

The Polluted Situation and Proposed Solutions to Minimize Single-Use Plastic Waste in Quan Trieu Ward - Thai Nguyen City - Thai Nguyen Province, Vietnam

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ABSTRACT: The survey results show that: In Quan Trieu ward, the amount of disposable plastic waste accounts for about 35-40% of the total daily-life waste and tends to increase. The rapid plastic waste classification includes plastic bags, styrofoam boxes, plastic bottles, and other plastic products. There are two leading causes of this situation: People's awareness is not high, and the management of single-use plastic wastes is fragile. The other issue is no appropriate treatment mechanism. Most local people know and understand this issue, but they do not have the habit of separating wastes at sources and limiting single-use plastic waste. Single-use plastic waste management is a challenge for local environmental protection. This research proposes two solutions to reduce single-use plastic waste for two groups: local people and managers and local authorities. The most important solution is building models such as the model neighborhood in environmental protection, business start-up models that do not use disposable plastic waste, and collection and recycling of plastic waste.

KEYWORDS: Single-use plastic waste, domestic waste, garbage sorting, environmental pollution, Quan Trieu Ward

1. INTRODUCTION

Environmental pollution is an alarming problem all over the world. Many developed countries such as the US, Russia, China, and other developing countries, including Vietnam, have to put their concerns first. They are approaching sustainable socio-economic development. Strong economic development in recent years thanks to industrial parks, export processing zones, export of agricultural products, international exchanges, and cooperation. Vietnam is facing increasingly severe environmental pollution. [1]

In many types of environmental pollution today (land pollution, water pollution, air pollution, noise pollution, sea pollution, white pollution), plastic waste, also known as white pollution, is an urgent matter that requires immediate action. Production and consumption of plastic packaging have become commonplace in people's daily lives. However, it also generates a large amount of waste plastic that causes severe environmental pollution [2]. Many studies in countries around the world have been carried out to investigate the knowledge, perception, behavior, and understanding of the health hazards and the environmental impact of the use of products. Plastic changes human behavior to reduce plastic waste generation, including the survey in Secretariat Capital, Yemen, conducted in 2019. Survey results: 81.0% of respondents use plastic bags more often than other plastic products due to their easy availability. The study also recommends that the Yemeni government encourage people to use eco-friendly bags and

propose a "No plastic bags Day" program. Other studies have also been carried out in Thailand, China, southwestern Ethiopia. That report researched the use of plastic bags and their impact on the environment, especially plastic bags are very high and tend to increase, although the government has many policies to propagate and encourage changes in usage habits. [3], [4]

According to the State of the National Sea and Island Environment Report for the 2016-2020 period of the Ministry of Natural Resources and Environment, in August 2021, the situation of plastic waste, including ocean plastic waste, is a hot issue. Globally, especially in coastal countries [5]. The United Nations Environment Program report in 2019 also shows that Vietnam is one of the five countries that emit the most plastic waste globally. Plastic waste appears everywhere, in tourist areas, urban areas, rural and mountainous areas. The increase in plastic waste in the composition of domestic solid waste is one of the problems for domestic solid waste treatment in Vietnam [6]. According to a survey by WWF (World Wildlife Fund) in 2019, the amount of single-use plastic bags and disposable plastic items discharged daily in many provinces and cities in Vietnam is relatively high, an average of 2-4 pieces/household/day.

With many studies, surveys, and warnings on a global scale in general and Vietnam in particular, the amount of plastic waste, incredibly disposable plastic waste, has not shown

any signs of decline. Thai Nguyen is the economic, political, and educational center of the Northern Midlands and Mountains, the gateway for socio-economic exchanges between the Midlands and Mountains and the Northern Delta. The management of domestic waste, especially single-use plastic waste, is a big problem in the province. In the context of the 25th largest population in the country, the people's living standards are increasingly improved, leading to a large amount of waste.

Quan Trieu Ward is about 5km from the center of Thai Nguyen city, has a high population density, and has five schools, many factories, markets, and shops: Z127 Company - Ministry of Defense, Hoang Van Thu Paper Joint Stock Company, Cao Ngan Thermal Power Company, more than 30 operating businesses (according to 2020 data), Quan Trieu Market... Environmental pollution has always been a hot issue for many years, typically air pollution. Gas, noise caused by the runway transporting coal of Nui Hong Coal Company to Cao Ngan Thermal Power Plant runs through the ward. In addition, the increasing use and emission of single-use plastic waste in the ward are increasing, and there is currently no detailed and specific assessment. This report studied the current pollution situation, proposing solutions to reduce single-use plastic waste in Quan Trieu ward, Thai Nguyen city, Thai Nguyen province.

2. RESEARCH METHODS

Documentary analysis and synthesis methods: To conduct this study, the author collects documents from many different sources: The Ministry of Natural Resources and Environment, People's Committee of Thai Nguyen city, articles, documents. Scientific data on waste and classification, treatment, and disposable plastic waste. These documents are used in the overview analysis of the problem used as a basis for research orientation.

Sociological survey method: The sociological survey method is used mainly by direct interviews with households in Hoang Van Thu ward, applied to 10% of total households in the area, evenly distributed in 12 residential groups. The content of the interview focused on the following topics: Sources of single-use plastic waste, the causes leading to the increase in single-use plastic waste, people's awareness, and solutions derived from the community effort to reduce single-use plastic waste.

Data processing method: The authors use this method to synthesize people's opinions to assess the current implementation status and the community's awareness of classifying domestic waste at its source, reducing single-use plastic waste. The supporting tool selected by the authors for statistics, analysis, and data processing is excel software.

3. RESULTS AND DISCUSSION

3.1. Current status of single-use plastic waste pollution in Quan Trieu ward - Thai Nguyen city

Quan Trieu ward is located in the north of Thai Nguyen city, to the east by Quang Vinh ward, to the west by Tan Long ward and Phuc Ha commune, to the south by Quang Trung ward and Quyet Thang commune, to the north by Cao Ngan and commune Son Cam, Thai Nguyen city. Quan Trieu ward has an area of 2.81 km², and the population as of 2021 is more than 10 thousand people. There are many factories, schools, and a large population. The source of plastic waste in the ward is quite large, mainly from households, business households, Quan Trieu market, companies, and businesses. Household sources: 97% of surveyed households have used plastic bags to store food, household items, even breakfast foods such as vermicelli, Pho... when going to the market or the supermarket. In particular, many families know that the molecules in plastic bags and styrofoam boxes, when exposed to high temperatures, will separate into substances that are very dangerous to health but still use plastic bags to store hot food directly. Some households discharge an average of 10-15 plastic bags/day.

Household business sources: There are many large and small business households in Quan Trieu ward, Thai Nguyen city. With the advantage of low cost, plastic bags and disposable plastic bottles are the priority of business store owners. All lemon tea shops, milk tea shops, office rice shops use plastic bags, plastic straw covers, plastic cups, plastic straws, plastic spoons and forks, foam boxes. The Covid-19 epidemic has significantly affected business activities. Shops and take-out services mainly use disposable plastic in sales, so the amount of waste also increases, proportional to the amount of waste consumption by the people. A survey at Mr. Minh Phung's noodle shop - a small breakfast restaurant in Group 2, Quan Trieu Ward- showed that about 80 take-out times a day, corresponding to about 240 plastic bags, 80 disposable plastic spoons, and 80 disposable plastic spoons plastic chopsticks bag. This number increased by 300% compared to before the Covid-19 epidemic. In many other business households, plastic bags and other disposable plastic wastes are also increasing. Quan Trieu Market source: Quan Trieu market is the most active shopping center with more than 100 large and small stalls with various products of all types and designs to meet the needs of many people. It is also a gathering place to consume many plastic products and also a place to gather much plastic waste from fresh stalls such as meat, fish, vegetables, and fruits to stalls of dry goods, household goods. Almost small stalls selling snacks such as tea, yogurt, soft drinks that the price is only 10,000VND/products all use a lot of foam boxes, plastic spoons, plastic forks, straws, plastic cups, plastic cups.

Recently, the amount of plastic waste in Quan Trieu ward has been increasing, accounting for about 35-40% of the

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total daily waste. It is a burden on local environmental protection. The survey results show that most waste is concentrated at the gates of schools, Quan Trieu market, companies, agencies, garbage gathering areas in residential groups. These wastes have quickly classified the composition of plastic waste, including plastic bags, foam boxes, plastic bottles, and other plastic products.

The most important reason for the increasing amount of single-use plastic waste in Quan Trieu ward is the lack of awareness of a part of the people. Through the survey results, most respondents are aware of the harmful effects of using single-use plastic, but most do not want to change the use of single-use plastic. That is causing the amount of waste to increase exponentially. In addition, the effectiveness of the programs guiding the classification of waste at source is still not high. Many households and business households still mix waste with different types of waste. Not only abuse, many individuals are not aware of environmental protection but throw garbage indiscriminately, do not perform classification, affecting the environmental landscape, urban beauty and difficulties for collection and treatment.

The management in the work of quality management is also the cause of this situation. Most residential groups focus on dumping waste by regulations; waste classification at the source has not been focused on. Because of the absence of a treatment regime for non-segmentation of waste at the source, the use of plastic products, and the discharge of single-use plastic waste, the local authority is only authorized to remind households to people and business households. Moreover, residential groups often have only one leader at the ward level and have too many tasks, unable to remind households regularly.

3.2. Assessing the awareness of people in Quan Trieu ward about classifying domestic waste at its source and limiting single-use plastic waste

The assessment of people's awareness in Quan Trieu ward is carried out by interviewing people, determining the criteria of awareness, and implementing domestic waste classification at the source, limiting single-use plastic waste. The survey results of 10% of households in the ward showed that:

About awareness: 100% of surveyed households know the source of disposable plastic waste, understand (preliminarily or clearly) the harmful effects of single-use plastic waste, 73% of households know how to sort household waste. In particular, 87% of the interviewed households are aware of the causes leading to the increase in single-use plastic waste. They have come up with many mitigation measures (going to the market by lane, cloth bags), bringing boxes to the market, having breakfast at home, bringing food to work instead of ordering rice from restaurants, replacing packaging, and storing things at business establishments.

The survey showed that people's awareness in Quan Trieu ward is outstanding. The government of Quan Trieu ward and the leaders, women's unions, and youth unions of residential groups have fully and regularly carried out propaganda and classification of domestic waste at its source in the area. In addition, the current mass media (TV, newspaper, radio, internet) also have many programs to disseminate knowledge about the harmful effects of waste and disposable plastic waste. People's living standards in the ward are now relatively high, and all households can access these information channels to receive knowledge and improve their understanding.

Behavior: 47% of households in Quan Trieu ward classify domestic waste at source, of which 29% of households correctly classified it according to the guidance of the "Project on the classification of domestic waste at source" in Thai Nguyen city the period 2017 -2020". The amount households said that the family's house is small, leaving many trash cans taking up space, business households have large trash, but they do not have time to sort garbage, many households do not have the habit of storing garbage in the house, including recycled waste. As for the problem of disposable plastic waste, most households are using and discharging 3-5 plastic bags/day; there is also some other disposable plastic waste such as water bottles and styrofoam boxes and ready-to-eat food packaging (cakes, candies, snacks). 86% of households do not want to reduce the amount of single-use plastic waste daily for many reasons: they are not used to going to the market in cloth bags, meat, fish still need to be put in plastic bags. The awareness summary of the results of the people of Quan Trieu ward can be displayed in Table 1 below.

Table 1. Results of checking the determinants of people in Quan Trieu ward on the use of single-use plastics and classification of household waste at the source

No	Criteria	Proportion (%)
1	Households know about the harmful of single-use plastic	100
2	Households know about the source of single-use plastic	100
3	Households know how to classify domestic waste at the source	73
4	Households know the cause of increasing in single-use plastic	87
5	Households implement classification of domestic waste at the source	47
6	Households implement the classification of domestic waste at the source properly	29
7	Households tend to reduce single-use plastic	14

3.3. Proposing solutions to limit single-use plastic in Quan Trieu ward

* Solutions for individuals and households

Enhancing and raising people's awareness and participation and orienting and building habits for the community about dissolving waste at its source, limiting plastic waste is the most effective method for current business households.

Increasing awareness and participation of the community needs to be done regularly and continuously, with the encouragement of business households, neighborhoods, and households for good performance, building models of environment-friendly business, limiting disposable plastic waste (such as rice shops use stainless steel trays), spoons, and chopsticks, business households reduce the use of plastic bags). In order to implement waste classification and limit plastic waste, households must first understand the groups of waste. According to the "Project on the classification of domestic waste at source in Thai Nguyen city for the period 2017-2020", waste is divided into three groups: Degradable waste group (organic waste, garbage stored in poor conditions), nature quickly rots, giving off foul odors such as vegetables, leftovers, spoilage, fruit peels...); Inorganic group recycles and recycle (Cardboard, metal, paper, plastic utensils: bottles, household appliances...); Group of non-recyclable intangible waste (styrofoam boxes, broken glass, broken crockery). Based on this classification, households can participate in managing daily-life solid waste in the ward, reducing the amount of

waste released into the environment, incredibly disposable plastic waste (which has been sorted and recycling).

For the problem of changing the habit of using single-use plastic: Many information channels offer solutions for producing plastic products. For each individual, nine actions are encouraged the implementation of single-use plastic mode: (1) use cloth bags, recycle reusable bags; (2) bring a personal water bottle; (3) do not use personal products containing plastic particles (such as facial cleansers, toothpaste, shower gel); (4) do not use straws, plates, cups, plastic straws (replaced with products derived from nature and used many times such as straws of grass, rice, stainless steel; bowls, plates from leaves), (5) use glass jars for food in the family; (6) do not use plastic bags; (7) Buy in bulk to save on packaging (preferably buy items with paper packaging instead of plastic bottles/boxes), limit chewing gum (because it is plastic); (8) Bring food containers; (9) Propaganda to everyone also restricts plastic consumption.

In addition, many solutions can be applied to limit single-use plastic, such as limiting the purchase of bottled water, squeezing and squeezing fruit at home, or eating fruit instead of buying pre-packaged juice. Print plastic bottles (this method does not reduce plastic waste but is also better for family health by limiting the consumption of harmful ingredients in pre-packaged products, enhancing natural vitamin sources)). Preparing food to take to work is also a way to reduce the value of plastic bags and foam boxes



Figure 2: Some simple ways to replace plastic products in daily life.

* Solution for management agencies, Quan Trieu ward government

Local authorities should encourage people to reduce the amount of plastic bags released into the environment by

using renewables. Supermarkets and shops should encourage people to use cloth bags and recycled bags, both suitable and aesthetic, which are both friendly to the environment, and at the same time educates the awareness

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of environmental protection for all groups, essential for children group to establish waste classification and collection according to regulations. Limit plastic production for children from an early age to create environment-friendly adjacent systems.

Professional regulatory agencies need to advise the Human Resources Board of Thai Nguyen province to propose a financial regime that is eligible for licensing for those who do not comply with regulations. In addition, the company that collects and treats household solids and single-use plastics need to be improved to minimize the negative impacts of single-use plastics on health and the environment.

Building a model of a neighborhood that manages waste bins operating at the source sample, a community model to reduce plastic waste bins, and a model of "Say no to plastic bags when shopping" in residential groups in the ward. Quan Trieu ward government and residential groups strengthen propaganda and apply economic measures to maintain the operational efficiency of the models, thereby expanding on a larger scale. Each residential group installs many standard trash cans, divided into separate categories (trash bins, intangible, recycled).

Promote the influence power, pioneering role in the work protection environment of social organizations such as the Women's Union, the Veterans' Association, the Youth Union of the neighborhood group in communication and implementation, analyzing types of waste at source, limiting plastic.

Some solutions should be applied, such as

1. Hosting "The Green Sunday" event frequently to collect plastic waste and sells it to raise funds for activities;
2. supports youth union members to start up from business models that do not use single-use plastics and collect and recycle plastic waste;
3. Start-up models help union members develop their economy, contribute to the environment protection section, and positively build the face to local date.

4. CONCLUSION

Single-use plastics waste is increasingly popular in human activities and production. Although its benefits to the practice are undeniable, the single-use plastic job leads to significant day-to-day emissions of single-use plastic waste. It is the agent that creates the environment, significantly affecting life, especially the health of humans and different species of living things. Surveys in Quan Trieu ward show that: People's daily activities; business, production have released a vast amount of plastic waste, especially single-use plastic waste. The cause of the situation is that people's awareness is not high, and the waste management company operating at the source, including single-use plastic waste, is flawed, not strict, and does not have appropriate treatment.

Most people in the ward know and understand this issue but still do not have good habits in dissolving waste at the source and limiting single-use plastic waste. Based on the current status of plastic pollution in Quan Trieu ward and the people's awareness, the author proposes two solutions to approach the local people and local authorities. The most important solution is to build model neighborhood models in a protected environment, business models that do not use single-use plastics, collect, recycle plastic waste.

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