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Effect of Plastic Grocery Bags on Environment and Its Reuse

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Abstract: *Plastic, one of the most preferred materials in today's industrial world is posing a serious threat to the environment and consumer's health in many direct and indirect ways. Exposure to harmful chemicals during manufacturing, leaching in the stored food items while using plastic packages or chewing of plastic and toys by children are linked with severe adverse health outcomes such as cancers, birth defects, impaired immunity, endocrine disruption, developmental and reproductive effects etc. Promotion of plastics substitutes and safe disposal of plastic waste requires urgent and definitive action to take care of this potential health hazard in future. One of the environmental issues in most regions of India is a large number of Plastic Grocery Bags deposited in domestic wastes and landfills. Due to the high volume of grocery bags, more than 1 million m³ landfill spaces are needed for disposal every year. As per a survey conducted by Central Pollution Control Board (CPCB) in 60 cities of the country, the quantum of plastic waste generation is estimated to be 15,342.6 tonnes per day. The total plastic waste which is collected and recycled is estimated to be 9205 tonnes per day and 6137 tonnes remained uncollected and littered. The purpose of this experimental study was to investigate the possibility of reuse of waste grocery bags so that it will reduce the environmental effects.*

Keywords: *Plastic, Recycle, Incineration, Grocery Bags.*

1. INTRODUCTION

One of the most common items in our modern world is the ubiquitous plastic grocery bag. Highly convenient, strong and inexpensive, plastic grocery bags are appealing to both customers and businesses as a reliable way to deliver goods from the store to home. However, there are several issues associated with the production, use, and disposal of plastic grocery bags which may not be initially apparent to most users, but which are nonetheless extremely important. By assessing the lifecycle of plastic grocery bags, we can better understand the full ecological footprint of the plastic bag, and find more effective means of dealing with the associated negative impacts. This report will outline the ecological footprint of plastic grocery bags by looking at the immediate impacts associated with their manufacturing, followed by impacts created by their use and disposal, with a final discussion concerning waste management and recycling.

2. ENVIRONMENTAL IMPACTS

2. A) Air and Water Pollution

Air pollution caused by the emission of toxic chemicals and CO₂ during the manufacturing of plastic bags is a significant part of the environmental impact of this product. According to the Institute for Lifecycle Environmental Assessment (1990), the manufacturing of two plastic bags produces 1.1 kg of atmospheric pollution, which contributes to acid rain and smog.

Acid rain is recognized as a serious threat to natural and human-made environments, particularly in regions which have historically relied heavily on coal, such as Eastern Europe. Smog is also a well-documented and significant problem, particularly concerning human health. Additionally, the manufacturing of two plastic grocery bags produces 0.1 g of waterborne waste, which has the capability of disrupting associated ecosystems, such as waterways and the life that they support. To exacerbate the problems of air and water pollution, most plastic shopping bags are made in countries with few environmental regulations, such as China, which results in even greater impacts on the environment and human health.

2. B) Shipping and Transportation

Following manufacturing, the plastic grocery bags are subsequently shipped all over the world; Australia alone imports 4 billion bags annually. Container ships used to transport these bags to each consumer country use fuels which produce high levels of pollutants. Annual trips multiply this environmental damage as manufacturers try to accommodate the increasing demand to numerous countries.

To illustrate, of the estimated 4 to 5 trillion plastic bags produced per year, North America and Western Europe account for nearly 80 per cent, with the U. S. eventually throwing away 100 billion plastic grocery bags annually. Australia uses 7 billion plastic bags annually, of which 53 per cent come from supermarkets. The United Kingdom consumes between eight and 10 billion bags annually, and in Taiwan this number rises to 20 billion. The ecological footprint of the plastic bag grows with each increasing statistic.

2. C) Health Impacts

Toxic emissions produced during the extraction of materials for the production of plastic grocery bags, their manufacturing, and their transportation contribute to acid rain, smog, and numerous other harmful effects associated with the use of petroleum, coal, and natural gas, such as health conditions of coal miners and environmental impacts associated with natural gas and petroleum retrieval. Impacts on human health are perhaps the most serious of the effects associated with plastic grocery bags, ranging from health problems associated with emissions, to death. Earlier this year, the city of Mumbai, India experienced massive monsoon flooding, resulting in at least 1,000 deaths, with additional people suffering injuries. City officials blamed the destructive floods on plastic bags which clogged gutters and drains, preventing the rainwater from leaving the city through underground systems. The similar flooding happened in 1988 and 1998 in Bangladesh, which led to the banning of plastic bags in 2002. By clogging sewer pipes, plastic grocery bags also create stagnant water; stagnant water produces the ideal habitat for mosquitoes and other parasites which have the potential to spread a large number of diseases, such as encephalitis and dengue fever, but most notably malaria.

2. D) Land Pollution

Due to many factors, not the least of which is their ready availability, 96 percent of all grocery bags are thrown into landfills. However, plastic bags decompose very slowly, if at all. In fact, a bag can last up to 1000 years, inhibiting the breakdown of biodegradable materials around or in it.

Lightweight plastic grocery bags are additionally harmful due to their propensity to be carried away on a breeze and become attached to tree branches, fill roadside ditches or end up in public waterways, rivers or oceans. In one instance, Cape Town, South Africa, had more than 3000 plastic grocery bags that covered each kilometer of road. In this century, an estimated 46,000 pieces of plastic are floating in every square kilometer of ocean worldwide.

2. E) Impacts on Wildlife

Most distressing, over a billion seabirds and mammals, die annually from ingestion of plastics. In Newfoundland, 100,000 marine animals are killed each year by ingesting plastic. However, the impact of plastic bags does not end with the death of one animal; when a bird or mammal dies in such a manner and subsequently decomposes, the plastic bag will again be released into the environment to be ingested by another animal.

2. F) Impacts on Government and Politics

The production and use of plastic grocery bags have several important political impacts. Because Western nations have infrastructures that are able to deal well with waste and recycling, these nations generally do not feel the same effects of plastic bags on the environment. However, this is far from the case in developing nations where waste management is not well established or is non-existent. The effects of plastic bags are most severely felt in poor and rural areas, where shopping bags are dispensed and used widely but not disposed of properly. The footprint of plastic grocery bags also includes high civic costs to governments, most of which are incurred through clean-up efforts. Plastic bags can litter roads, sewers, and waterways, making litter collection and disposal difficult and costly. High costs are being shouldered by governments and taxpayers, which results in the loss of funds from other services offered by the government. Because of this problems, many governments have banned plastic grocery bags entirely or imposed levies on their use.

3. USE AND IMMEDIATE DISPOSAL OF PLASTIC GROCERY BAGS

Plastic grocery bags have been a part of daily life in developed countries since their introduction in 1977, and in more recent years, their use has spread to many developing countries as well. Unfortunately, the most common final resting place for garbage bags is the garbage bin, resulting in countless numbers of bags filling landfills and spilling over onto essentially every other surface of the planet. It is the very prevalence of these bags that result in several critical environmental and social impacts associated with their use and immediate disposal.

Plastic bags and their nuisances

Plastic bags are popular with consumers and retailers as they are a functional, lightweight, strong, cheap, and hygienic way to transport food and other products. Most of these go to landfill and garbage heaps after they are used, and some are recycled. Once littered, plastic bags can find their way on to our streets, parks and into our waterways. Although plastic bags make up only a small percentage of all litter, the impact of these bags is nevertheless significant. Plastic bags create visual pollution problems and can have harmful effects on aquatic and terrestrial animals. Plastic bags are particularly noticeable components of the litter stream due to their size and can take a long time to fully break down. Many carrier bags end up as unsightly litter in trees, streets, parks and gardens which, besides being ugly, can kill birds, small mammals, and other creatures. Bags that make it to the ocean may be eaten by sea turtles and marine mammals, who mistake them for jellyfish, with disastrous consequences. In developed countries,

billion bags are thrown away every year, most of which are used only once before disposal. The biggest problem with plastic bags is that they do not readily break down in the environment. It has been found that the average plastic carrier bag is used for five minutes, but takes 500 years to decompose.

Plastic bags are made from ethylene, a gas that is produced as a by-product of oil, gas and coal production. Ethylene is made into polymers called polyethylene. This substance, also known as polyethylene or polyethylene, is made into pellets which are used by plastic manufacturers to produce a range of items, including plastic bags.

Plastics can be broadly split into two groups, those that consist of long strands and those that also contain short cross-links. Thermo softening plastic will deform when heated and can be remolded into new shapes. Thermosetting plastics are much stronger, but once they have been formed into a shape, they will hold that shape indefinitely, and if heated they will merely burn. Recycle and reuse of plastic bags can mitigate environmental problems.

4. WASTE MANAGEMENT AND RECYCLING

4.1 MANAGING WASTE

Although plastic bags can be used over and over again, particularly in comparison to a paper bag, they are most commonly thrown into the garbage once they are no longer useful since recycling services for plastic bags are not yet widely available. The recycling rates for plastic bags are extremely low, only 1-3 percent, primarily attributed to three reasons. First, plastics are made from many different resins, and because they cannot be mixed, they must be sorted and processed separately. Such labor-intensive processing is expensive in high-wage countries like the United States and Canada. Most plastics also contain stabilizers and other chemicals that must be removed before recycling. Second, recovering individual plastic resins does not yield much material because only small amounts of any given resin are used per product. Third, the price of oil used to produce petrochemicals for making plastic resins is so low that the cost of virgin plastic resins is much lower than that of recycled resins. As a result, recycling is not a simple solution to lessen the ecological footprint of the plastic grocery bag.

4.2 NEED FOR ANALYSIS

An analysis of the composition, characteristics, and quantities of solid wastes is essential for the following reasons:

- It provides the basic data on which the management system is planned, assigned and operated
- The changes/trend in composition and quantity of waste over a period of time are known which help in future planning
- It provides the information for the selection of equipment and appropriate technology
- It indicates the amount and type of material suitable for processing, recovery, and recycling
- The forecast trends assist designers and manufacturers in the production of vehicles and equipment suitable for future needs.

4.3 RECYCLING AND INCINERATION

In all stages of a plastic bag's life, from manufacturing to disposal, negative social and environmental impacts are evident. The planet's environment, including its soil, water, and air, is affected directly in numerous ways, beginning with the extraction and use of fossil fuels during the manufacturing process of plastic bags. Emissions resulting from this process are also very harmful to both humans and the physical environments, and the transportation of plastic bags from their origin to their place of use also contributes significantly to the environmental footprint of this product. Further negative impacts are found during the use and immediate disposal of plastic bags, particularly in non-industrial nations where waste management services are not well-developed. In these regions, plastic bags are found everywhere, from remote tourist destinations to city streets where they can clog drain pipes, contributing to massive flooding which has already cost thousands of lives. Plastic bags are also problematic to concerning the livelihoods of local people and national governments, both in terms of the loss of agricultural potential and impacts on tourism, in addition to the high cost of cleanup which falls to local and national governments. Reducing the economic footprint through recycling and therefore reducing the use of landfills, incinerators, and raw materials is not as important as the other benefits of recycling, which reveal how the net economic, health, and environmental benefits far outweigh the costs. Correcting our faulty economic system in which the market price of a product does not include the harmful environmental health costs associated during its life cycle could reveal the true costs of plastic bag consumption.

The question of plastic bags ultimately comes down to the issue of use. If people are willing and able to use environmentally-friendly alternatives, such as reusable cloth or plastic bags, the decreasing use of plastic bags will reduce their overall footprint. However, without educating the public concerning the impacts of plastic grocery bags or constructing barriers to their use, business will continue as usual. Many governments have chosen the route of taxes or levies on plastic bags, to great success. Perhaps in a culture where convenience often comes before environmental concern, speaking to consumers' pocketbooks may be the only way to effectively deal with this ever-increasing problem.

4.4. Pollution problems of plastics

Industrial practices in plastic manufacture can lead to polluting effluents and the use of toxic intermediates, the exposure to which can be hazardous. Better industrial practices have led to minimizing exposure of plant workers to harmful fumes.

There is growing concern about the excess use of plastics, particularly in packaging. This has been done, in part, to avoid the theft of small objects. The use of plastics can be reduced through a better choice of container sizes and extremely through the distribution of liquid products in more concentrated form. A concern is the proper disposal of waste plastics. Litter results from careless disposal and decomposition rates in landfills can be long. Consumers should be persuaded or required to divert these for recycling or other environmentally acceptable procedures. Marine pollution arising from the disposal of plastics from ships or flow from storm sewers must be avoided. Recycling of plastics is desirable because it avoids their accumulation in landfills. While plastics constitute only about 8 percent by weight or 20 percent by volume of municipal solid waste, their low density, and slowness to decompose make them a visible pollutant of public concern. It is evident that the success of recycling is limited by the development of successful

strategies for collection and separation. Recycling of scrap plastics by manufacturers has been highly successful and has proven economical, but recovering discarded plastics from consumers is more difficult.

4.5 Advantages of reuse and recycling of plastics – It has been observed, to reduce bad effects of waste plastics, it is better to recycle and re-utilize waste plastics in environment-friendly manners. As per statistics, about 80% of post-consumer plastic waste is sent to landfill, 8% is incinerated and only 7% is recycled. In addition to reducing the number of plastics waste requiring disposal, recycling and reuse of plastic can have several other advantages, such as:

- (i) Conservation of non-renewable fossil fuels – Plastic production uses 8% of the world’s oil production, 4% as Feedstock and 4% during manufacture.
- (ii) Reduced consumption of energy.
- (iii) Reduced amounts of solid waste going to landfill.
- (iv) Reduced emissions of carbon-dioxide (CO₂), nitrogen oxides (NO_x) and sulfur dioxide (SO₂).

PHOTOS SHOWING THE DIFFERENT STAGES OF WASTE PLASTIC RECYCLE



Openly Dump Waste Glossary Bags in dumping Yard



Glossary Bags from dumping Yard is collected and processed in melting machine



Plastic bags are melted



Solid Plastic is then Crushed into grinding machine



From this molten plastic HDPE pipes for irrigation is manufactured.



From this molten plastic HDPE pipes for Drainage is manufactured.

CONCLUSION

In all stages of a plastic bag's life, from manufacturing to disposal, negative social and environmental impacts are evident. The planet's environment, including its soil, water, and air, is affected directly in numerous ways, beginning with the extraction and use of fossil fuels during the manufacturing process of plastic bags. Emissions resulting from this process are also very harmful to both humans and the animals.

The question of plastic bags ultimately comes down to the issue of use. If people are willing and able to use environmentally-friendly alternatives, such as reusable cloth or plastic bags, the decreasing use of plastic bags will reduce their overall footprint. However, without educating the public concerning the impacts of plastic grocery bags or constructing barriers to their use, business will continue as usual. Many governments have chosen the route of taxes or levies on plastic bags, to great success. Perhaps in a culture where convenience often comes before environmental concern, speaking to consumers' pocketbooks may be the only way to effectively deal with this ever-increasing problem. Physical environments and the transportation of plastic bags from their origin to their place of use also contribute significantly to the environmental footprint of this product.

REFERENCES

1. The Asian News. 2005. "Bags of Misery in Monsoon Mayhem." *The Asian News* November 28, 2005. Accessed November 20, 2005.
2. http://www.theasiannews.co.uk/heritage/s/204/204628_bags_of_misery_in_monsoon_mayhem.html
3. Australian Government, Department of the Environment and Heritage. 2005. "Action Being Taken on the Plastic Bag Problem." Website. Accessed November 20, 2005. <http://www.deh.gov.au/settlements/waste/plastic-bags/action.html>
4. Australian Bureau of Statistics. 2004. "Year Book Australia: How Much Energy is used to make a Plastic Bag?" Website. Accessed November 15, 2005. <http://www.abs.gov.au/ausstats/abs@.nsf/0/2498b7e0c5178282ca256dea000539bc?OpenDocument>
5. Baker, R. 2002. "Ministerial Brief: Plastic Bag Levy." Website. Accessed November 22, 2005. http://sres.anu.edu.au/people/richard_baker/examples/briefing/minty/Minty.html
6. Blumberg, L. and R. Gottlieb. 1989. *War on Waste: Can America Win It's Battle with Garbage?* Washington, D.C.: Island Press.
7. Brown, S. 2003. "Seven Billion Bags a Year." *Habitat Australia* 31(5) (Oct.): 28.
8. Butte Environmental Council. 2001. "Reducing Plastic Waste Tops 2001 Legislative Agenda." *Environmental News* (spring). Online newsletter. Accessed December 18, 2005. http://www.becnet.org/ENews/01sp_plastic.html
9. Chauhan, B. 2003. "India State Outlaws Plastic Bags." *BBC News* August 7. Accessed November 20, 2005. http://news.bbc.co.uk/2/hi/south_asia/3132387.stm
10. EduGreen. 2005. "Health Impacts of Water Pollution." Website. Accessed December 18, 2005. <http://edugreen.teri.res.in/explore/water/health.htm>