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Plastic Waste in Vietnam: Current Status and Solutions

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Abstract: ***Plastic waste has been an international issue. However, the situation of plastic waste and its environmental and social implications are complicated. The Government of Vietnam has taken measures and joint efforts of the whole world in the prevention of plastic waste. This article analyzes the causes and the consequences of plastic waste, based on that proposing solution for this issue.***

Keywords: Plastic waste, environmental pollution, solutions, Vietnam

1. Introduction

Plastic waste is a global environmental threat which has negative impacts on the ecosystem, habitat, human health and sustainable development of each country[1]. Together with other countries in the world, Vietnam is making efforts to eliminate pollution caused by plastic waste. According to experts' analysis, plastic waste is substances that is non-degradable in many environments, including many kinds of used bottles, bags, or toys ... Plastic waste consists of polyethylene (PE) packaging, after being used, it becomes garbage. There are other types of plastic in household waste that also contain waste plastics. Nylon waste is actually a mixture of plastic, in which PE plastic counts for the major proportion[2].

In reality, the sources of plastic waste generated in our environment are very diverse, from the modern lifestyle where people prefer to use utility products such as disposable plastic cups, plastic bottles, straws, plastic bags. Therefore, plastic waste can come from the daily-life waste of residents, tourists, markets, trading centers, hotels and restaurants ... More than 50 percentage of daily consumed plastic is disposable plastic products[3].

Majority of plastic waste is not properly disposed of but buried or thrown into the ocean. Especially plastic bags, plastic products used for packaging which are easily produced are non-degradable. The habit of using plastic bags, disposable plastic can bring convenience to humans in a short period of time, however, it is the agent that pushes the environment to the danger of pollution disaster.

According to the United Nations Environment's 2018Annual Report, each year, about 500 billion plastic bags are used and 40% of the plastic is produced for packaging worldwide. The amount of plastic waste is enough to cover four times the surface area of the Earth, of which 13 million tons of plastic waste goes to the ocean[3].

In Vietnam, according to a report of Vietnam Plastics Association, in 2015, about 5 million tons of plastic was produced and consumed in Vietnam, of which, about 80% of imported materials used from scrap plastic. Plastic consumption index per capita in Vietnam increased rapidly from 3.8kg/year/person in 1990 to 41kg/year/person in 2015 (Figure 1). It is estimated that in Vietnam, there are more than 1.8 million tons of plastic waste discharged per yearbut only 27% of which is recycled. Vietnam is also facing the risk of becoming a global dumping site with the increase rate of 200% in plastic waste over the past year [4].

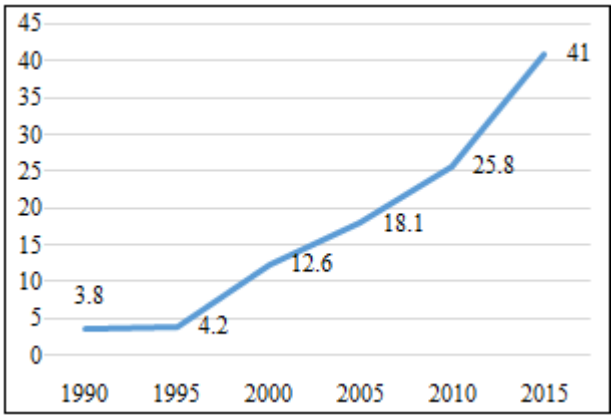

Figure 1: Plastic consumption per capita during the 1990-2015 period (in kilograms)

The statistics of the Ministry of Natural Resources and Environment also shows that in Hanoi, from 4,000 - 5,000 tons of wasteare discharged each day, of which plastic waste accounts for 7-8%. In only the two big cities of Hanoi and Ho Chi Minh City, about 80 tons of plastic and plastic bags is discharges into the environment per day. Notably, the amount of plastic waste and plastic bags of the whole country accounts for about 8 - 12% of domestic solid waste. If on average, about 10% of plastic waste and plastic bags are not reused but completely discarded, the amount of plastic waste and plastic bags is approximately 2.5 million tons/year, which is a burden to environment even leading to the "white pollution" disaster[5].

2. Threats from Plastic Waste

According to the experts, the plastic waste is hard to be decomposed, onlya small part is processed, the rest is burnt or discharged into the ocean, this is also one of the causes which lead to the death of thousands of sea creatures.

The problem of plastic waste which is also known as "white pollution" is visible at tourist destinations, especially in coastal areas. At many beaches, the situation of plastic waste

dumping ashore is quite popular. The main reason is that peopledischarge waste directly into the sea. Plastic waste is floating, being swept ashore causing very heavy pollution. At the Davos Conference, Switzerland has reported that the amount of plastic waste that discharged into the ocean by 2050 will be larger than fish (by weight). But it takes hundreds, even thousands of years for plastic and nylon wastes to decompose.

The scientists have issued warning that when a small piece of plastic waste is thrown into the environment, it takes 450 years to be completely decomposed. In other words, it takes many generations for a piece of plastic material to be decomposed. In addition, the plastic also gets into the water, preventing oxygen which makes the marine creatures unable to breathe. Or they can be mistakenly ingested by organisms such as fish and there is a high possibility that humans will ingest organisms containing toxic micro-plastics. The dangers of micro-particles which are microscopic particles derived from decomposing plastic waste can penetrate and destroy cells in the body of marine creatures, thereby infecting and destroying cells in the human body when they eat fish and other marine creatures.

Plastic bags, plastic bags containing food make food contaminated food by containing metal substances such as lead, cadmium that cause damage to the brain and cause lung cancer, fainting, shortness of breath, hemoptysis, affecting endocrine glands, reduce the body's immunity, cause dysfunction, cancer and birth defects for infants ...

Plastic wastes does not only cause bad impacts to the environment but also to human health. The plastic will be melt in the temperature range of 70 - 800 degrees Celsius and dissolved into food and entering the human body. Those toxins accumulated for a long time will cause extremely dangerous diseases. In particular, plastic contains a toxic substance called DOP. This toxin can cause gender effects in boys and cause infertility in girls.

At the seminar "Plastic waste, public-private sector handle the challenges together" held in June 2019, Mr. Albert T. Lieberg - Chief Representative of United Nations Food and Agriculture Organization (FAO) in Vietnam stated that the waste management capacity in Vietnam is still very limited, this limitation has contributed to increase the burden of plastic waste on the environment and public health. It is estimated there is 1.8 million tons of plastic waste generated in Vietnam per year, while plastic consumption is estimated to increase 16-18% per year. Therefore, the systematic solutions in dealing with plastic waste is required, otherwise it is too late

In addition, the plastic and nylon waste burned in the environment will create many toxic gases including Dioxin and Furan, which are extremely toxic substances that can cause shortness of breath, affect the endocrine glands, reduce immunity, gastrointestinal dysfunction and birth defects in children. Particularly it can cause cancer when exposed regularly. In addition, with the characteristics of hard to be decomposed and processed, plastic and nylon waste discharged every day to the environment in large quantity will make the environmental pollution to be increasingly serious.

3. Solutions to limit plastic waste

Minimizing plastic and plastic waste has become an urgent requirement in Vietnam and over worldwide. Facing the consequences of plastic waste to the ecological system, environment, human health and sustainability of each country, the Government of Vietnam has certain solutions as follows:

Firstly, improve the legal environment. The discharge of plastic waste that destroys the environment is not the fault of the manufacturer or distributor, but due to the inadequate and unconscious behavior of the user, therefore, it is needed to take certain consideration when identifying the direct responsibility for the consequences of environment based on the harmful effects of the discharge. The government applies tax policy to minimize the indirect discharge of plastic waste. The Law on Environmental Protection in 2010 specified that for multi-layer plastic bags manufactured or processed from HDPE, LDPE, LLDPE single-layer and other plastic films (PP, PA ...), or other substances such as aluminum foil ... the environmental protection tax is determined as a percentage of the weight of HDPE, LDPE, LLDPE single-layer plastic film contained in multi-layer plastic bags, also according to the provisions of Resolution No.579/20189/ UTVQH14 in Clause 1, Article 1, the absolute tax rate for non-biodegradable and environmentally friendly plastic bags production units will be taxed 50,000VND/kg; the environmentally friendly plastic bags production is untaxed.

Environmental tax is an expression of the ethical obligation of the trader to pay the cost for the society to overcome the consequences caused by the goods thay they earn profit on, and they must take measures to recover the waste after usage in order to get "tax refund" and to take advantage of renewable raw materials for production. Although not directly causing harm to the environment, the traders and distributors of all plastic products - especially disposable and hard-to-recover plastics ... need to take indirect responsibility by taxes when contributing to the formation of the threat of plastic waste to environment. The object of the Environment Tax is the Trading unit that launches finished products with plastic packaging into the market. If plastic packaging is a consumer product, the manufacturer is the distributor who is subject to tax.

Developing a strong legal corridor to punish the acts of littering in combination with environmental tax regulations that directly impact plastic companies and manufacturers. This funding can be used as a financial source for activities to overcome the consequences of environmental pollution, as well as other activities to protect the environment and limit hard-to-recover plastic products.

Secondly, promote the propagandize activities and raise awareness of people in using disposable plastic to minimize environmental pollution from plastic waste. Organizing seminars and propaganda about the harmful effects of plastic waste on the environment. Launching campaigns and green

voluntary activities to raise the awareness and responsibility of people in using plastic products. Changing the daily living habits, say no to disposable plastic products, plastic bags through shopping, daily activities, work and labor; using the environmentally friendly products as instead. Actively participating in environmental protection activities in the living place by the smallest actions such as sorting, recycling, reusing wastes, economical use of raw materials and fuels; promptly condemn acts of causing environmental pollution, the habit of wasting resources and energy ... According to the national environmental protection strategy, by 2020 within vision to 2030, Vietnam has set a great deal of specific objectives, including the goal of reducing the amount of indestructible nylon used in people's markets by 50% by 2020. Under the Proposal to strengthen control of environmental pollution due to use of non-biodegradable plastic bags by 2020 by the Government,the volume of non-biodegradable plastic bags will be reduced by 50% at supermarkets and trade centers by 2020; the volume of non-biodegradable plastic bags used in people's markets will reduce by 50% compared to 2010.

Because of the convenience of consumption habits, plastic waste has become a major concern and challenge for the living environment. This is a problem and a great challenge for the environment in general because plastic waste pollution seriously affects the soil, water and aquatic systems. It is time for humans to stop discharge tons of plastic waste into the environment every day. In order to do that, first of all, it is needed to change the awareness and habit of using plastic waste in daily activities. Therefore, the current situation of spreading plastic waste pollution shall be reduced, then the plastic waste should become a renewable resource for social living activities.

Increasing the responsibility of localities, businesses and each person in limiting the import, supply, production of plastic bags, organizing propaganda and commitment signing activities to limit towards combating plastic waste. At the same time, strengthening supervision of recycling collection and use of plastic waste activities.

Thirdly, diversify the investment sources for environmental protection and economic development orientation towards the direction of green growth. Recycling is a highly appreciated solution in minimizing the harmful effects from plastic and plastic bags on the environment, helping plastic to be recycled to serve people once again. However, the production and recycling of plastic scrap in Vietnam is still concentrated mainly in craft villages and small-scale craft households. Due to the investment capital constraints, lack of environmental protection awareness, spontaneous operation and lack of planning, most recycling activities have caused significant consequences: manual and primitive technologies; the toxic substances in the process of cleaning and recycling are discharged directly into the air, surrounding water sources, causing people in surrounding area have to inhale toxic fumes, using poisonous water every day.

On the other hand, the recovering and recycling of plastic waste products is extremely important to both solve the problem of pollution and to make use of raw materials for production as a renewable resource. Based on the current average rate of plastic consumption, economic development, population growth, it is shown that the opportunity for development of plastic recycling industry is huge. According the Vietnamese plastic industry, if the cycled plastic material source is used at the rate of 35-50%/year, the businesses can reduce production costs by more than 15%.

Therefore, in parallel with the economic solution by applying environmental tax, Vietnam also attaches special importance to technical solutions to optimally operate the recycling and generating machinery. In the face of the increasingly macro scope of serious problem of plastic waste, Vietnam has recognized the importance of waste recycling. In order to accomplish that purpose, the research and survey activities are conducted together with learning experiences and technology transfer from countries that have effectively operated in the recycling of plastic waste. In particular, the experience in collecting, recycling, processing plastic waste of some other countries such as Germany's Green Dot in sorting waste at source and taxing on plastic products; India's experience in organizing the recover of all used plastic products before and after disposal; Singapore's process to collect, transport garbage, incinerate and process emissions and ashes; or Japanese technology to burn CFBs with controlling the emission of gas generated, as well as the experience or the Mexican plastic recycling method to produce recycled plastic materials for the plastic industry's own production or cutting, compressing, heating, shaping in Indian style as building materials for works or roads ... should be taken into consideration.

In addition, Vietnam has strengthened with policies, technology, economic and technical investment to research and manufacture "green" straws and alternative plastic packaging that are environmentally friendly, in which the outstanding product is the biodegradable plastic (bioplastics) which was recognized as the leading solutionworldwide. This is a "green" plastic product from a perfect combination of fully biodegradable polymers such as PLA, PBS, PBAT ... and materials with natural origin such as corn starch, vegetable starch, collagen, cellulose ... The outstanding advantage is that this plastic is 100% biodegradable by the action of bacteria into natural substances, blended into the soil and harmless, completely biodegradable (compostable) and environmentally friendly. Particularly, the US scientists have used shrimp shells, crabs, crustaceans, insects to extract chitin, then combined with the plant bark and some fungi which contains high quantity of cellulose to get a synthetic resin. The new products are confirmed to be able to replace the entire nylon packaging from current PE, PET into better, cleaner bags that can easily decompose in the natural environment after being used.

Combining all the economic-technical-educational aspects in the solutions on creating awareness of source waste separation, proper waste disposal, thorough collection, scientific treatment for regeneration and burial ... together with the solution on applying environment tax and the enhancement of environmentally friendly alternatives, these will be the solutions to gradually balance and control the current situation of rampant plastic waste and guide the production of consumer plastic products to a more

sustainable development future. This roadmap is not short, fast but very serious, persistent and drastic with the implementation of synchronous solutions to bring efficiency.

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