste dumped into the environment each year. According to the United Nations, about 300 million tonnes of plastic are produced annually, but only about 9% of it is recycled, leading to the accumulation of hundreds of million tonnes of plastic waste in oceans, rivers and land. It is estimated that by 2050, if this trend continues, the total mass of plastic waste in the ocean can surpass the total mass of fish[2]. Plastic waste does not only endanger marine life but also negatively affects human health through the food chain.

In Vietnam, the situation of plastic waste pollution is also increasing significantly. According to the World Bank's reports, Vietnam ranks 4th in the world in the amount of plastic waste discharged into the sea, with 3.1 million tonnes of plastic waste generated each year, of which 730,000 tonnes are not treated properly[3]. The main reason is due to the widespread use of plastic bags and plastic bottles, along with the limitations of the solid waste management system.

To solve this problem, Vietnam has made many efforts such as the "Say No to plastic waste" campaign and the implementation of policies to reduce single-use plastic[4]. However, stronger measures on waste management and community awareness raising are needed to minimize the negative impacts of plastic waste on the environment and people.

Impacts of Ocean Plastic Pollution on Environment, Society and Economy

Ocean plastic pollution is resulting in serious environmental, social and economic impacts globally.

Impact on Environment

Plastic waste, especially single-use plastic, is being accumulated in the ocean; about 8 million tonnes of plastic enters into the marine environment every year. Ocean plastic waste takes hundreds of years to be decomposed and, in that process, it breaks down into microplastics, harming a wide range of marine life. According to a report by National Geographic (2019), more than 700 marine species, including fish, seabirds and turtles, have been directly affected by ingesting plastic or becoming trapped in plastic fragments. Microplastics can also be accumulated in the food chain and eventually enter human body through seafood consumption[5].

Impact on Society

Plastic pollution does not only affect marine life but also coastal communities, especially those who live on marine resources. The decline in sea water quality and the habitat of marine species results in difficulties for people who rely on fishing, increasing the risk of job loss and

[2] United Nations Environment Programme (2018), *Single-Use Plastics: A Roadmap for Sustainability.*
[3] World Bank (2022), *Plastic Waste Management in Vietnam: Opportunities and Challenges.*
[4] Vietnam Ministry of Natural Resources and Environment (2020), *National Action Plan on Marine Plastic Debris Management by 2030.*
[5] National Geographic (2019), *Ocean Plastic Pollution: How It Impacts Marine Life*.

income reduction. According to a United Nations study, these negative impacts increase the burden on health systems as coastal communities face health problems due to seawater pollution and the rise of environmentally infectious diseases[6].

Impact on Economy

Economic losses due to ocean plastic pollution are also tremendous. As reported by the World Economic Forum (2020), damage from plastic pollution to the fisheries, tourism and shipping industries is estimated to be up to 13 billion USD per year[7]. The tourism industry, especially in coastal destinations, is severely affected when beaches are polluted by plastic waste, causing the reduction of tourist arrivals and negative impacts on local economies, especially in coastal destinations.

Ocean plastic pollution is not only an environmental problem but also a serious socio-economic challenge. To minimize its impacts, global coordination is needed, from limiting single-use plastic production to increasing plastic waste recycling and management, as well as raising public awareness of the plastic pollution problem.

Plastic waste has become one of the most pressing environmental challenges globally. Plastic waste is difficult to decompose, can take decades or even centuries to decompose, causing long-term negative impacts on both human health and ecosystems. Therefore, plastic waste management and minimization is an urgent task to contribute to environmental protection and ensuring a sustainable future for the next generations.

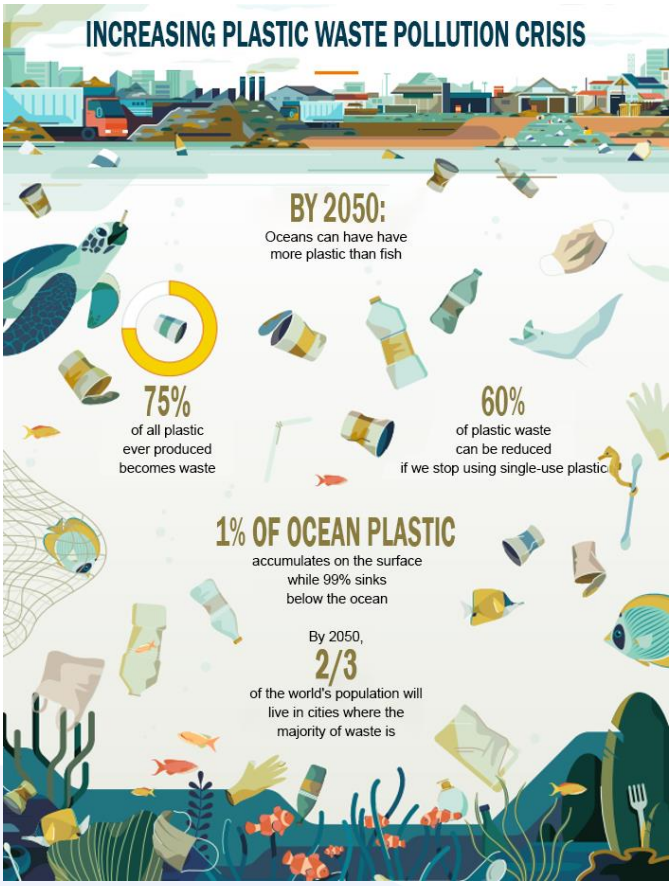

Figure 4. Increasing plastic waste pollution crisis

[6] United Nations (2020), *Plastic Pollution and Its Impact on Coastal Communities*.
[7] World Economic Forum (2016), *The New Plastics Economy: Rethinking the Future of Plastics*.

2. JOURNEY TOWARDS "HUE - A PLASTIC SMART CITY IN CENTRAL VIETNAM"

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The journey towards plastic smart cities was started with conducting baseline studies guided by the Plastic Smart City program to assess the current state of solid waste and plastic waste management, identify relevant stakeholders and crucial interventions. Accordingly, community consultation and feedback opinion collection from domestic and foreign experts was conducted to develop an action plan for the implementation period from 2022 to 2024, including activities and specific targets set out for each stage, in order to realize the overall goal: reducing 30% of the amount of plastic waste leakage into the environment, building a green - clean - bright city.

2.1 Implementation of Baseline Studies

Current Situation of Solid Waste in General and Plastic Waste in Particular in Hue City

The City's administrative boundaries have changed after July 1, 2021 according to the adjustment of the Resolution No. 1264/NQ-UBTVQH14 dated April 27, 2021 of the National Assembly's Standing Committee. Accordingly, the city area has increased to 265.99 km2, 3.8 times larger than before. The structure of communes and wards has also changed after the adjustment of administrative boundaries for the expanded area, specifically 13

wards/communes from Huong Thuy, Huong Tra towns and Phu Vang district were merged into the (previous) city (27 wards) and restructured into 36 wards/communes.

Prior to its expansion, the Hue City area had a volume of domestic solid waste generated in 2020 of about 289 tonnes/day (Department of Natural Resources and Environment of Thua Thien Hue province), the rate of collected solid waste reached 98%. The amount of waste generated in Hue City accounted for about 45% of the total amount of waste generated in the entire province.

According to research results implemented by WWF (2021) using the WaCT tool[8], the total volume of domestic solid waste generated in Hue City (including the expanded area) in 2021 was more than 400 tonnes per day. However, only more than 20% of it was recovered and recycled, the rest was transferred to Thuy Phuong landfill for burial, causing great pressure on the environment. Plastic waste accounted for more than 60 tonnes/day, of which 86% was recyclable, but in reality only more than 13% was recovered because waste separation at source has not been thoroughly implemented. The study also showed a clear difference in the quality of waste collection and transportation services between wards before and after merging into Hue City. In the expanded areas of Hue City, the solid waste collection rate was lower and the collection means were more rudimentary, leading to more solid waste and plastic waste leakage into the environment.

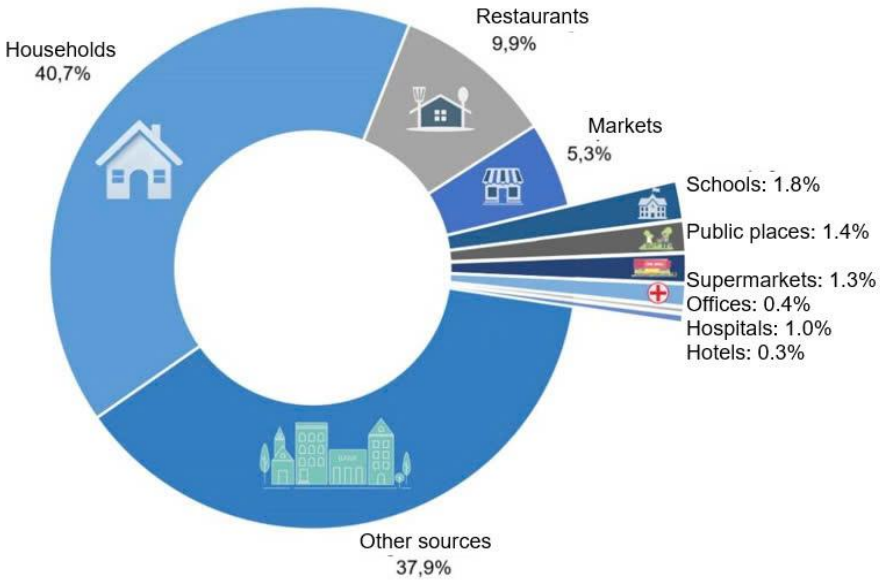


Figure 5. Proportion of solid waste generation sources on Hue City

Findings from the baseline studies showed that households accounted for the highest volume of domestic solid waste (40.7%) with about 165.5 tonnes/day. The source with the lowest generated volume at the time of the survey (2021) was hotels with only 1.3 tonnes/day, due to the impact of the Covid-19 pandemic.

The domestic solid waste generation rate in Hue city was different between wards/communes and ranged from 179 to 621 grams/person/day.

Regarding the proportion of domestic solid waste, the group of kitchen waste accounted for the highest percentage (72%), then the group of plastic waste with 15.4% (equivalent to 60 tonnes/day) and the group of waste generated from gardens/parks with 4.3% respectively.

[8] UN-Habitat (2021). WASTE WISE CITIES TOOL: Step by Step Guide to Assess a City's Municipal Solid Waste Management Performance through SDG indicator 11.6.1 Monitoring.

As for domestic solid waste from non-household sources, biodegradable organic components still account for the highest proportion, an average of about 72.6%. Among non-household sources of domestic solid waste, markets have the highest rate of decomposable organic waste (80%) and public areas have the lowest rate (34.1%). Regarding plastic waste, supermarkets are the largest source of plastic generation (27.9%), followed by public areas (27.4%), hotels (17.8%), and offices (15.1%).

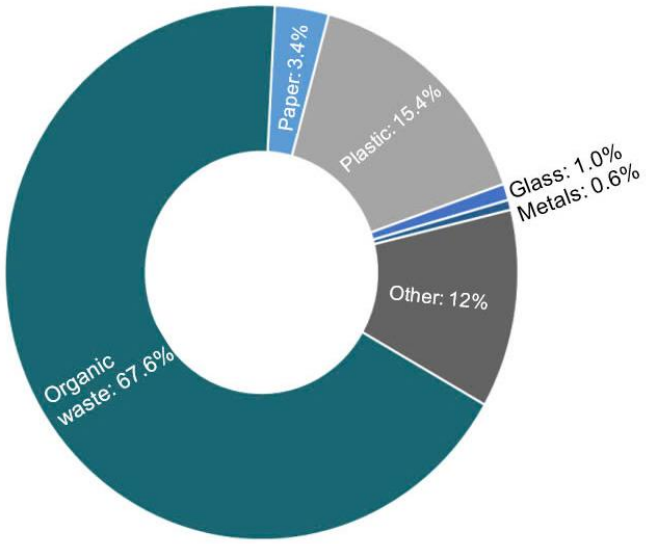


Figure 6. Percentage of domestic solid waste components in Hue City

Survey results of the current status of domestic solid waste management show that 100% of the population in Hue City and wards of Huong Tra town, Huong Thuy town, Phu Vang district already merged into Hue City can have access to collection service. The current collection, transportation and disposal of domestic solid waste in Hue City is mainly implemented and managed by HEPCO, through direct contracts with local authorities. For domestic solid waste, there are two methods of collection and transportation currently applied in Hue City:

- Door-to-door collection by hand carts or electric vehicles: People leave waste on the sidewalk or in front of their house, collection workers use hand carts or electric vehicles to collect and transport waste to designated collection points, where waste is collected and transported by compactors to treatment facilities.
- Waste collection by skips: Waste skips are placed at fixed points, where workers will collect waste from generation sources and then transfer it to the skips or people can directly put garbage into the skips. Then crane trucks will transport garbage to treatment facilities.
- Garbage collection frequency is once/day or 2-3 times/week depending on population density and actual collection needs in local areas.

> **Overall Assessment:** Domestic solid waste from households accounted for the largest proportion of the total volume generated in the study sites. In the period from 2014 to 2021, the volume of plastic waste in the domestic solid waste component increased rapidly. However, until 2021 the waste separation at source program in Hue City had not been implemented yet.

Although the entire City population has access to waste collection services, the collection rate in the central area of Hue City at the time of the survey reached 98%, still under 100% due to the fact that some people are not aware of disposal of garbage in the right places, especially

in public areas, and this makes it difficult for the collection.

For treatment activities, domestic solid waste collected from Hue City, Huong Thuy town, Huong Tra town and Phu Vang district are transported to HEPCO's Thuy Phuong landfill (Figure 7). Findings from the survey show that everyday Thuy Phuong landfill received about 313 tonnes of domestic waste from the Hue City core area and its expanded area, with 266 tonnes/day from the Hue core and 47 tonnes/day from the expanded area. Medical and hazardous waste is treated by an incinerator with the capacity of 100 kilos/hour, while domestic waste was brought into a sanitary landfill with an area of 8.44 hectares.

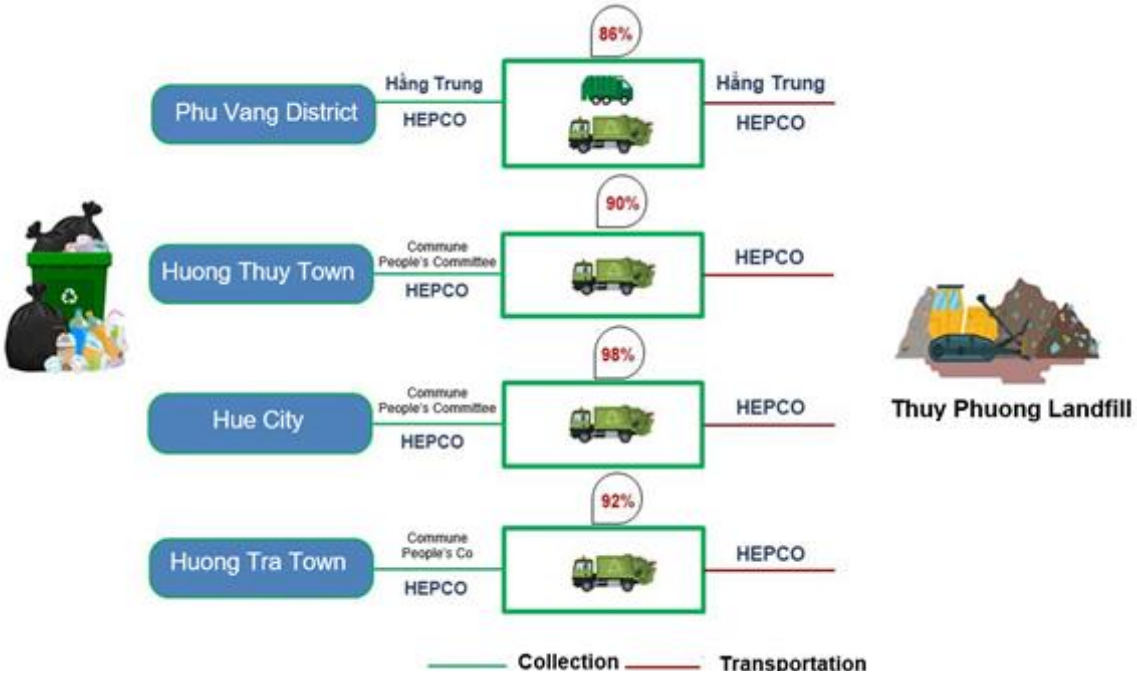


Figure 7. Domestic solid waste collection and transportation diagram in Hue City and some districts, towns of Thua Thien Hue province before September 2023

Solid waste recovery and recycling activities in Hue city mainly take place spontaneously and are carried out by informal groups, including junk shops, waste pickers, scrap collectors, some volunteer organizations and food scrap collectors. Currently, state agencies only manage and supervise junk shops administratively and their commitments related to environmental protection.

Service prices for solid waste collection, transportation and treatment in Hue City are applied according to Decision No. 2239/QD-UBND dated September 26, 2016 on the unit price of urban public services and Decision No. 16/ 2022/QD-UBND dated December 23, 2022 on amending and supplementing Appendix 2 issued with Decision No. 94/2017/QD-UBND. Funding for solid waste collection, transportation and treatment is mainly taken from sanitation fees and local budgets (district and provincial levels).

Although the collection service has covered 100% of residential areas with relevant infrastructure, there is still a small amount of solid waste (about 11 tonnes/day) that has not been collected, especially in the expanded area of Hue City. (WWF, 2021). Specifically, in the core area of Hue City, 1.6% of waste (1,892 tonnes/year) was not collected, while this figure in the expanded area was 9.5% (2,248 tonnes/year). The source of solid waste leakage in both

the core and expanded areas of Hue City is mainly due to uncollected waste. The solid waste leakage rate in the Hue City's core was lower than in the expanded area.

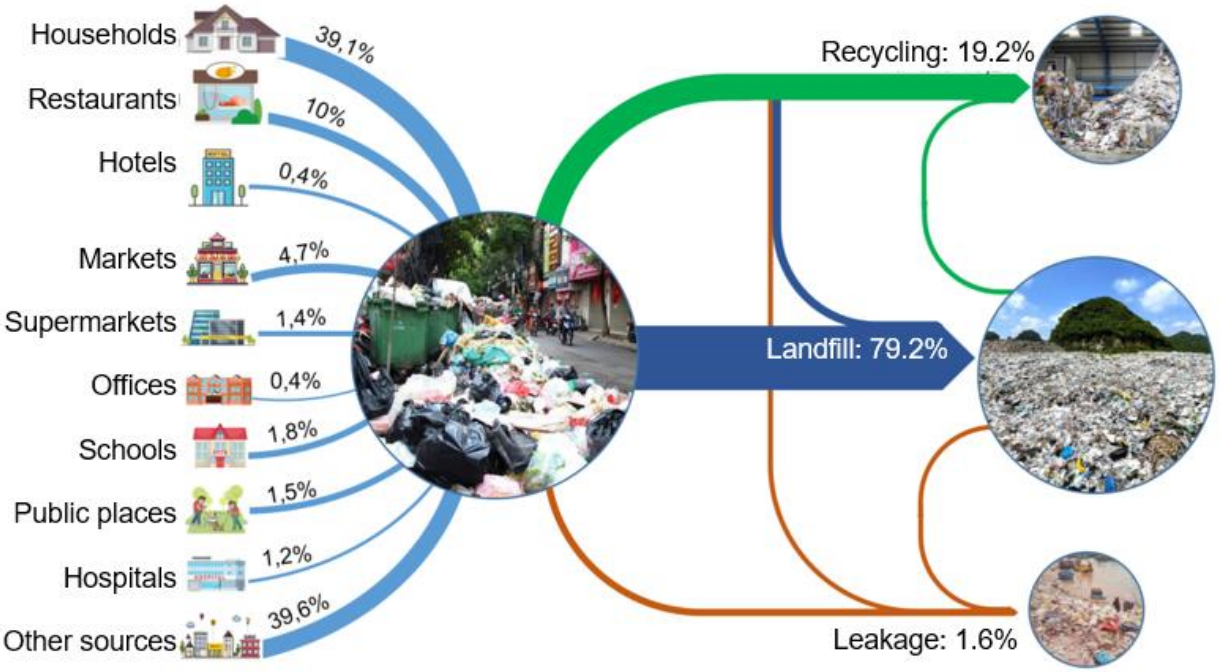


Figure 8. Solid waste flow diagram in Hue City's core (tons/year)

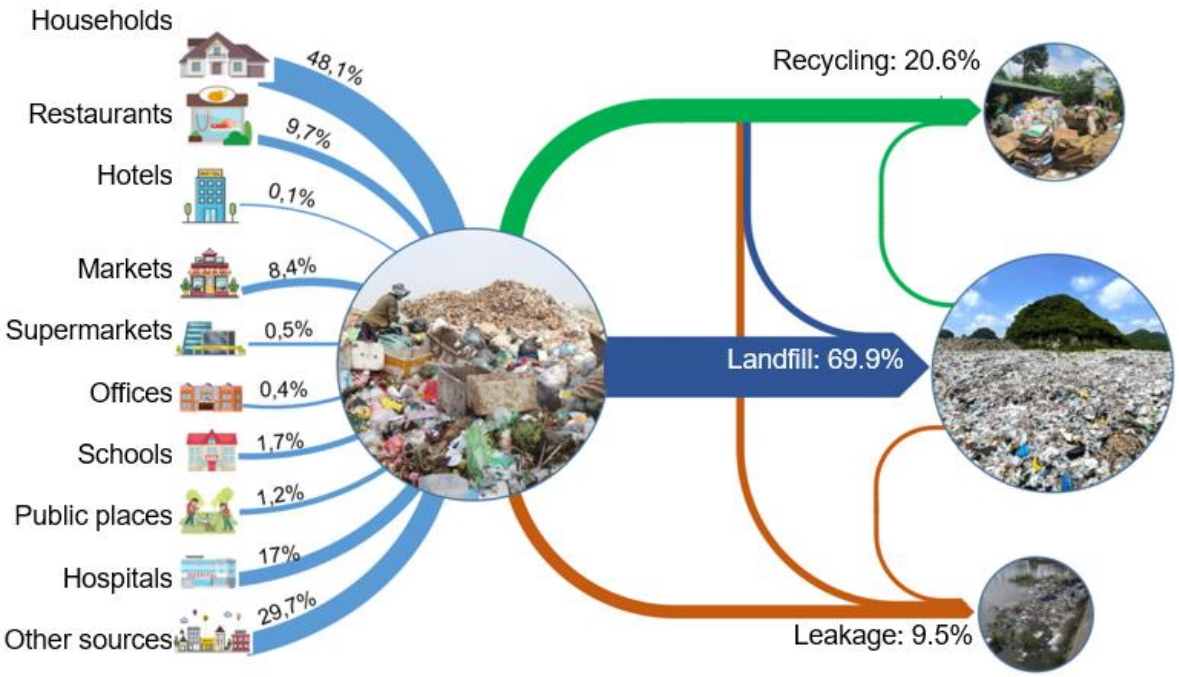


Figure 9. Solid waste flow diagram in Hue City's expanded area (tons/year)

Stakeholders and their responsibilities in solid waste management system

In domestic solid waste management in Hue City, the main stakeholders and responsibilities include:

- ✓ **Local authorities:** The City's People's Committee and wards/communes, are mainly responsible for promulgating and enforcing regulations on solid waste management; directing the process of implementing and promulgating specific policies and regulations; ensuring the organization of communication activities and closely monitoring the implementation of solid waste separation; investing in solid waste collection and treatment infrastructure.
- ✓ **Environmental agencies:** Units such as the Department of Natural Resources and Environment are responsible for monitoring, managing and assessing the impact of waste on the environment.

Figure 10. Hue – the City of "Heritage, culture, ecology, landscape, environmental friendliness"

- ✓ **Waste collection and transportation companies:** Play an important role in providing products and services including solid waste collection, transportation and treatment such as trash bins and sorting equipment and participating in the solid waste processing and recycling chain.
- ✓ **Social, political and mass organizations:** Act as core teams in implementing activities to change behavior, mobilizing their members and residents to participate in the solid waste management process, especially the implementation of solid waste separation and minimization.
- ✓ **Households and individuals:** As the source of waste generation, they are responsible for complying with regulations on sorting and transfer of waste-to-waste collection and transportation units
- ✓ **Enterprises and production organizations:** Companies, hotels, restaurants... also generate a significant amount of waste and must comply with waste management regulations.
- ✓ **Non-governmental organizations (NGOs):** WWF or other environmental protection organizations participating in research, technical assistance or implementing public awareness raising programs on waste-related issues.

✓ **Communities and groups of local residents:** Participate in activities to maintain sanitation, protect the environment and monitor waste management.

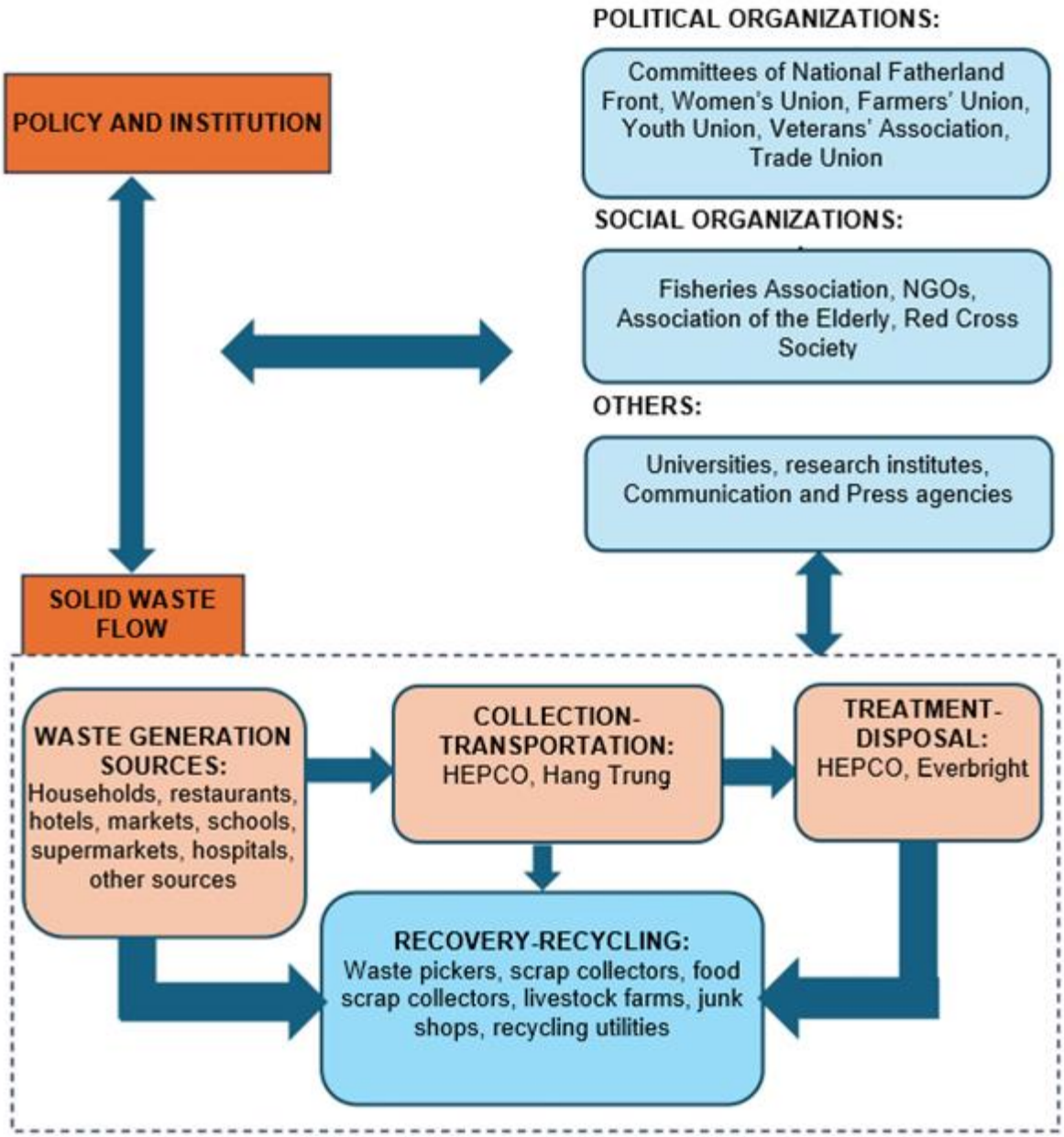
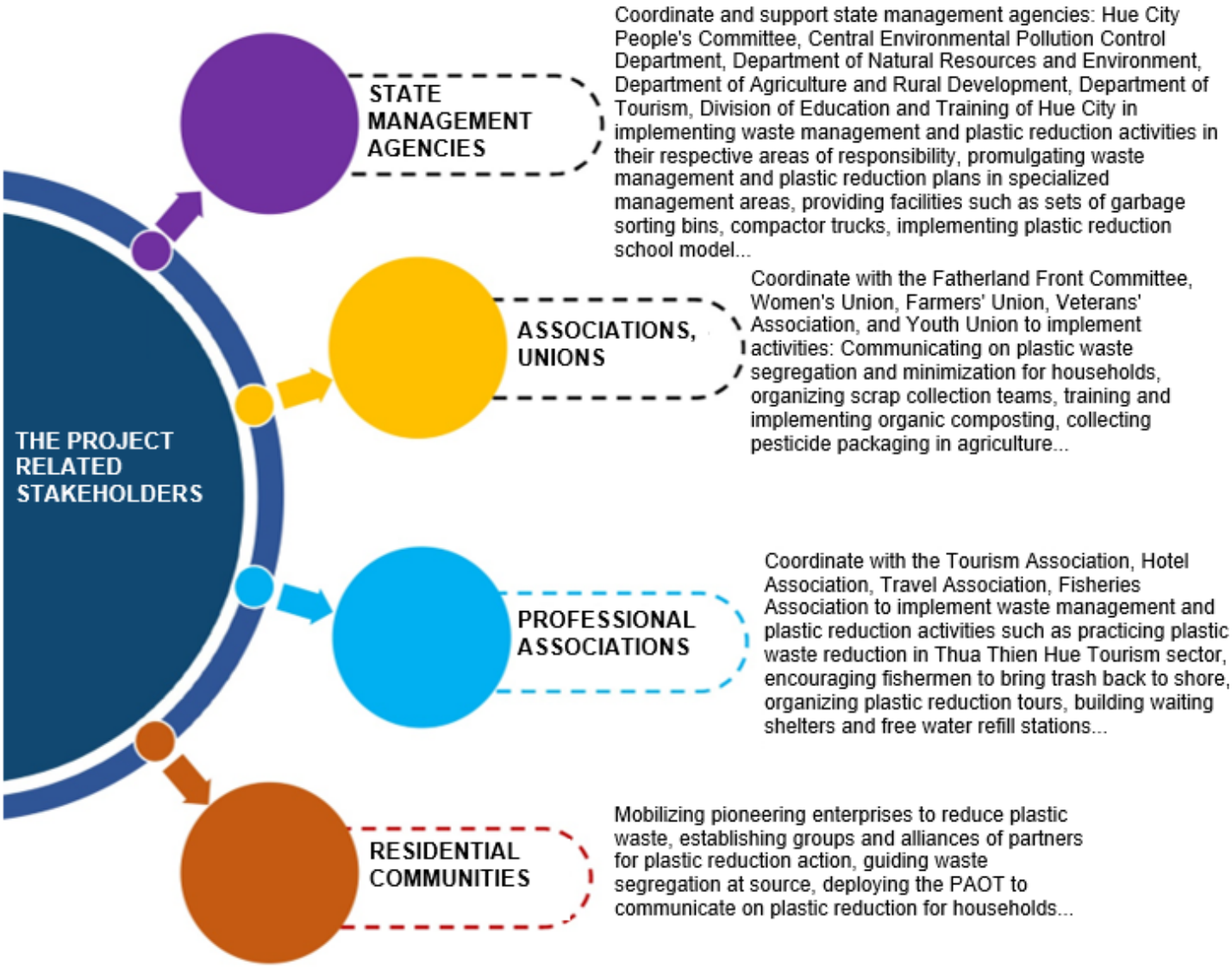


Figure 11. Key stakeholders in domestic solid waste management of Hue City

- ✓ **Researchers and educational organizations:** Participate in research on effective waste management methods, training and communication on waste management.
- ✓ **Informal waste collectors:** People who collect and recycle waste spontaneously, play a role in reducing waste but need better management.

The stakeholders in Figure 11 were identified as the result of the social assessment on the current status of solid waste management in Hue City by WWF-Vietnam in 2021.



Based on research results on the current status of solid waste management and analysis of the roles of relevant parties, the Project has called for active participation from state management agencies, unions, associations and residential community. Each unit and organization plays an important role in implementing intervention activities to achieve the overall goals of the Program. Activities are designed separately and in accordance with the functions, tasks, and capabilities of each agency and organization, ensuring synchronous and effective coordination towards the goal of reducing 30% of plastic waste leakage into the environment.

2.1 Building Plastic Waste Reduction Action Plan

To achieve the overall goal of the Program, the formulation and promulgation of documents and regulations to improve the solid waste management system in an integrated and effective way is a necessary and important step in the plastic waste minimization progress. With the vision that solid waste management in general and plastic waste in particular is a common responsibility of the whole society, a key task of all levels of government, departments, socio-political organizations and the community; the mobilization of the full and active participation of all organizations and individuals living and working in Hue city is crucial.

Documents and decisions related to solid waste and plastic waste management do not only demonstrate the City's commitment to environmental protection but also focus on the goal of building Hue into a Plastic Smart City and a green, sustainable tourist destination.

Below are the main guiding documents related to integrated management of solid waste and plastic waste, and documents on implementing plastic waste separation program in Hue City to meet the goals of increasing collection rates and enhancing recovery, recycling of solid waste and plastic waste, reducing the amount of solid waste to be treated and disposed of, and contributing to the goal of minimizing plastic waste leakage to the environment.

Hue City's Plastic Waste Management Plan

Hue City's plastic waste minimization action plan to 2025 and vision to 2030 (Plan No. 1121/KH-UBND dated February 22, 2022) focuses on managing plastic waste in a sustainable way, in accordance with integrated solid waste management principles. The plan sets the goal of building Hue into a plastic smart city through the following specific measures: Plastic waste management is a common responsibility of the entire society, the State plays the leading role and mobilizes resources from the community. Plastic waste will be collected, separated for reuse, recycling and disposal according to legal regulations.

Objectives:

- **Period 2022 - 2025:** Reduce at least 25 - 30% of the amount of plastic waste leakage into the environment compared to 2020, focus on eliminating hot spots of plastic waste at fishing ports, markets and public places.
- **Period 2026 - 2030:** Reduce from 50 - 100% the amount of plastic waste leakage into the environment compared to 2020 through improving the collection system and developing policies to minimize single-use plastic.

Action: The plan proposes measures: strengthening communication, training, plastic waste separation at source and building pilot models such as "Plastic waste free school" and "plastic waste reduction market".

Regulations on Solid Waste Management in Thua Thien Hue Province

The Plastic waste minimization Plan of the People's Committee of Thua Thien Hue province is stipulated in Decision No. 12/2023/QD-UBND focusing on solid waste management to protect the environment and promote sustainable development. This plan points out the responsibilities of all levels of government, from communes, districts to province in collecting, transporting and

handling solid waste, including domestic solid waste, industrial, medical, and hazardous waste with a focus on plastic waste.

Key measures include increasing plastic waste collection at fixed points, promoting recycling and safe disposal of solid waste, along with minimizing single-use plastics (SUPs) and raising public awareness of environmental protection. This plan also replaces previous regulations to improve the efficiency of solid waste management, to build a green and sustainable living environment for Hue City. These efforts do not only help reduce plastic pollution but also contribute to building the image of Hue as an environmentally friendly City.

Plan for Organization and Deployment of Domestic Solid Waste Separation at Source in Hue City (phase I)

The Plan No. 4130/KH-UBND dated June 10, 2022 focuses on raising community awareness and building the habit of waste separation at source. The main goal of the program is to implement waste separation at source according to the National Strategy on integrated solid waste management, to aim at building a green and environmentally friendly city.

The waste separation at source program in the city is divided into 02 phases:

- **Phase I (2022 - 2023):** Applied in 23 wards of the city before the merger, with the goal of implementing domestic solid waste separation at source, creating a strong change for the community in the habit of solid waste separation.
- **Phase II (2023 - 2025):** Implemented in 36 wards and communes in the city to raise awareness about environmental protection, to help organizations and individuals understand their responsibilities in waste separation.

Implementation roadmap:

- From June 2022, wards implemented the program with communication activities, equipment procurement, installation of sorting trash bins and provided training for the community.
- The program will be evaluated after 3 months of implementation to learn from experience and make adjustments.

Action steps:

o Garbage is sorted into 3 groups: reusable and recyclable, hazardous waste and remaining waste.

o Trash bins are placed at public locations and collection will be organized with appropriate frequency.

o Communication force and community monitoring teams are established in each ward to ensure effective waste separation.

Document on Requesting Urgent Implementation of Domestic Solid Waste Separation at Source according to Plan No. 4130/KH-UBND

Hue City People's Committee issued the Document No. 5623/UBND-MT dated July 29, 2022 requesting urgent implementation of domestic solid waste separation at source according to Plan No. 4130/KH-UBND dated June 10/ 2022, with the main content including:

1. **Communication:** The Division of Culture and Information coordinates with the Division of Natural Resources and Environment, the Centre for Culture, Information and Sports, and related units to strengthen the communication on domestic solid waste separation on mass media. Wards will use Broadcasting station to disseminate information from August 1, 2022.
2. **Installation of waste containers:** The Division of Natural Resources and Environment is assigned the responsibility of coordinating with relevant units to inspect and supervise the installation of clusters of containers, ensuring the completion before August 15, 2022.
3. **Local guidance:** People's Committees of wards will disseminate and provide specific instructions to each household, agency and unit in the area on the domestic solid waste separation procedure. The report on implementation results must be sent to the City People's Committee before August 12, 2022.

Plan for Organization and Deployment of Domestic Solid Waste Separation at Source in Hue City (phase II)

In continuation of implementing the Plan No. 4130/KH-UBND dated June 10, 2022 of the City People's Committee and in order to effectively implement the goal of domestic solid waste separation at source, on July 25, 2023, Hue City People's Committee issued the Plan No. 5881/KH-UBND on organizing and implementing the program for domestic solid waste separation at source in the City until 2025 (phase II).

- **Purpose:** The plan aims at strengthening domestic solid waste at source, contributing to the fulfilment of the criteria for domestic solid waste management of Thua Thien Hue province. Until 2025, all households, organizations and agencies in the City must comply with domestic solid waste separation at source.
- **Domestic solid waste separation:** Domestic solid waste will be separated into three groups: waste that can be reused and recycled (paper, plastic, metal), hazardous waste (batteries, accumulators, light bulbs) and remaining waste (excluding construction debris and large animal carcasses).
- **Implementation:** This phase will focus on communication, guidance and training for organizations and individuals. Waste sorting equipment and containers will be installed at public places and residential areas.
- **Monitoring:** Levels of authorities and relevant units will closely monitor implementation, while mobilizing community participation and socialization in waste management**.**

Therefore, these documents and plans have created a solid legal foundation for the management and treatment of domestic solid waste, contributed to the goal of building a green and sustainable Hue City, and accordingly reflected the commitment of local authorities in building a plastic smart City, enhancing living environment and raising community awareness about environmental protection.

2.3 Objectives and Timelines in Plastic Reduction Journey

The participation of Hue City in the global Plastic Smart Cities network supported and accompanied by WWF will create conditions for stakeholders, provide implementation guidance and resource support, to achieve the goal of No Plastic Waste in Nature by 2030. Hue City proposed a plan to participate in the Plastic Smart Cities program with the goal of reducing 30% of plastic waste leakage by 2024 and becoming a Plastic Smart City with 70% of solid waste being sorted at source, collected and processed, and the recovery of recyclables from the landfill is enhanced.

Figure 12. Standing Vice Chairman of Hue City People's Committee Tran Song (right) and Mr. Le Viet Tam - Director of Biodiversity Conservation WWF-Vietnam signed a commitment to turn Hue city into a Plastic Smart City

Targets and timelines in Hue City's plastic reduction journey:

- November 11, 2021: Commitment signing for becoming a Plastic Smart City in Central Vietnam.

- February 22, 2022: Issuance of Action Plan No. 1121/KH-UBND dated February 22, 2022 on organizing, deploying and managing plastic waste in Hue City until 2025, with vision to 2030.

- 2022: Deployment of plastic reduction interventions in 6 wards and communes of Hue City and reduction of 72 tonnes of plastic waste leakage into the environment.

- 2023: Expansion of plastic reduction interventions in 18 wards and communes of Hue City and reduction of 392 tonnes compared to target of 143 tonnes of plastic waste leakage into the environment.

- 2024: Expansion of plastic reduction interventions in 19 wards and communes of Hue City and reduction of 570 tonnes compared to target of 215 tonnes of plastic waste leakage into the environment.

With the Project's companionship and funding for 4 years, from 2021 - 2024, Hue has achieved over 260% of the Program's targets, effectively minimized the amount of plastic waste leakage into the environment and the plastic waste separation program has been deployed throughout Hue City.

3. ACHIEVEMENTS

3. ACHIEVEMENTS

3.1 Project Funding for Facility Improvement

Domestic Solid Waste Collection

The TVA project has provided equipment and facilities for Hue City to promote the efficiency of waste collection and separation at source, including: sets of bins for separated waste in wards and communes (240-liter bin), green houses for recyclables (green houses help promote recyclables collection while raising funds to support the activities of mass organizations), sets of bags for separated waste at households (including orange bags for hazardous waste, net bags for recyclables and grey bags for glass waste).

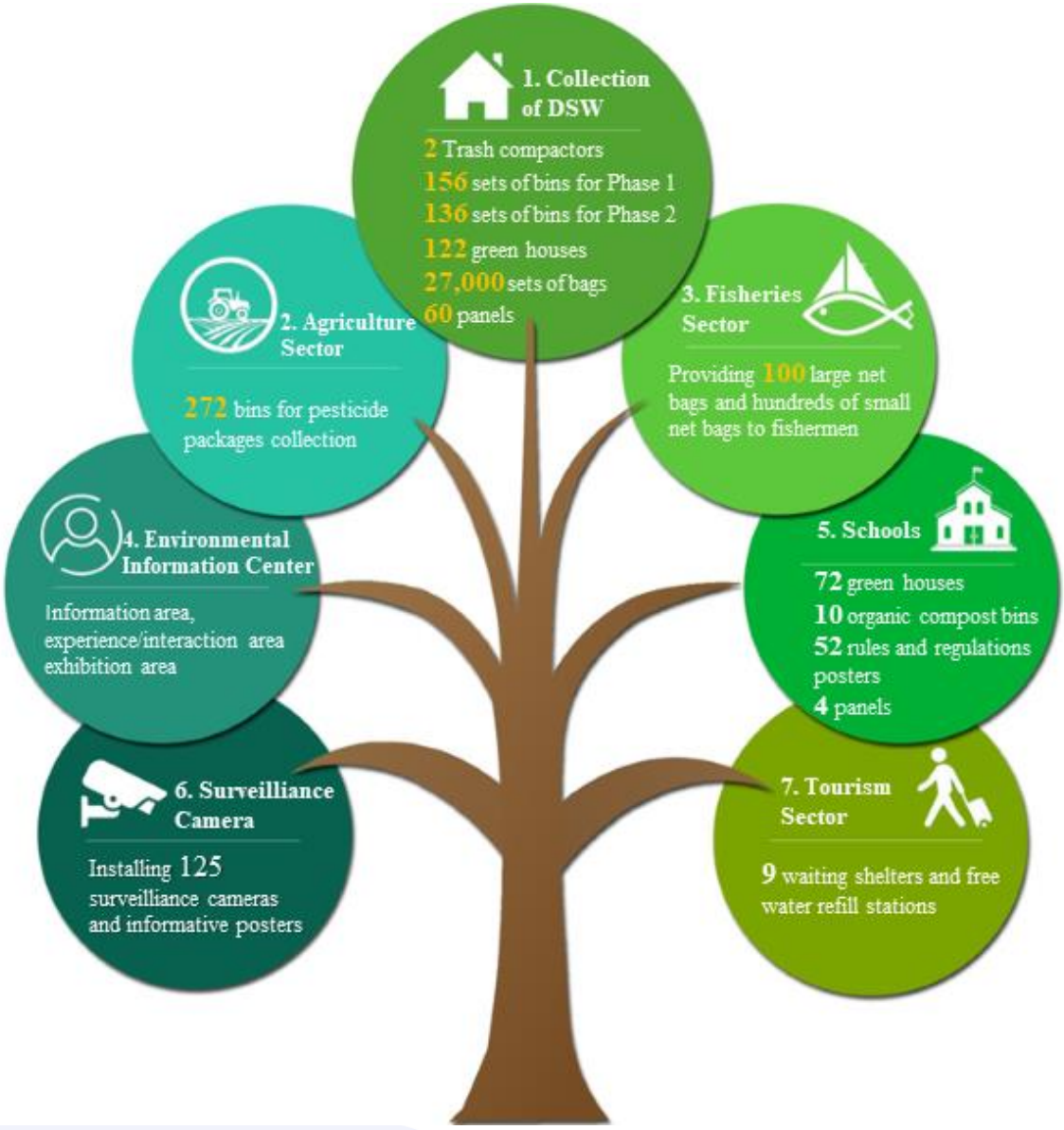


Figure 13. Facilities provided for Hue City to promote the efficiency of waste collection and separation at source

Figure 14. The project has offered a synchronous system of waste separation bins and green houses

Providing training for core officers in wards/communes; Providing technical support and training for households; Providing training for teachers (preschools, primary and secondary schools); implementing communication activities such as Manuals and instruction leaflets on WSAS, installing more than 60 outdoor panels, WSAS instruction videos broadcast on Thua Thien Hue Radio - Television Station (TRT), radio news broadcast on loudspeaker systems in ward and commune and via Zalo, Facebook fan page of Hue IOC, TVA project fan page, communicative videos shown in public areas. In addition, the project has supported the organization of “Exchange waste for necessities and ornamental plants” programs to motivate and promote the formation of habits for implementation of WSAS; Supporting local units to organize around 60 activities such as art contests, skits, and “Ring the Golden Bell” for enrichment of knowledge and integration communication on WSAS and plastic reduction. Providing technical support for monitoring and evaluation of the efficiency of the sets of waste separation bins and the extent of waste separation at households.

Upon the project’s proposal, Hue City’s Party Committee issued the Directive No. 15-CT/TU dated August 29, 2022 strengthening the leadership of the Party Committee, the local government, the role of the Fatherland Front and socio-political organizations in communication activities, advocacy and implementation of domestic solid waste separation at source program in Hue City. This program is associated with the movements such as the “Green Sundays”, “Sunday for the community”, self-management of environmental protection, new rural development, advanced new rural development, new-style rural areas, model of “skilled mass mobilization worker”, and other movements launched by the province and city, and its implementation is supervised at the same time.

Implemented training and communication activities

Provision of training for core officers of wards/communes on WSAS Program (13 trainings)		Number of meetings with local people	Number of households receiving training on WSAS	Cooperation with the Division of Education and Training of Hue City to provide trainings on how to organize WSAS teaching at schools.		Sponsoring the launching ceremony of the WSAS program (Number of participants)
Phase I (delegates)	Phase II (delegates)			Number of teachers	Number of schools	
400	300	120	6.000	200	101	100

Overall assessment: The project has provided a synchronous system of separation bins, waste bags and green houses to separate recyclables as well as promote the organization of training sessions for government officials, local residents and schools. The project also takes advantage of social media platforms and state media to propagate the idea of WSAS and PW reduction.

Collection of Hazardous Waste in Agricultural Cultivation

The project has created favorable conditions for the People's Committee of Hue City to issue the Plan No. 5625/KH-UBND dated July 17, 2023, on the collection, transportation and treatment of pesticides packaging in agricultural production in Hue City.

Figure 15. Collection bins for pesticide packaging on the field

After adjusting the administrative boundary (as of July 01, 2021), there is an area of 5,786 hectares used for agricultural production in Hue City. There are still large areas for rice production in some communes such as Huong An (740 hectares), Huong Phong (369 hectares), Huong Vinh (330 hectares), Phu Duong (309 hectares), Phu Thanh (284 hectares) and Phu Mau (246 hectares). In fact, a large amount of pesticides is found in agricultural activities. On average, farmers have to spray pesticides 5 to 7 times every rice cropping season; The number of sprays is applied even more for some types of vegetables. After being used, those pesticide packaging are often discharged on the fields, ditches, or canals. Therefore, there must be a solution to collect and treat this type of waste to protect the environment and prevent PW leakage into the environment.

Stakeholders: Natural Resources and Environment Division, Economics Division, City Farmers' Union, Thua Thien Hue Fisheries Association; Hue Environment and Urban Works

Joint Stock Company (HEPCO), the People's Committee of 24 coastal wards/communes and districts.

The project has funded the City 272 bins (240-liter orange color bins) for pesticide packaging and communicative panels about environmental protection in agricultural production. In particular, 12 bins were installed in Huong An Ward in 2022 as a pilot program, and by September 2023, 260 bins were installed for all wards/communes of the City where agricultural production exists.

Some requirements when installing collection bins for pesticide packaging:

Location of bins: near water bodies that farmers need to fetch for pesticide preparation before spraying
At least 01 point/03 hectares of agricultural land;
63 points were selected as gathering points, acting as both location for setting bins and collection points for gathering from nearby bins so that it will be more convenient for loading and transportation.
Each bin was anchored with iron piles with a strong foundation base and stainless-steel chains to avoid drifting during the rainy season.

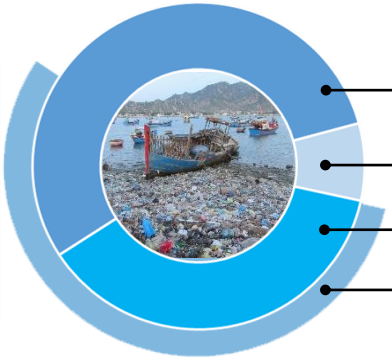
Overall assessment: With coordination and supervision of the Farmers' Union of Hue City, all collection bins for pesticide packaging have been completely installed and put into use from September 2023. However, people still have not developed the habit of discarding pesticide packaging into the collection bins. Therefore, it is necessary to further promote communication activities to encourage people to dispose of used pesticide packaging in the designated places while closely monitoring and handling violations.

Figure 16. Collection bins were handed over to all agricultural wards/communes

Collection of Plastic Waste in the Fisheries Sector

Upon the Project's proposal, the Department of Agriculture and Rural Development issued the Plan No. 1052/KH-SNNPTNT on reducing PW generated from fisheries sector in Thua Thien Hue Province from 2023 to 2030.

According to the study of the Provincial Fisheries Association (2022), the amount of PW from fishery activities was roughly 131 tonnes/year, of which 56% is single-use plastics, generating more than 2.8 million plastic bags.



55%, Capture Fisheries

8%, Aquaculture

37%, Other activities

56%, Single-use plastics

50 tonnes of plastic bags per year

The Project has cooperated with Thua Thien Hue Fisheries Association to provide trainings about the provisions of the law on PW management to fisheries managers and about the impacts of PW to five fisheries sub-associations in Thuan An Ward, Huong Phong Commune and Hai Duong Commune.

- Organized "Green Sundays" with 198 participants. Cleaned up coastal and lagoon areas and collected **12.3** tonnes of waste, including 4.3 tonnes of plastic waste
- Dong Phong fisheries sub-association (Huong Phong Commune) has established a self-management team to daily and weekly collect waste during their fishing in lagoon and river. By September 2024, the team had collected more than 2.9 tonnes of waste, of which nearly 2 tonnes were plastic waste.

The Project also cooperated with Thua Thien Hue Fishing Port Management Board to provide trainings on the impact of PW to offshore fishing crews and encouraged fishermen to bring waste ashore.

- **100** large net bags for offshore fishing vessels and hundreds of small net bags for nearshore fishing vessels were provided to fishermen to encourage them to bring waste ashore.
- **30** pioneer fishing vessels were mobilized by the Port Authority to carry out litter logging on board in accordance with the guidance of Appendix V of MARPOL Convention.
- 4 tonnes of waste, including more than **2** tonnes of PW, were collected.
- The Port Authority collected more than **23.3** tonnes of waste, of which nearly **6.02** tonnes were PW with the installation of waste removal equipment mounted on the patrolling canoes

Stakeholders when taking actions to reduce plastic waste in the fisheries sector: Natural Resources and Environment Division, Economics Division, City Farmers' Union, Thua Thien Hue Fisheries Association; HEPCO, the People's Committee of 24 coastal wards/communes and districts.

Overall assessment: PW collection from fisheries sector has received the attention of fisheries sub-associations and trade unions. However, carrying out in the peak fishing season, training and communication activities faces a lot of difficulties. In addition, the separation bins at Thuan An fishing port have not been installed in the right position, therefore, it is impossible to promote the efficiency of waste collection. The project calls on fishermen to actively bring waste from the sea to gathering points and requests the People's Committee Hue City to contract with waste collection service providers for long-term treatment.

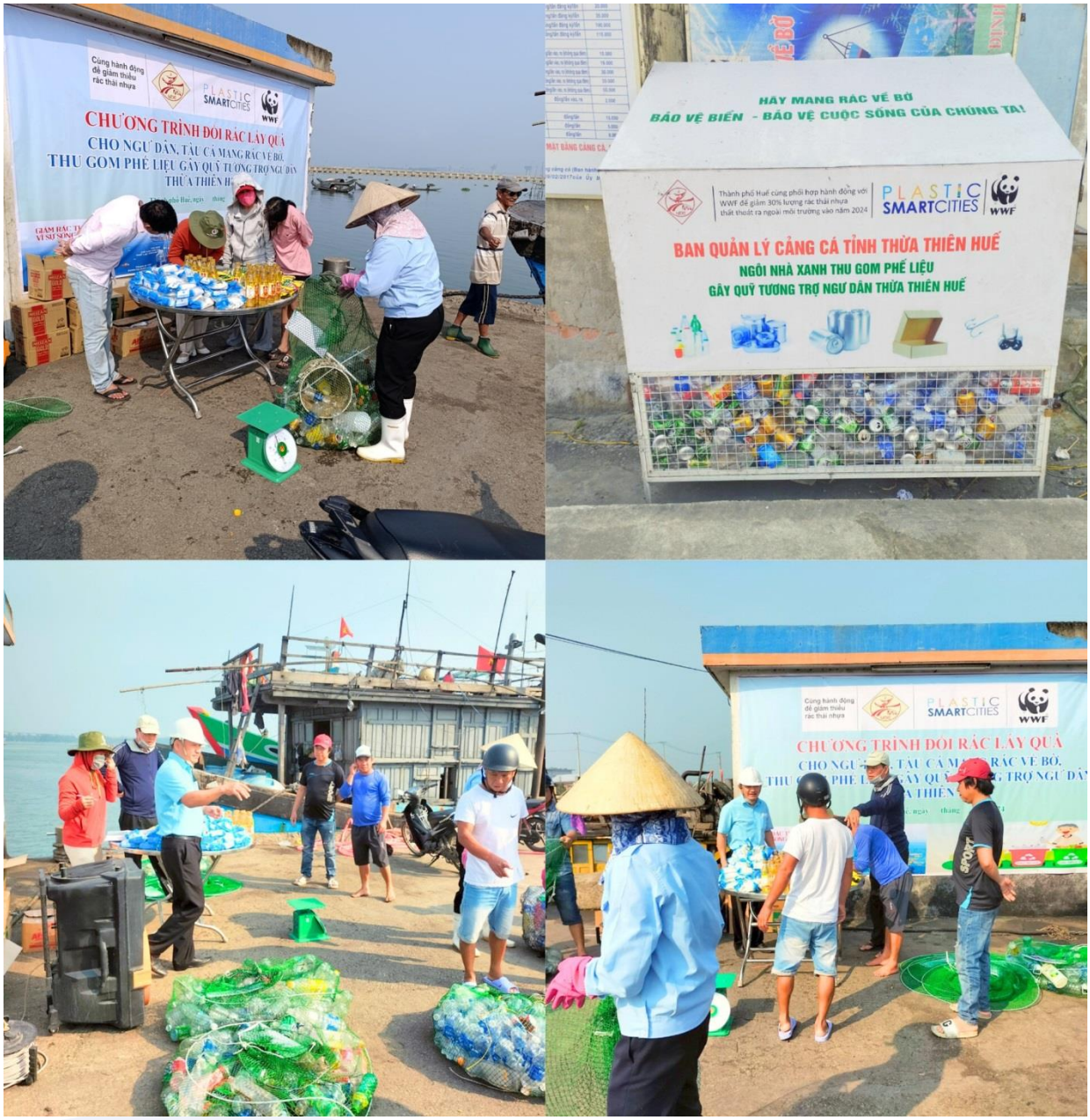


Figure 17. Stakeholders involved in plastic waste reduction in the fisheries sector

Providing Green Houses and Compost Bins for Schools

The project has equipped the participating schools with 72 green houses, 10 organic compost bins and 52 rules and regulations posters to promote WSAS and PW reduction with the following purposes:

- ✓ Raise students' awareness about WSAS.
- ✓ Recyclables collected from the green houses can be sold to raise funds for school activities, and organic fertilizer can be used for growing plants and trees on the school grounds.

Overall assessment: The green houses at schools have made a great contribution to raising students' awareness and changing their habits about recyclables separation and collection.

Handing Over 02 Compactor Trucks to Hue City

On September 28, 2024, the TVA Project handed over 2 modern compactor trucks to Hue City with a total value of nearly VND 10,000,000,000. These two trucks belong to the new generation of all-in-one trash compactors of ISUZU 3 with an average gross weight of 24 tonnes, holding an average of 20m^3 of trash and meeting EURO 4 emission standards.

The amount of waste collected in Hue city is quite large, more than 410 tonnes per day (2024). In addition, in early 2024, Phu Son Waste-to-Energy Plant officially came into operation, the distance of waste transportation is longer, so having more large-capacity compactor trucks will improve the efficiency of waste transportation for the city, contributing to minimizing waste leakage in general and reducing PW into the environment. With the advantage of large-capacity vehicles, the number of transportation trips will be reduced, thereby reducing costs and transportation time as well as environmental pollution.

Figure 18. TVA project handed over 2 modern trash compactors to Hue city.

Overall assessment: The provision of 2 large-capacity compactor trucks with advanced technology will contribute to improving the transportation capacity of waste collection service providers, minimizing plastic waste leakage into the environment, eliminating odors, and optimizing the cost of collecting and transporting solid waste to Phu Son Waste-to-Energy Plant with a longer distance than Thuy Phuong landfill.

Construction and Operation of the Environmental Information Centre

In coordination with HEPCO, the TVA Project built the Environmental Information Centre at 46 Tran Phu, Hue City. The centre is a place that provides information and communication to raise awareness for residents in Hue City about PW reduction and WSAS, moving towards the success of the WSAS program in Hue City.

With the purpose of being a tourist destination serving the community, the structure of the Centre incudes 3 main parts: an indoor information area, an exhibition area and an experience/interaction area. The information area provides information on the composition of waste (organic waste, glass waste, reusables and recyclables, and others), the harmful effects of some types of waste and methods of WSAS through games with attractive designs. The exhibition area displays educational picture books, documents and video presentations on WSAS, plastic recycling initiatives, posters, manuals and 3D model instructions and wall drawings. The experience area will guide visitors to separate waste according to its composition (organic waste, recyclables, glass waste, hazardous waste and other type of waste). In addition, the Centre also coordinates with other units to provide additional services such as giving instructions on how to design and make recycled products.

The Centre has organized many meaningful activities such as “Recycling Day”, “Exchanging Trash for Gifts” event, “Green Reception Point”. In coordination with the HEPCO’s Youth Union, the Centre has cooperated with the “Green Sunday” program to organize outdoor activities and events such as a drawing/knowledge competition for teenagers in Hue City about waste separation and PW reduction. These activities have attracted more than 1,400 visitors.

Figure 19. Recycling Day - Hue 2023 held at the Environmental Information Centre

Overall assessment: The Environmental Information Centre contributes to promoting and raising public awareness of WSAS and PW reduction in Hue City. This is an ideal destination for educational activities for school students so that they can learn more about WSAS and PW reduction.

Construction and Installation of Waiting Shelters and Free Water Refill Station at Heritage Sites and Tourist Attractions

In coordination with Hue Monuments Conservation Centre, Thua Thien Hue Department of Tourism and Green Park Centre in Hue City built **9** waiting shelters and free water refill station for visitors and residents at heritage sites and tourist attractions.

At these stations, residents and visitors can drink water directly from the tap or refill their personal water bottles. This helps to reduce PW from water bottles that visitors bring with them. According to preliminary statistics in 1 week, during the peak summer season, each waiting shelters and free water refill station attract 900 visitors, reducing more than 3,300 water bottles.

Figure 20. The waiting shelter and free water refill station at Gia Long mausoleum

> **Overall assessment:** The waiting shelters and free water refill stations not only create an image of a tourism-friendly city but also contribute to reducing plastic waste from tourism activities.

Installation of Surveillance Camera System to Support Solid Waste Management

In 2021, according to a survey of the current status of major polluted areas in Hue city, 19 polluted hotspots in 15 wards/communes were discovered. These hotspots are mainly in the areas that have been merged into the city since July 1, 2021. They are located along the traffic routes, and are far from residential areas, so they exist for a long time.

According to the announcement of the local authorities of wards/communes, illegal waste dumping still occurs frequently at night and far from residential areas, making it difficult for the authorities to detect violations. In order to support the authorities in solving this situation, from 2022 to 2024, TVA project has sponsored 125 surveillance cameras to monitor illegal waste dumping along with posters placed at polluted areas in 20 wards and communes.

> **Overall assessment:** The surveillance camera system has improved monitoring capacity and reduced environmental pollution caused by illegal dumping.

Supporting policy improvement

TVA/WWF-Vietnam project has coordinated with the city government and departments to implement the following activities

1 THE PEOPLE'S COMMITTEE OF HUE CITY

PLAN NO. 4130/KH-UBND dated June 10, 2022 organizing and implementing the Program on separation of Domestic Solid Waste at Source (SDSWAS) in Hue City (Phase 1).

4130

1502

2 THUA THIEN HUE DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

Plan No. 1052/KH-SNNPTNT dated May 23, 2023 reducing plastic waste from the Fisheries Sector in Thua Thien Hue Province for the period from 2023 to 2030

3 THE PEOPLE'S COMMITTEE OF HUE CITY

PLAN NO. 5625/KH-UBND dated July 17, 2023 organizing the collection, transportation and treatment of used pesticide packaging in agriculture production in Hue City

5625

4 THE PEOPLE'S COMMITTEE OF HUE CITY

PLAN NO. 5881/KH-UBND dated July 25, 2023 organizing and implementing SDSWAS Program in Hue City by 2025 (Phase 1).

5881

1741

5 THUA THIEN HUE DEPARTMENT OF TOURISM

PLAN NO. 1741/KH-SDL dated October 26, 2023 reducing plastic waste in the tourism industry in Thua Thien Hue from 2023 to 2025.

3.2 Models and Good practice

Plastic Waste Reduction School Model

The plastic waste management plan in Hue City has set out a key task of raising awareness and changing behaviors towards SUPs in particular and plastic waste in general. This has been done through integrating the topic of plastic pollution into curriculum at all levels, and developing materials and providing training for teachers. The TVA project has also identified primary and lower secondary school students as priority audiences for environmental education activities, aiming to instill habits and behaviors to reduce plastic from a young age, spreading to their families and community. Therefore, within the framework of the Project, WWF-Vietnam has coordinated with the Division of Education and Training of Hue City to fund 52 schools (including 01 kindergarten, 30 primary schools and 21 lower secondary schools) in 19 wards/communes participating in the project to implement the plastic waste reduction school model to reduce plastic waste as well as organize environmental education activities to raise awareness of students and teachers about the impact of plastic waste. To tailor the activities to the specific conditions of each school, the project staff worked closely with the schools to plan at the beginning of each school year to ensure that activities continued throughout the year. The activities were divided into two main categories: curricular and extracurricular activities.

For the curricular activities: the contents of WSAS and plastic waste reduction were integrated into the lessons, the project has coordinated with consultants to compile and publish the reference document - “Teaching Handbook for Integrating Plastic Waste Reduction into the General Education Program in Hue City”. This document includes lessons and educational activities that can be used for 54 lessons at both primary and lower secondary levels. The content of the document focuses on a number of main subjects including Experiential Activities - Career Guidance, Vietnamese, English (primary program); Experiential Activities - Career Guidance, Literature and Geography - History (lower secondary program).

Figure 21. Integrating the content of WSAS and plastic waste reduction into the lessons

For extracurricular activities, the project collaborated with schools to implement a variety of engaging activities involving multiple stakeholders such as HEPCO, local organizations and market traders. Through interactive activities with the community outside the school such as distributing paper bags to market traders, participating in art performances with the local Veterans Association, and experiencing a day in the life of an environmental worker, students gain opportunities to share knowledge about WSAS and plastic waste reduction with a broader audience. Additionally, these activities help students develop a deeper appreciation for the hard work and efforts of the “unsung heroes” who contribute to keeping Hue City “Green - Clean - Bright”.

Students have access to information about WSAS and plastic waste reduction through various competitions such as Ring the Golden Bell contest, speaking contest, painting and book cover design contest along with communication sessions during flag-salute ceremonies. The information is also shared by students through the school’s youth radio program, ensuring that all students are reached.

Figure 22. Forming “I love the environment” clubs in primary and lower secondary schools

In addition, students participate in school waste audits to better understand the waste situation at their schools. The volume and number of waste items collected by each group reflect the habits of students and office staff, providing valuable insights that help the schools develop regulations and plans to reduce waste, especially SUPs. To further encourage recyclables separation, the “Exchange trash for gifts” initiative has been carried out at each school and has received strong participation from students.

At each participating school, “I love the environment” clubs have been formed. At these clubs, students engage in activities that focus on environmental protection. These activities are introduced by teachers, with one topic covered at a time. Students will become “Green Ambassadors” themselves by practicing WSAS and plastic waste reduction both at school and at home, which is in line with the Participatory Action-Oriented Training (PAOT) method. Each

student serves as a young communicator within their class and family. Club members are instructed to use a checklist with 9 actions divided into 3 categories (WSAS, plastic waste reduction at school and plastic waste reduction in daily life) and how to record their good practices on a monthly basis. These records will be compiled by parents and teachers in charge of the club to acknowledge the students' efforts and motivate them to continue their positive actions. To help schools familiarize themselves with the PAOT method, the project conducted 01 training and experimental course specifically for 150 primary and lower secondary school teachers on October 26, 2023. Moreover, the project staff also accompanied the schools throughout the implementation process, from November 2023 to the end of May 2024.

To improve solid waste management at school, in addition to implementing the activities mentioned above, the Project also provides technical and physical support to schools, including: trash bins, green houses and model of composting from organic waste. The composting model mainly uses garden waste at school because kitchen waste accounting for only a small, insignificant amount. Moreover, schools implementing this model have many trees, hence, the source of compost is abundant. If utilized, it will reduce the amount of waste generated from the school. In addition, the finished dry or liquid compost can be used to fertilize the trees or vegetable garden in the school, creating diverse experimental models for students to interact with and experience.

Since 2022, the project has funded and promoted 52 schools in adopting plastic reduction models. A total of 17,442 students and teachers participated in activities and models with 88 integrated lessons and 25 "I love the environment" clubs were formed, attracting more than 500 students to participate in implementing the PAOT method. The experiential lesson is chosen the most for integrated curriculum due to the flexibility in the content that facilitates teachers to convey vivid images and games, captivating students' interest and participation. In these lessons, teachers not only collect their own content, but also create specific kits for WSAS and plastic waste reduction to serve their teaching purposes. These lessons not only feed information to students but also help them remember more deeply through interactions with teachers and among students.

Figure 23. Students experiencing a day in the life of an environmental worker

During each school year, each school organized at least 01 contest related to environmental protection, 01 activity of exchanging waste for gifts, 01 flag-salute ceremony and 02 waste audits. These activities engaged nearly all students in the schools. In some schools, awareness campaigns are also carried out through youth radio broadcasts (8-10 broadcasts per school) with content compiled by the students themselves based on their knowledge of WSAS and plastic waste reduction that they gained through the project.

Figure 24. Green house – where recyclables are collected gifted by TVA projects to schools

To create connections between schools participating in the "Plastic Reduction Waste School" model in Hue city, the project organized 01 summer camp and 02 ***"Recycling Day"*** *events* with the participation of hundreds of students. During the event, students reviewed the activities they had done at school and visited recycling booths and played group games related to WSAS. These events are not only a place for schools to exchange experiences and operational effectiveness at each school but also a place for students to interact, enhance knowledge and experience.

Figure 25. Students and Parents' engagement in the activities

72 "Green Houses" were handed over to 52 schools to improve the collection efficiency of recyclables. These models were designed to be student-friendly with separate compartments for paper and plastic waste, suitable for the characteristics of waste generated at schools compared to household waste. Schools also received funding to participate in and organize events such as "Exchange waste for school supplies" and "Recycling Day" to motivate students to practice waste separation at home and at

school. Thanks to these activities, the green houses of 52 schools collected 99kg of plastic and 123kg of other recyclables.

Currently, the organic waste treatment model is being implemented in 02 primary schools and 08 lower secondary schools. The staff in charge of the model at each school received technical training and were supported with facilities for pilot. Specifically, the model at Tay Loc Primary School used both kitchen waste and garden waste to create dry organic fertilizer from the compost bin, then fertilizes the trees in the school. Meanwhile, Phu Thuong Primary School only uses garden waste as compost material and applies both dry and liquid compost models. In particular, the project has supported schools to transform part of the school's land into an experimental vegetable garden for students. Some classes, along with teachers in charge, are assigned to take care of each area of the vegetable garden and use composted organic fertilizer to fertilize the leaf vegetables grown. Through this model, students have opportunities to engage in activities close to nature, learn about some plant species and understand more about the potential of utilizing organic waste. For the remaining 8 lower secondary schools, the staff in charge of the schools are supported by the project with composting equipment and guidance on composting techniques through a group of consultants working with the schools.

> **Overall assessment:** Close cooperation and persistent efforts from stakeholders have contributed to raising awareness of plastic waste reduction in particular and environmental protection in the school environment in general. Notable activities include: auditing waste at schools; developing a plan to integrate plastic reduction into curricular activities and implementing extracurricular activities such as communicating during flag-salute ceremonies, broadcasting to young people about the harmful effects of plastic waste, organizing the Green House model, drawing contest on environmental protection and Green Living Day, etc.

Figure 26. Vegetable garden model at Phu Thuong Primary School using organic fertilizer from waste

Waste separation at source

The 2020 Law on Environmental Protection stipulates that by December 31, 2024, localities nationwide must implement the WSAS program. The People's Committee of Thua Thien Hue Province issued Official Document No. 4512/UBND-GT dated June 1, 2020 guiding the solid waste separation at source in Thua Thien Hue Province. The WSAS program in Hue City is divided into 2 phases:

- ✓ Phase I: According to Plan No. 4130/KH-UBND of the People's Committee of Hue City.
- ✓ Phase II: According to Plan No. 5881/KH-UBND of the People's Committee of Hue City.

Waste is divided into 3 categories:

- ✓ Recyclables and reusables
- ✓ Hazardous waste
- ✓ The remaining waste

The activities and results of the implementation of 2-phase WSAS are described in the following table:

Phase I	Phase II
Provided **156** sets of trash bins	Provided **136** sets of trash bins
	
Provided **27,000** waste separation bags for households	
	
2 training sessions for **400** delegates	**1** training session for **300** people
	
6,000 turns of government officers and residents received intensive training and guidance on WSAS	
	

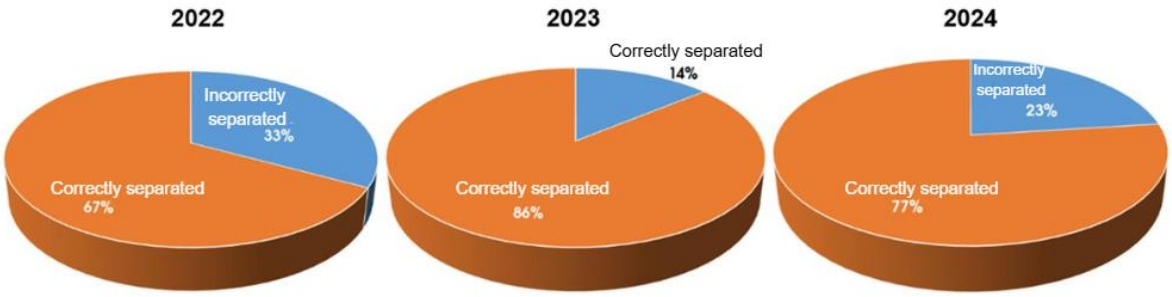
Sponsored the launching ceremony of WSAS program with **100** participants

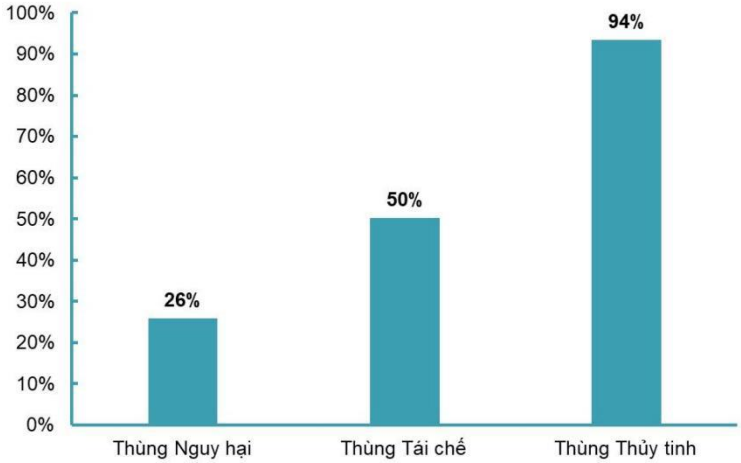
Provided training for over **200** teachers of **101** kindergartens, primary schools and lower secondary schools

Supported the establishment of **37** community monitoring teams and core communication teams (**612** people) communicating to over **28,000** households and over **53,000** inspections and monitoring visits

The result of the inspection of households that got the waste separation bags (2023): **68%** households separated waste.

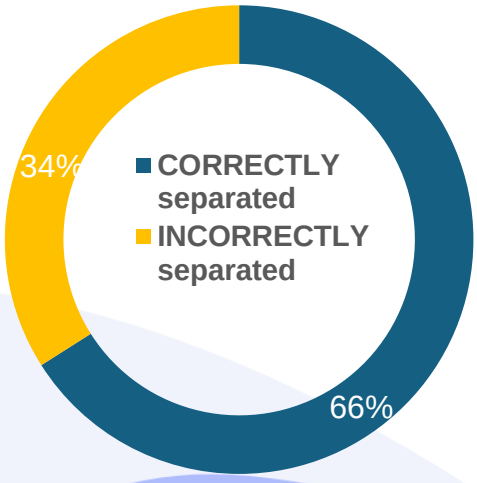
Results of the inspection of waste separation level by community monitoring teams and HEPCO at waste storage points: December 2022, **2,054kg** of waste was disposed at the points, the correct separation rate was **67%**; December 2023, **11,200kg**, correct separation rate was **86%**; July-August 2024, **11 tonnes** of waste were disposed of at points, the correct separation rate was **77%**.





Percentage of waste CORRECTLY separated at each separation bin across the area (2024)

Waste separation audit at households in 19 wards participating in the Project



Overall assessment: The strong, continuous and appropriate support of the project has significantly improved the capacity and effectiveness of SWM and plastic waste reduction in Hue City. The results show that there has been a positive change in people's awareness of disposing waste in the right place as well as doing WSAS.

Stakeholder engagement in communicating and advocating people to implement WSAS

The communication and advocacy activities for people to implement WSAS are accompanied and supported by stakeholders, from the authorities at many levels, specialized agencies to associations, socio-political organizations, etc.

Unit/Organization	Communication activities
Dong Ba Market Management Board	Promote organic recycling, build 21 eco-stalls. Provide training on organic waste separation for agricultural and fruit stalls.
City Women's Union	Support female scrap dealers and junk shops.
Provincial Women's Union **City Farmers' Association**	Promote WSAS and plastic waste reduction through organizing training sessions, green living day, organizing recycling activities and treating organic waste.
Department of Natural Resources and Environment	Organize training for key officials in districts and towns in the province on WSAS and plastic waste reduction.
Thuan An Fishing Port Management Board **Provincial Fisheries Association**	Organize training and communication for fishermen about WSAS and plastic waste reduction.
City Veterans Association **Hue City Youth Union**	Communicate WSAS and plastic waste reduction to each household and high school students.
Provincial Department of Tourism **Provincial Tourism Association** **Hue Monuments Conservation Centre**	Communicate and promote tourism and service businesses to commit to reducing plastic.
University of Sciences, Hue University	Integrate plastic waste into curriculum for university students, publish articles in domestic and international journals on plastic waste.
Hue College of Tourism	Issue and teach standard procedures towards plastic reduction in vocational training for students.

a. Collective groups of scavengers

Recyclables recovery activities in Hue City are currently carried out by informal groups. These informal groups which collect reusables and recyclables have played a very important role in the SWM system. However, there are no specific policies to support the activities of these groups and the city still does not have tools to control and monitor recyclables.

To help those working in this field improve their livelihoods and enhance their social status, the project has cooperated with the Women's Union at all levels to establish of two collective groups of scavengers with 22 female members in An Dong Ward (in charge of collecting scrap in the area on the Southern bank of the Huong River) and Huong So Ward (in charge of collecting scrap in the area on the Northern bank of the Huong River). With the support of the project, the members work together in an organization under the auspices of the Women's Union. Acting in organized activities, they have better access to large volume of scrap from companies and schools as well as opportunities to participate in events and campaigns of the Women's Union and local authorities. Through these opportunities, they can demonstrate their capacity, speak up and advocate policies that are favourable to their profession. In addition to purchasing directly from households, the partnership groups cooperated with mGreen App to purchase from scrap sellers through booking on the App. They have purchased more than 50 tonnes of recyclables and 10.2 tonnes of recyclable plastic waste.

> **Overall assessment:** The establishment and support of the collective groups of scavengers and the mGreen App have improved the efficiency of recyclables collection, livelihoods and enhanced the social status of female scrap dealers.

Figure 27. The project has cooperated with the Women's Union to establish the collective groups of scavengers.

b. Participatory Action-Oriented Training (PAOT) Methodology Model

The Participatory Action-Oriented Training (PAOT) methodology is a method researched and developed by the United Nations International Labour Organization (ILO) (1986 - 2000) to promote volunteering- based and on-the-ground initiatives, self-reliant actions that help local people to make immediate and incremental improvements using locally available experience and resources. So far, the method has been applied in many fields of health, education, rural development, child injury prevention, clean water and sanitation, climate change and most recently in the field of plastic waste reduction, etc.

Based on the experience of implementing the PAOT method in plastic reduction communication within the WWF-Vietnam's "Mitigating Marine Plastic Debris" project in Phu Quoc, the TVA project has adjusted the PAOT toolkit to suit the current SWM in Hue City for households and small-scale businesses after 3 implementation phases from 2023 - 2024. The PAOT toolkit usually includes:

Checklist	Handbook for communicators	Supported tools
		

Figure 28. Voluntary and self-reliant action helps locals implement WSAS

For households

Initially, many households had not been ready, but after the project members shared the benefits of waste separation, most people registered to participate in the WSAS model. The change in people's behavior when participating in PAOT is shown as follows:

Activity	Percentage of change in the activities	
	Before communication activities (%)	Commitment to practice after communication activities (%)
WSAS		
Hazardous waste	50 - 60	95 - 97
Recyclables	70 - 85	99
Organic waste	83	93
Compost/enzyme	13 - 21	41 - 48
Properly disposal		
Separate construction waste and animal carcasses from household waste	73	98
Not burning plastic waste	89	99
Participating in Green Sunday	66	89
Plastic waste reduction		
Avoid using plastic bags when shopping	82 - 85	98 - 99
Bring personal items or refuse SUPs	84	98

The process of monitoring and inspecting the model shows that the households have fulfilled their commitments, estimated to have reduced 2 million plastic bags and more than 800,000 SUPs of other types, equivalent to 15 tonnes of plastic waste.

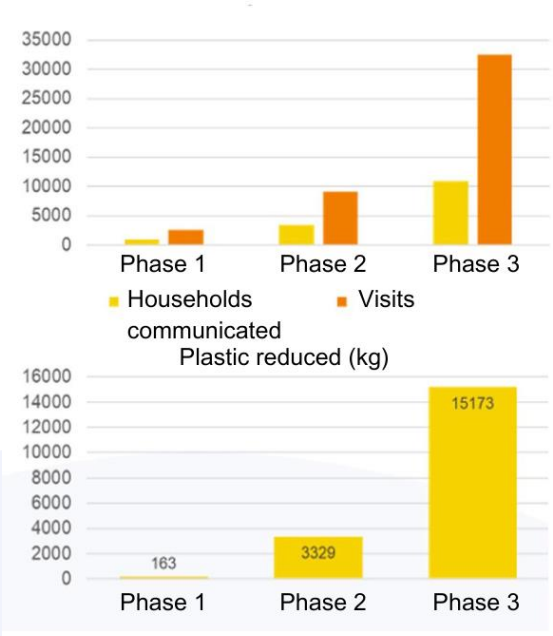
Figure 29. Deploying the PAOT method in plastic waste reduction communication

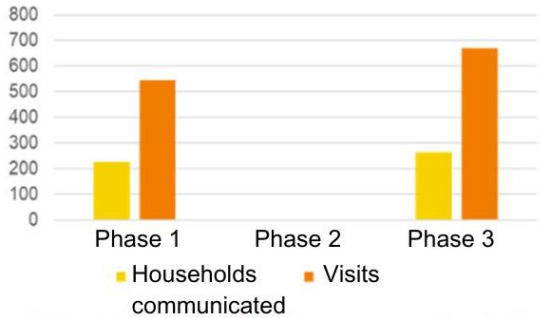
For business households

The businesses that have participated in PAOT and received support from the project including 2,550 paper/rice/bamboo/stainless steel straws, 6,542 paper cups/paper boxes, 1,350 paper bags and 195 communication boards, resulting in encouraging changes from the participating businesses:

Activities	Percentage of change in the activities	
	Before communication activities (%)	Commitment to practice after communication activities (%)
Grassroots communication		
Businesses install communication boards provided by the project.	26	100
Ask in advance and only provide SUPs if requested by customers	41	87
Arrange a SUPs self-service station for customers	22	34
Plastic waste reduction		
Businesses encourage customers to bring their personal items when shopping.	42	90
Businesses recycle, make use of bottles, barrels, packaging.	73 - 81	89 - 97
Businesses agree to let customers deposit or borrow items and return them.	35	44
Businesses replace SUPs with reusable items.	54	88
WSAS		
Hazardous waste	44	77
Recyclables	81	96
Glass waste	48	92
Organic waste	58	81

Results after 3 years of communication:





- **Number of households communicated: 15,182 households, 44,251 visits**
- **Number of businesses communicated: 492 businesses, 1,214 visits**
- **172 residential groups in 31 wards and communes**
- **612 communicators**
- **Amount of plastic reduced after 3 phases: over 18 tonnes**

Overall assessment: The PAOT method has promoted WSAS activities and plastic waste reduction in households and businesses with specific activities to encourage and enhance SUPs reduction such as bringing personal bags/baskets/boxes when shopping, proactive reduction from businesses, increasing participation in communication activities in the community and Green Sundays.

Models to Enhance Organic Waste Separation and Treatment at Source

According to the survey in the project's baseline study, organic waste such as kitchen waste, leftover food, livestock waste and garden waste accounted for the largest proportion of DSW in Hue City, with 66.7% of the total volume, equivalent to more than 270 tonnes per day. Households are the main source of waste, followed by markets, restaurants and schools. However, in Thua Thien Hue, there are no centralized organic waste treatment facilities. As a result, organic waste is transferred to Thuy Phuong sanitary landfill. The City People's Committee encourages waste sources to separate and treat food waste properly. To utilize organic waste as a resource and reduce emissions, the project is working with partners to promote collection and treatment models at source, such as composting, making enzyme cleaners and animal feed.

Figure 30. Model of making enzyme cleaners

The project has coordinated with the Provincial Women's Union and the Hue City Farmers' Association to organize 10 training of trainers courses (ToT) for all leaders of the Women's Union and the Farmers' Union on the treatment of organic waste using indigenous IMO microorganisms. In 19 wards/communes participating in the model, the project organized technical training and practice of composting organic fertilizer using microbial products and making enzyme cleaners from fruit peels for 30-60 people/class in each locality). In addition, the project organized 39 training courses on composting organic fertilizer for 1,700 households and 01 cooperative, of which more than 900 households and the cooperative practiced composting and as a result, **702 tonnes** of organic waste were treated. The model of making enzyme cleaners, with the main participants being the Women's Unions of the wards, produced finished enzyme cleaners from nearly 400 kg of fruit peels. In addition to technical support, the project

also provides facilities and initial raw material costs such as compost/enzyme storage bins and probiotics so that participants can practice immediately after the training.

The amount of organic waste separated at Dong Ba market is transferred to Huong Long Saemaul Agricultural Service Cooperative for processing: about 6 tonnes of organic waste. The model is still being implemented because the waste is separated quite well, with technical support during the composting process to ensure the quality of the finished product.

Figure 31 Composting model

With full technical and material support from the project as well as close coordination with associations at all levels, farmers with actual demand for organic fertilizer have successfully implemented organic composting. Of the two models, the model of making enzyme cleaners has been rapidly expanded due to its advantages such as the simplicity of raw materials, its suitability for households with limited space, and the fact that the finished products can be used in daily life.

In addition to the advantages, the high humidity in Hue during the rainy season poses challenges. The selection of waste and the mixing of raw materials must be carefully managed to ensure the proper humidity and composition before composting. The composting process must be strictly followed, requiring a large area and a long processing time. In contrast, the model of making enzyme cleaners has fewer difficulties. The main challenge of this model lies in the habit of using chemical cleaning agents instead of natural alternatives.

> **Overall assessment:** Relevant local associations can organize meetings to facilitate the exchange of experiences among households participating in the models. Based on the vegetable growing season and the weather conditions, a well-planned model implementation strategy is necessary to prevent losses or ensure the quality of the finished products. To guarantee that participants receive timely technical support, key local officials should be thoroughly trained to understand the procedures and methods to provide guidance to overcome challenges.

3.3 Plastic Waste Reduction Tourism Model

Plastic Waste Reduction Community-based Tourist Destination Model in Thuy Bieu Village

In the PW Reduction Plan for the Tourism Sector of Thua Thien Hue in the period 2023-2025, the Department of Tourism set the goals as follows: 100% of travel agencies, transportation services, and tourist destinations committing to reduce PW; implementing at least one measure to limit the use of SUPs; developing 5-6 SUPs-free community-based tours and destinations; achieving 50% of SUPs-free hotels from 3 to 5 stars by 2024 and 80% by 2025. With the coordination and support of the Thua Thien Hue Tourism Association, especially the Community Tourism Sub-Association, the plastic waste reduction tour itinerary in Thuy Bieu was developed and put into operation.

Figure 32. Guests experience plastic waste reduction tour itinerary in Thuy Bieu village

The plastic waste reduction tour itinerary in Thuy Bieu village began operations at the end of 2023. Tourists participating in the tour use no SUPs; instead, they receive a kit that includes a personal water bottle, a shopping bag, a reusable raincoat, and take part in a bike tour to explore the Thuy Bieu village. Tourists can refill their water at designated Refill stations. Such community-and environmentally-friendly services have made a positive impression, generating excitement and satisfaction among tourists, thus contributing to enhancing the image of Hue tourism.

Overall Assessment: With the support of stakeholders, especially the TVA project, the Department of Tourism, and the Tourism Association, initiatives have been launched to position Hue as a plastic waste reduction tourist destination. However, unpredictable weather conditions, the economic crisis, and the decline in tourists following the Covid-19 pandemic have led many organizations to hesitate in their participation. The primary challenge in moving away from SUPs is the financial resources needed to implement these models effectively. For this initiative to succeed, the funding must be secured from stakeholders, and incentive mechanisms must be created to attract businesses' participation.

Plastic Waste Reduction Hotel Models

Hue is a popular tourist destination, attracting a large number of domestic and international visitors. However, the rapid tourism development has led to an increase in PW, especially from hotels, homestays, and restaurants. To mitigate the negative environmental impacts, the city has started encouraging tourism and service businesses to adopt environmentally friendly business models, including reducing the use of SUPs. To implement this model, the TVA project has conducted surveys on food and beverage (F&B) chains, tourism businesses, travel agencies, and hotels in Hue to assess the plastic waste reduction potential. F&B chains, homestays, and restaurants are encouraged to commit to plastic waste reduction through the launch events of Plastic Waste Reduction Partnership and Alliance. Additionally, workshops have been organized, in collaboration with the Department of Tourism and the Tourism Association, to share successful plastic waste reduction models in the tourism sector, motivating businesses to reduce their plastic usage.

Figure 33. The signing ceremony for the commitment to practice plastic reduction in the tourism sector

Figure 34. Tourism and service businesses are encouraged to adopt environmentally friendly business models

Overall Assessment: The involvement of businesses in plastic waste reduction remains limited, primarily because there are not enough economically viable alternatives to single-use plastic products that meet their business objectives. Furthermore, the balance between economic benefits and environmental concerns has not been adequately addressed, and support from management agencies is still lacking. To achieve better results, practical alternatives should be provided, successful models should be studied, and ongoing consultation and experience-sharing should be maintained to ensure businesses remain committed to plastic waste reduction.

Pilot Model for Teaching and Training a Plastic Waste Reduction-Oriented Workforce

Education and raising awareness about environmental protection should be considered a priority task in training programs, aiming to form sustainable habits and thinking for students from their time in school. These educational programs should not only focus on the theory of reducing PW protecting ecosystems and developing sustainable tourism, but also provide opportunities for students to practice and apply their knowledge to real-life situations. This approach helps them not only master the knowledge but also gain a deep understanding of their role in environmental protection, especially in the responsible tourism industry.

The leadership, faculty, and staff of Hue Tourism College have actively collaborated with the project to organize awareness-raising activities for faculty members and students, including study tours and green consumerism and shopping events. In particular, thanks to the consultants' support, the University's faculty members have developed and validated a Standard Operating Procedure (SOP) for plastic waste reduction based on the 5R1C principles (Refuse - Reduce - Reuse - Recycle - Replace - Collect), which has been included in pilot programs for students. These SOPs serve as a foundation for students to learn and practice plastic waste reduction in real-life work environments.

The official inclusion of these SOPs in the curriculum in the near future will make a positive contribution and play an important role in promoting the sustainable value of a plastic waste reduction and ASEAN clean tourism heritage city. However, the implementation of plastic waste reduction SOPs curriculum still faces challenges due to limited time and heavy workload, requiring precision and coordination with experts. The inclusion of SOPs in the curriculum faces obstacles due to traditional teaching methods and requires time for adjustment.

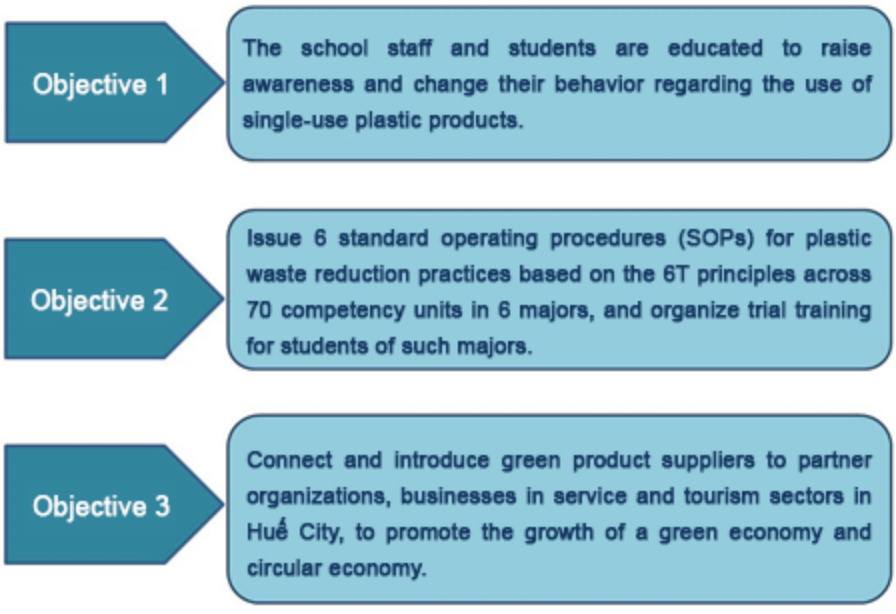


Figure 35. Objectives of Hue Tourism College

Overall Assessment: Collaboration, creativity, and flexibility in teaching methods are essential to effectively implement plastic waste reduction activities. Educational institutions need to put efforts into developing programs and initiatives to train a workforce for responsible tourism and plastic waste reduction tourism.

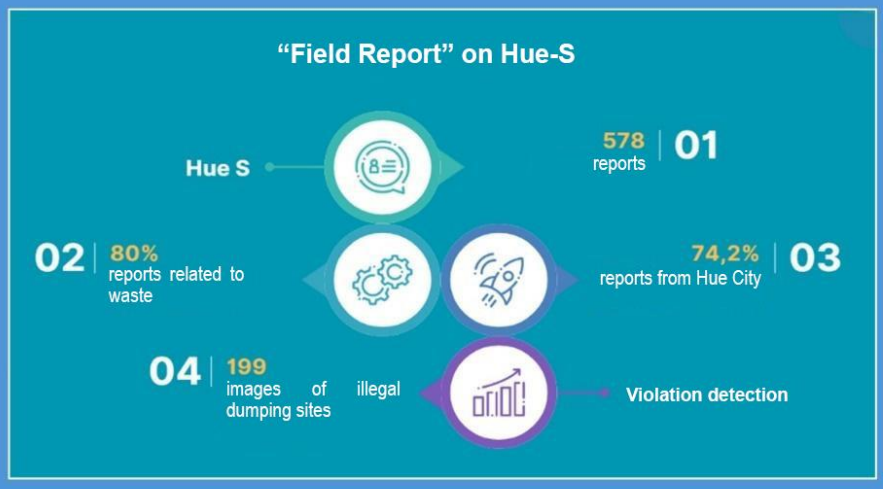
3.4 Smart Solid Waste Management System

Technology Application in Environmental Monitoring and Enforcement: Hue-S App

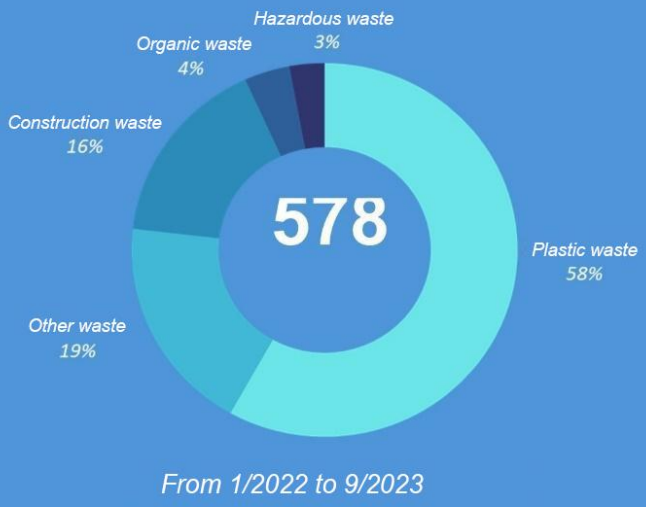
The TVA project has partnered with Hue IOC to create software utilizing artificial intelligence (AI) for image analysis. This software will help detect improper waste disposal using images captured by cameras. The data collected will be integrated into the “Field Reporting” system on the Hue-S smart city app, enabling alerts to be sent to the relevant authorities, facilitating timely image retrieval and violation handling.

The app has over 868,000 users and more than 17 million visits (2021), assisting the authority with notifications and alerts, while also enabling citizens to monitor and provide feedback on solid waste management. Since 2022, WWF-Vietnam has joined hands to enhance this feature, reducing the response time for handling reports by 60-70%, with some cases improving by more than 90%. Additionally, a waste pollution map has been created from data provided by the public.

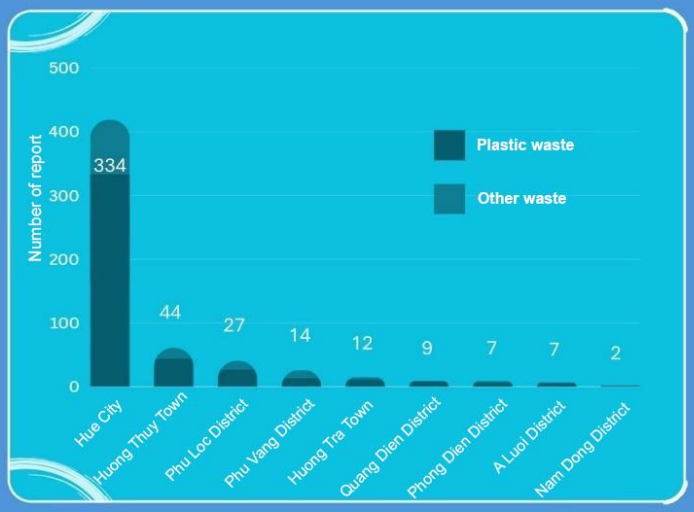
TVA/WWF-Vietnam, in collaboration with Hue S, has used a camera system funded by the TVA project to detect instances of illegal dumping in unauthorized areas and report them to local authorities for timely handling.



THE NUMBER OF REPORTS ON HUE-S RELATED TO WASTE DISPOSAL



From 1/2022 to 9/2023



Source: Hue IOC Center (2023)

Compared to the first nine months of 2022, the number of waste-related reports in 2023 decreased by 60%, from 354 reports (2022) to 142 reports (2023). Reports related to PW also dropped by more than 61%, from 204 reports (2022) to 79 reports (2023). This indicates certain improvements in the provincial waste management system. By September 2024, the reporting rate had decreased to 51%.

From 2022 to 2024, the project has installed an additional 117 surveillance cameras to monitor activities such as illegal dumping and environmental sanitation violations in 19 wards and communes across the city.

Figure 36. Map of polluted spots based on residents' reports

Figure 37. Waste detection by the AI software

> **Overall assessment:** The installation of surveillance cameras received consensus and close cooperation between the local authorities and stakeholders. However, challenges arose due to the installation sites being far from residential areas, which required the use of solar-powered cameras with 4G connectivity, resulting in unstable signal transmission. Some outdoor cameras were damaged by storms and lightning strikes. Although there was support from Hue IOC, the high cost of AI software licenses and the increased number of connected cameras posed additional difficulties.

The Shared Database on Solid Waste and Plastic Waste

The shared database on SW, PW, and waste source management has been developed to support the digital transformation efforts aimed at making Thua Thien Hue Province a centrally-governed city.

The shared database on SW and PW (hereinafter referred to as the database), designed for management tasks, has been developed and handed over to the Department of Natural Resources and Environment for operation and management. This system manages the content, information, and data related to SW and PW in Thua Thien Hue Province. The shared database on SW and PW has two main functions:

1. **Information Management:** The system enables district/city-level administrators to update data on SW and PW for their respective areas. Provincial-level administrators (Environmental Protection Division) will verify and compile the data for the publication and preparation of annual reports on waste management
2. **Data Lookup:** Users, including researchers and managers, can access the portal at https://chatthairan.thuathienhue.gov.vn to search for survey data, legal documents, and related materials.

This database is integrated on the website of the Department of Natural Resources and Environment, and has been put into operation since December 07, 2022. As of December 07, 2023, it has received a total of 46,089 visits.

Figure 38. The website displays the Shared Database on SW, PW, and Waste Source Management in Thua Thien Hue Province

Although the management agencies expect the database to reduce the time and effort required for data compilation and analysis, actual testing has shown that many units still require extra time to gather and input data. Moreover, localities only submit reports when requested, rather than updating them regularly on the system. Therefore, for the database to function effectively, guidance from the provincial level authority is necessary, along with regular updates and rewards for well-performing units. This ensures that SW data remains accessible and current for effective reporting and environmental planning.

> **Overall assessment:** The development and operation of the database on SW in general, and PW in particular, not only require precise guidance from all levels of leadership but also a strategic approach to human resources, data collection and input processes, along with appropriate incentive mechanisms. These factors will ensure that the data remains accurate, accessible, and up-to-date to support environmental protection decision-making

mGreen app for waste separation at source and recyclables collection

Currently, the recyclables recovery activities in Hue City are carried out by informal groups, which play an important role in waste reduction and human resources cost-savings for the city. However, the City Authority currently does not have a specific support mechanism for these groups, especially for women (who make up more than 80% of the workforce in the junk trading sector).

mGreen Collector is not only the name of the mobile app that connects waste separators and waste collectors, but also the name of the app-based scrap collection team in Hue City. For nearly a year of operation, from October 2023 to September 2024, members of the collective groups of scavengers in An Dong and Huong So Wards underwent training to use the mGreen Collector app effectively for recyclables recovery and scrap dealings. This training has enabled the women in the collective groups of scavengers save time and enhance their work efficiency.

Since the activity launch on October 15, 2023, over 50,114 kg of recyclables have been collected via the mGreen Collector app, including 10,182 kg of PW. There have been 1,877 successful scrap dealing transactions conducted at homes via the mGreen Collector app.

Via mGreen Collector, scrap dealers and collectors receive recyclables recovery requests with specific information, including the address of the waste source and a set schedule. They

***Figure 39*. The Launch and Deployment Ceremony for mGreen - the smart city app for waste separation at source and recyclables recovery with a reward points exchange system**

also have the option to make payments using mGreen points instead of cash. This feature enables the mGreen Collector team to organize collection orders more effectively and optimize their work schedules. Residents can schedule recyclables and scrap dealings via the mGreen app. The app provides waste source owners with complete contact information, images, and collection time details, which helps build trust and facilitates smooth communication regarding scrap dealings.

Following a successful implementation in Hue City, the innovative app-based scrap dealers known as mGreen Collectors have inspired many informal scrap collectors. This has led to the expansion of the model to other regions across the country to address the waste separation challenge, promote digital transformation in scrap dealings, establish a circular economy, and contribute to environmental protection and sustainable development.

The implementation of the mGreen app has gained support from the Hue City Women's Union, as well as An Dong and Huong So Wards. Additionally, the members of collective groups of scavengers have shown enthusiasm and a strong sense of responsibility. However, the limited number of members with smartphones has created challenges in facilitating transactions through the mGreen app.

Figure 41. The volume of dealt recyclables via the mGreen app

Figure 40. Members of collective groups of scavengers are dealing recyclables from households that have been scheduled via the app.

Overall assessment: It is necessary to maintain regular meetings to support the members of the collective groups of scavengers while also seeking support from businesses and social organizations to connect the collective groups of scavengers with the market. The collaboration and support from government agencies and public awareness campaigns will help residents easily access the app. Combining these efforts with flexible technological solutions will lead to the app's success.

4. COMMUNITY ENGAGEMENT AND THEIR BEHAVIOR CHANGE

4. COMMUNITY ENGAGEMENT AND THEIR BEHAVIOR CHANGE

4.1 Large-scale Awareness Raising Campaigns

Awareness raising activities, events or campaigns have been directly implemented by the project team or by the project implementation partners, including schools, Ward or Commune People's Committees, mass organizations, the Hue IOC, and media agencies. The details are presented as follows:

HUE PLOGGING

The TVA Project, in collaboration with HEPCO, organized a plogging activity that aimed at eliminating plastic waste pollution hotspots and reducing the risk of waste leakage into the ocean at Hai Duong Beach.

Hai Duong Beach

The “Hue Plogging 2023” event combined walking with waste collection to help clean and embellish the surroundings of Hai Duong coastal road.

30
teams participated in the beach cleanup at Hai Duong

>300
people participated in the activity

3,1
tonnes of waste collected

300
kg of plastic waste collected

3
km of coastline length benefited from the waste collection activity

Thuan An Beach

The Hue Plogging 2024 event with the message 'Green Roads, Clean Seas' was held in celebration of the World Environment Day.

32
teams participated in the Event

>350
people joined the activity

>2
tonnes of waste collected by the teams

200
kg of plastic waste collected

5
km of coastline benefited from the waste collection activity

Recycling Day

The Project, in collaboration with HEPCO, organized two events: the Recycling Day - Hue 2023 and the Reduce Plastic Day

1

1st Recycling Day - Hue 2023

Time: May 2023
Number of students participating: 200
Number of participating primary schools: 7
Collaborative activities: Trash-for-gift exchange, Recyclable waste collection, Waste separation games, Experience making paper from straw, Visits to the Environmental Information Center.

2

2nd Recycling Day - Hue 2023

Time: November 2023
Number of students participating: > 200
Number of participating primary schools: 14
Collaborative activities: Recycling plastic products, Green Instant Noodles Experience, Recycling Instant Noodles Packaging, Experience as Environmental Sanitation Workers, Waste Separation Game

3

Reduce Plastic Day

Time: April 2024
Participants: 140
Collaborative activities:
- Walking and collecting waste: 58.3 kg
- Exchanging trash-for-gift resulted in the collection of 220 kg of recyclables

4.2 Programs to Encourage and Support Pioneering Enterprises in Plastic Reduction

SUPPORTING PIONEERING ENTERPRISES IN PLASTIC REDUCTION

Supporting MAI Organic in Transitioning to Fully Plastic-Free Packaging

In the current development trend in Viet Nam, green production and consumption are encouraged by the government to alleviate environmental pressure. One of the difficulties and challenges that enterprises face in green production and consumption is the lack of alternatives to SUPs that are both cost-effective and durable for consumers. As a small-scale startup, MAI Organic has encountered numerous difficulties in finding innovative, plastic-free packaging solutions to ensure that its products are entirely environmentally friendly. To support successful plastic reduction practices, the project has signed a funding agreement with MAI Organic to implement the following specific activities:

- Enhancing the capacity of the F&D team and conducting research on eco-friendly packaging.
- Designing "plastic-free packaging" and conducting pilot production.

Introducing green alternatives to single-use plastics for new customer segments and sharing the process of transitioning to "plastic-free packaging" with the startup ecosystem.

With financial support from the project, MAI Organic invited experts to provide training and capacity building for the F&D team and successfully utilized packaging made entirely from natural materials.

- The material used for packaging is brown kraft paper, with a paper weight of 320 gsm or higher.
- Labels affixed to the packaging containing areca leaf plates and sea grape leaf plates are made from decal paper without plastic coating.
- Materials used to protect grass straws and bamboo straws inside the packaging from moisture during transportation: biodegradable bags.
- Materials used to protect areca leaf plates and sea grape leaf plates inside the packaging during transportation: biodegradable bags or POF shrink wrap.

Figure 42. Products and plastic-free packaging

Remarkably, after switching to fully plastic-free packaging, MAI Organic has received more orders and positive feedback from foreign consumers. With financial support from the TVA project and the company's persistent efforts, the products and packaging are now fully natural, generating zero plastic waste. However, due to the entirely natural nature of the products, the production costs remain high, limiting its reach within the domestic market. Additionally, these products, being completely natural and preservative-free, are prone to mold in high-humidity conditions.

PROGRAMS TO ENCOURAGE PLASTIC REDUCTION THROUGH FUNDING PLASTIC WASTE REDUCTION INITIATIVES

With the aim of seeking practical plastic reduction initiatives and practices, from February 23, 2023, to May 28, 2023, the Project collaborated with the Hue Innovation Hub to organize the 2023 Hue Plastic Waste Reduction Initiative Contest. As a result of the contest, the Project selected and funded six projects to conduct research and apply their ideas, including: high-tech research and applications to address environmental issues in Viet Nam contributing to the Sustainable Development Goals (DONASO), the Journey of Straw, KODO Hue HUB - a Cultural, Educational, and Arts complex, the mGreen Solution System, the production of biodegradable films from natural materials, and Green Instant Noodles. Notably, two initiatives, the Journey of Rice Straw and the mGreen Solution System, received funding for implementation for two consecutive years, 2023 and 2024.

Figure 43. Final round of the Hue 2023 Plastic Waste Reduction Initiative Contest

"The Journey of Rice Straw" Project – "From the Paddy Fields to The City: Rice Straw Transforms into Paper and Dreams Take Shape"

The Journey of Rice Straw is a project that not only creates environmentally friendly products but also raises environmental awareness within the community in Thua Thien Hue. The project has made a significant impact in Hue with notable achievements both domestically and internationally.

With funding from the project through the 2023 Hue Plastic Waste Reduction Initiative Contest, the Journey of Trip implemented various scientific research activities and established strong connections with local life, including:

- Surveying the current use of rice straw in Phu Mau commune, Hue City.

- Developing a paper-making process from straw combined with other materials and production process for cup holders made from water hyacinth.

- Testing the paper quality to meet food safety and hygiene standards.

- Distributing hundreds of straw bags and cup holders free of charge to more than 30 businesses in the area and gathering user feedback on product quality.

- Organizing communication activities to raise awareness among students in Hue about reducing plastic waste, attracting thousands of participants.

To spread the message about environmentally friendly products, the project team utilized social media channels like Facebook and TikTok. Currently, the project's fan page has attracted over 1,700 followers. The project's activities are regularly updated, aiming not only to spread the message of environmental protection but also to enhance public awareness. Especially, the project's products have reached all parts of the country and even international friends, extending to the United States, Belgium, Japan, Taiwan, and beyond.

"A Sustainable Journey across the Green Paddy Fields" is both the project's slogan and its commitment. The Journey of Straw continues to develop with a humanitarian spirit, striving toward more sustainable and positive values for the community.

Figure 44. "The Journey of Rice Straw" project – "From the paddy fields to the city: Rice straw transforms into paper and dreams take shape"

Research on Producing Biodegradable Film (BioDF)

The project utilized locally available natural materials to produce environmentally friendly biodegradable film (BioDF) as an alternative to plastic wrap and conducted awareness raising activities to shift behavioral changes regarding SUPs. These project activities play a role in developing alternatives to plastic wraps, effectively supporting the plastic waste reduction initiatives among individuals, organizations, businesses, and communities, in the aim of transforming Hue into a “Heritage, Cultural, Ecological, Scenic, Environmentally Friendly, and Smart City.”

The project team achieved significant results, successfully developing a production process for biodegradable films using natural ingredients such as rice flour, wheat flour, tapioca starch, and seaweed. This process involves determining key film properties, such as thickness, transparency, and tensile strength comparable to conventional plastics. Additionally, the film’s mold resistance was tested under various humidity and temperature conditions.

Figure 45. Research on environmentally friendly biodegradable film

The final biodegradable film sample was sent to the Quality Assurance and Testing Centre 2 (QUATEST 2), under the Directorate for Standards, Metrology, and Quality, for testing hygiene and food safety standards. Test results indicated that the products met all necessary standards, making it ready for large-scale production.

Building on this success, the project produced approximately 200 square meters of biodegradable film to support activities related to product showcases, testing, and distribution of samples to production facilities and stores in Hue City to gather additional feedback on product quality.

Finally, to spread the message about environmentally friendly products, the project team utilized social media platforms like Facebook and TikTok. These channels enabled quick information dissemination and raised public awareness, contributing to behavior change and reducing the use of SUP products.

5. CONCLUSIONS

5.1 Lessons Learned and Key Achievements

The journey towards a successful plastic-reducing city of Hue highlights a substantial effort from the Project implementation team, along with strong support, close coordination, and steadfast leadership government agencies, as well as the enthusiastic participation of implementation partners, local communities, and pioneering businesses and individuals. Key lessons that have enabled Hue to successfully progress towards a plastic-reducing city include:

1. **Development of the Urban Plastic Reduction Action Plan:** The project mobilized and secured Hue city government's commitment to becoming a plastic-reducing city through the development of detailed action plans and collaborating with political systems at all levels and relevant departments. The government has implemented specific policies to prevent and reduce plastic waste, including managing waste in agriculture and fisheries, improving the collection and recycling of solid waste in general, with a particular focus on plastic waste.

2. **Enhancing Monitoring Systems and Waste Management Database:** The Technology application and Hue-S smart management system allows for the monitoring of littering behaviors, helping to reduce the amount of waste released into the environment. This system includes the network of monitoring cameras and a solid waste management database, providing comprehensive oversight from waste bin locations to tracking waste disposal behaviors and updating information online, thereby strengthening community awareness.

3. **Behavior Change Communication Activities and Community Events:** The project has implemented various direct and indirect communication activities to raise awareness and encourage community action, such as “Recycling Day”, “Plastic Bag Free Week” campaigns, and “Reduce Plastic Day” events. Notably, the PAOT has motivated households to adopt their habits for waste separation and plastic reduction.

4. **Increasing Plastic Waste Collection and Recycling Rates:** The project has fostered connections with and provided support to informal waste collection groups, encouraged recycling and increased plastic waste collection from scattered waste sources within communities and hotspots. By the end of 2024, plastic waste collection and recycling rates have significantly improved, with numerous green culture points established, contributing to a sustainable recycling ecosystem in the city.

5.2 Recommendations for Scaling up Successful Models

Replicating the "Plastic Waste Reduction School" model: This model lays a sustainable foundation for future generations in environmental protection. Schools serve as both knowledge hub and ideal environments for students to cultivate green living habits, waste separation, and plastic reduction from a young age. Students not only learn but also spread awareness about plastic waste reduction to their families and surrounding communities.

Maintaining and Scaling Waste Separation at Source (WSAS) model: WSAS plays an important role in increasing the collection rate of recyclables, reducing waste disposal, and directly contributing to reducing collection, transportation, and disposal costs. Therefore, the program should continue in the central area of Hue City (where it was implemented from 2022 to 2024) and expanded to satellite urban areas to ensure the effectiveness of WSAS when Hue becomes a centrally governed city in the future.

Expanding the Hue-S Application and Database System for Smart Solid Waste Management: Expanding the use of the Hue-S application and developing a database system for smart solid waste management across the province and other regions of Viet Nam leverages technology for waste monitoring and management. AI applications can be integrated to automatically detect littering behaviors and public awareness campaigns to reduce plastic waste can be intensified.

Replicating Refill Stations at Tourist Sites to Reduce Plastic: Implementing this model at heritage sites and popular tourist destinations in Hue has contributed to reducing plastic pollution, providing a novel experience, and creating a positive impression on visitors.

Replicating the "Plastic Bag Free Month" Program and Plastic Reduction Campaigns in Business: Encouraging retail chains and businesses to participate in "Plastic Bag Free" campaigns, prompting customers to bring their own reusable bags, and supporting environmentally friendly product choices.

Developing a Circular Economy and Supporting Green Enterprises: Continuing to fund circular economy initiatives to enable small businesses to trial eco-friendly solutions while supporting recycling initiatives in communities to reduce plastic waste and create sustainable jobs.

5.3 Calling for Efforts to Reduce Plastic Waste

Environmental protection is not only the responsibility of individuals or organizations but a collective effort across all sectors of society. The success of the “Hue – A Plastic Smart City in Central Vietnam” Project has demonstrated that when communities, governments, and businesses act together, we can achieve sustainable changes, reducing plastic waste and building a green, clean, and bright city. Through practical activities such as Recycling Day, Plastic Bag Free Month, and the Hue-S smart monitoring system, the Project has not only raised awareness but also provided motivation and means for each citizen to fulfill their environmental responsibilities.

We call for the active participation of all individuals and organizations in WSAS, reducing the use of single-use plastics, and increasing recycling efforts. Businesses and the private sector are urged to join hands and commit to green solutions, contributing to an eco-friendly working and consumer environment. Let us get together to make Hue a model city for plastic reduction, not only for Central Vietnam but for the entire country, ensuring a sustainable future for the next generations.

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The views expressed in the book are those of the consulting team and do not necessarily reflect the views of WWF-Viet Nam, its partners, or its funders.

APPENDIX

1. Related documents

Decisions, plans, and official letters related to “Plastic Smart Cities” Initiative.

2. References for integrated educational activities

Guidelines for integrating plastic waste reduction into the general education curriculum in Hue City.

Communication templates for plastic waste reduction using the Participatory Action-Oriented Training method.

3. Templates for integrated educational activities

Audit data entry template.

Audit template for schools.

Audit report template for schools.

4. Technical reports, Handbooks, and Manuals of the Project

Baseline studies reports, handbooks, and manuals of the project

The Journey of Plastic Reduction of Hue City

Scan the QR code to download the documents and templates.

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