

The Incidence of Plastic Waste and Their Effects in Alice, South Africa.

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Plastic grocery bags which have become a part of life for many people have become an environmental nuisance in Alice in South Africa. This is despite the legislation by government in 2003 banning production and use of thin plastics. They are lightweight and can therefore be blown over long distances. They become difficult to deal with once they enter into the environment. They take up to 1000 years to disintegrate. They are the most ubiquitous form of litter in the town and its surrounding environment. They hang in trees, litter open spaces and clog drains resulting in flooding of streets. Plastics are the most common floating litter item in the Tyume river. They are an eyesore and a threat to animals and aquatic life. Their preponderance in the environment needs to be reduced through awareness campaigns, recycling and reuse.

Keywords: Plastic waste, plastic bags, environmental pollution, Alice, South Africa.

INTRODUCTION

Plastic (polythene) bags which were introduced in the early 1980s have become an indispensable commodity in the modern lifestyle [1]. They are now a staple of the urbanites and are often used as shopping bags for packaging food [2]. Environmental groups estimate that every year 500 billion to one trillion of the bags are manufactured and used worldwide and this results in a proportionate rise in plastic waste in the municipal solid waste streams in large cities in sub-Saharan Africa [3]. Generally plastic bags are preferred to paper bags and reusable cloth and jute bags because of their physical and chemical properties [2]. They are strong, lightweight and moisture resistant [1]. Plastics also have unique properties which include versatility, inertness and flexibility, especially in the application areas of packaging [4]. Every year trillions of plastic bags are manufactured and used world over resulting in a proportionate rise in plastic waste in the municipal solid waste streams in large cities in sub-Saharan Africa [3]. The word plastic has its roots in the Greek word 'plastikos' which means being able to be moulded into different shapes [5]. Plastic bags are moulded from basic materials that are derived from oil, coal and natural gas [6]. They are so cheap to produce, sturdy, plentiful, easy to carry and store that they have captured at least 80 per cent of the grocery

and convenience store market since they were introduced a quarter century ago [7-8].

However, plastic bag litter has become an environmental nuisance in most cities and towns across the world because of their widespread use. If no corrective measures are taken the negative impacts caused by plastic bags haunt people for generations to come. Plastics are not easily biodegradable after their entry into environment and will pollute the environment for very long periods. How long plastic bags persist in the environment is essentially unknown but is likely many years to hundreds of years when exposed to sunlight which is the primary mechanism of decomposition. Plastics bags are very light and are therefore easily blown by wind and travel long distances. They are resistant to moisture; hence they do not break easily, and therefore they block drains during rains. Plastics cause a number of problems. They contribute to large municipal solid waste and as a result pose a problem for their disposal. At times they are burnt to reduce their presence in the environment, but this results in the release of toxic heavy metals and emission of noxious greenhouse gases (GHG) like dioxins and furans. These cause air pollution and also contribute to global warming and climate change [9].

The prevalence of improperly disposed plastic bags

has been linked to spread of malaria in some developing countries. Plastic bags are capable of holding rain water for several days thereby providing breeding habitats for mosquitoes. In Nigeria such conditions have been blamed for increasing the incidence of malaria [10]. Plastics are recognised threat to oceans, soil, domestic animals, wildlife and marine life [2]. In marine environments, bags can entangle, suffocate, or cause blockage in digestive tracts in marine animals, including marine birds, turtles, seals and whales [11]. The dangers posed by plastic bags to the environment has led a number of cities such as California, Oakland, Fairfax and Malibu in the United States of America have passed ordinances to ban plastic bags [12].

The problem of plastic litter has affected many countries in the world including South Africa. The plastic shopping bag litter is so ubiquitous in South Africa that these bags have earned nicknames such as the 'roadside daisies' and the 'national flower' [13]. In one instance, Cape Town, South Africa, had more than 3000 plastic grocery bags that covered each kilometre of road [14]. The multi coloured thin flimsy plastic bags were found flapping on trees and were also stuck to almost every surface. Their occurrence in Alice a small town in the Eastern Cape Province in South Africa motivated the researcher to embark on this study. The study identifies the causes of the prevalence of plastics in the town; discusses the potential threat likely to emanate from the careless disposal of plastics; and suggests possible ways of dealing with the problem.

STUDY AREA AND METHODOLOGY

This study was conducted in Alice, a small town in the Eastern Cape Province of South Africa. The town is located 32°47'S and 26°50' E, and is run by the Amathole Municipality. The study which is qualitative in nature is a mini ethnography. It was carried out for between January 2010 and June 2011. Observations on how the community dealt with plastics were made. Visits were made to the various parts of the town which include the different streets, the sites where casual dumping of solid waste is done, the outskirts of the town and the landfill. Interviews were conducted with residents as well as town officials to establish their views on plastics.

FINDINGS AND DISCUSSIONS

The study conducted in Alice revealed that there is a prevalence of plastics in the town. The litter from plastic bags is so bad in Alice that they are the most visible kind of waste. Besides being an eyesore they have become a symbol of Alice's landscape. The areas that are waste affected include the open areas within the town, the

outskirts of the town, the banks of Tyume River and the area near the town's disposal site. The poor solid waste management practices which include lack of regular collection of waste, indiscriminate dumping of solid waste and poor disposal of waste at the dump site are among the causative agents behind the proliferation of plastic waste in the town. The discussion below looks at the problem and possible impacts of plastics in Alice.

The observations made during the study reveal that plastics are readily available in Alice. The main issue is lack of awareness and concern by different stakeholders who include consumers and retailers on the potential negative impacts of plastic waste on the environment. Although the government imposed legislation in May 2003 to reduce plastic bag production and waste [15], it is apparent this has not deterred individuals and organisations from over-consumption and littering of plastics. Plastic bags are so inexpensive that in the stores no one treats them as worth anything judging by the way consumers buy them at the tills. Retailers in Alice sell plastic bags for between R0.30 and R0.50, and this is insignificant to lower the consumption of plastic bags, and individuals are not motivated to re-use bags or bring own carrier bags. Observations made in most retail shops revealed that till operators always asked customers whether to include a plastic bag on their commodities. Some of the customers who were interviewed admitted that plastic bags' cost was so insignificant to the extent that they saw no need of bringing their own bags. It was also observed that in one of the leading supermarkets in Alice, plastic bags were charged to those who bought small grocery quantities and not to those who bought large quantities. This is ironic because the impression created is that those who buy less are the people who pollute the environment, yet it is the opposite. As a result there is a high issuance of plastic bags in shops and supermarkets. There is so much unnecessary packaging going on in supermarkets as well as the market place. It was observed that plastic bags were issued to people who bought fruits at the market. In interviews conducted with stall holders at the market it was revealed that it was discourteous not to wrap commodities in plastic bag. In actual fact most of these market people continue to use the thin multi coloured bags which pose a grave threat to the environment. When asked on the dangers posed by the plastics to the environment they professed ignorance other forms of threats except for bags being a litter nuisance.

It is natural that plastic bags have two destinations after their use. Either they find their way to disposal sites and landfills, or they litter public spaces [16]. This is the case in Alice. Plastic bags have one unpleasant characteristic. They do not have any boundaries hence they pollute places several kilometres away from where they were dumped. Plastics that are taken to the dumpsite are easily blown from this unprotected site. This is because of their negligible weight and structure which makes it possible

for them to be filled up with air just like balloons, and get blown and dispersed over large areas. The area around the Alice disposal site as well as the sides of the road that leads to Fort Beaufort from Alice, are an aesthetic nuisance. In some cases the plastics have been blown for a distance of up to three to four kilometres from the dump site.

Observations made in Alice revealed that there is a lot of casual dumping in open and public places. Mounds and mounds of dirty plastic bags, food wrappings, plastic cups, bottles and cartons lie piled behind the shopping mall in the town. The situation is even worse behind Umtiza agricultural shop. The amount of plastics littering in this area makes it unpleasant although hordes of people enjoy their beer oblivious of the nuisance posed by the waste. The piles continue to grow on a daily basis as no one is concerned about removing them. They have become an attraction to rats and this could lead to diseases such as bubonic plague. The open spaces between Happy Rest, Golf Course and Ntselamanzi residential areas and town are heavily littered with plastics. Residents improvise and use plastic bags for storing their waste which they dump in the open spaces near their houses. Most of the waste is composed of plastic bags and cool drink containers. Residents said they used this improvisation because waste collection by municipal authorities was poor in their areas. These bags ultimately become part of the municipal solid waste stream and when littered in public places provide an ugly sight. These plastic bags do not remain confined in one place and they end up being everywhere.

The poor and irregular collection of waste within the town contributed to the occurrence of plastics in parts of the town. Solid waste from the shops in the shopping mall in Alice was temporarily disposed of at the transfer station situated in the eastern part of the mall before being taken to the dump site. Waste is collected from this place once in the morning. Observations made during the time of the study showed that this was inadequate since the mall was a very busy place which generates a lot of plastic waste. The transfer station is not covered at the top hence plastics by their nature were easily blown out of this facility. Plastic bags were seen flapping from trees near the transfer station and the whole area is awash in plastic pollution. Almost each and every tree in the vicinity of the transfer station has plastic bags flapping on its branches. Shop owners often collect waste in big plastic bags and place it along the streets in front of their business premises for collection by the Amathole Municipality solid waste management department. However in most cases the waste is not collected for up to three days and dogs as well as vagrants rip these bags open thereby releasing plastic bags to the environment. Once plastics are in the environment they do not remain confined in one place, and are difficult to deal with.

Plastic bag debris was awash on the banks of Tyume River during the time of the study. This presented one of

the big visual pollutant effects of plastic bags. When Tyume River is in spate it carries various forms of debris, and plastics get caught on the low-hanging branches. These river hanging bags are far more difficult to clean up than general street litter, because of their location on the riverbank and on overhanging branches. They continue to hang on the trees and nothing is done to them. As one traverses along Tyume river plastic bags hanging from tree branches are a real nuisance. The situation is terrible at the bridge site where both sides look unsightly. The channelized stream that runs through Alice into Tyume river was also observed to be heavily clogged with plastic waste. Tyume is the main tributary of Keiskamma river which flows into the Indian ocean near the town of Hamburg. Tyume river also feeds the Binfield Park Dam. The plastic debris that is carried into the ocean and the dam is a potential threat to aquatic life. Besides reports show that plastic litter has become a major nuisance at the beaches [17].

The prevalence of improperly disposed plastic bags in the town has the potential to cause an upsurge in the spread of malaria in the town and nearby rural areas. Stray plastic bags collect stagnant, standing water, and hold it as warm mini-pools for several days, which become a breeding ground for germs, bacteria causing diseases, and disease carrying vectors such as mosquitoes [18]. Plastic grocery bags also clog sewer pipes, thereby creating stagnant water, which produces the ideal habitat for mosquitoes and other parasites which have the potential to spread a large number of diseases. The presence of plastic litter in Alice is therefore a health time bomb.

Plastic wastes that are casually dumped in Alice have been blamed for blocking gutters and drains, ultimately creating serious storm water problems. Alice has both underground and surface drainage systems. These are quickly clogged by plastics during a rain storm rendering them ineffective in draining water. The streets get flooded making it almost impossible for pedestrians to use them. This was observed at the mall in the town where plastics blocked the openings to the underground drains, forcing water to flood the streets. Surface drains in Main Street are easily blocked by plastic and water ends up flowing on the streets. This is a health threat to members of the public who trudge in the contaminated water. Alice is a windy town and plastic bags are easily blown into open gutters, where they collect and end up blocking the gutters, resulting in water spilling on the streets.

One option that has often been used to reduce the amount of plastic bags in the solid waste stream in Alice is burning. This is done mostly behind shops next to the mall. This method is detrimental as plastic bags when burnt cause local air pollution and release toxic gases such as furan and dioxin, and leave unhealthy residues that include lead and cadmium [19]. These gases are a health hazard and according to The World Health

Organization, as soon as dioxins, for example, have entered the body they become a permanent fixture, as they do not dissolve in human fats. Dioxin has been linked to cancer and is also known to affect the immune system, reproduction, and the hormone-producing endocrine gland system. They also emit gases such as carbon dioxide which have negative impacts which include the depletion of the ozone layer.

Plastic grocery bags have a negative social impact as they linked to loss of livestock. Alice is surrounded by rural areas and as such cattle often wander in the small town. There is a likelihood that these cattle might mistakenly eat plastic bags which are often caught in trees and fences leading to suffocation or blockage of digestive tracts, and eventually death [19]. Ingestion of plastic bag litter can also cause a false sensation of fullness or satiation, as the litter may remain in the stomach. This can lead to internal infections, starvation and death [2]. Although no such case was captured for purposes of this study, it is a serious problem in other parts of South Africa [20]. Urban stray cattle tend to forage in the streets eating garbage-filled plastic bags and these remain undigested resulting in the animals suffering from various ailments due to hazardous materials, mostly plastic bags inside their abdomen [21-22].

CONCLUSIONS

Although the Government of South Africa enacted a law to reduce the use of plastic bags, the situation on the ground in Alice seems to show that residents of Alice have not taken heed of this. They continue to use plastic bags in a manner that is unsustainable. The levy put on the bag is not deterrent enough as customers continue to demand them during grocery shopping. Thin plastic bags continue to be issued out by street vendors. The awareness levels on the dangers of plastic bags are quite low. As a result the bags continue to pollute the environment. The prevalence of plastic bags and related materials in Alice is so extensive as already been discussed in the above discussion. It is apparent that plastic bags have become a staple of the urbanized human environment in Alice.

RECOMMENDATIONS

It is therefore necessary to introduce some remedies to the problems caused by plastic bags. These are supposed to be approached from an integrated point of view whereby all stakeholders are included.

Public awareness and education campaigns

Creating awareness among Alice residents regarding indiscriminate use and disposal of plastic bags will be a

good option to overcome the problem in future. This could be done through anti-littering campaigns and promotions where residents are educated on the dangers posed by plastic bags. The South Africa government has instituted regulations that prohibit the use of thin bags, and encourage the use of thicker, more durable, recyclable plastic bags. Failure to abide by this regulation attracts a fine of up to R10 000, or one year's imprisonment for first time offenders, and R100 000 or imprisonment of up to ten years for repeat offenders [23]. However it is apparent these regulations have not been effective. Retail shops, supermarkets and fruit and vegetable vendors continue to use plastic bags because they are the cheapest of all packaging materials. Taxation on its own as is not an ineffective measure. Awareness campaigns should be used to encourage behavioural change on plastic bag use. It is important to educate the public on the ills of plastic bags and ensure that information on the possible safe alternatives is available. There already are numerous alternatives to plastic shopping bags which include paper bags, green bags and degradable bags. However, the dearth of information among the public and selfish commercial interests of the plastic industry is responsible for the continued dependence on plastic bags. The government and concerned organization must work together towards promoting reusable alternatives. It is apparent that government imposed levies on plastic bags but did not educate the public on why the levy was being charged. Such an exercise should be accompanied with awareness campaigns through advertisements informing the public why the move is being taken. This was effective in Ireland. In 2002, Ireland passed a tax on plastic bags; customers who want them must now pay 33 cents per bag at the register. There was an advertising awareness campaign. Within weeks plastic bag use dropped 94 per cent and within a year, nearly everyone had bought reusable cloth bags, keeping them in offices and in the backs of cars [24-25]. Plastic bags were not outlawed, but carrying them became socially unacceptable.

Use of environmental R's

Though the government has taken measures to regulate the use of plastic bags, this seems not to achieve the intended objectives. Instead the application of the environmental R's could curtail the use of plastic bags. The government, environmental Non-Governmental Organisations and concerned stakeholders should utilise the three environmental R's (reduce, recycle and reuse) to mitigate the use of plastics. Producers and users should be encouraged to reduce the use of plastics. A reduction in the use of plastics means that alternatives such as paper and other biodegradable bags should replace the plastic ones; and new strategies of packaging should be practised. Customers should have a mind-set

that accepting plastic bags at the point of sale such as supermarket is unfashionable.

The government of South Africa should adopt and improve recycling technologies. Recycling of plastic bags is critical as it helps in slowing down the ever increasing plastic waste burden on the environment. However, plastic recycling is easier said than done. The challenges in plastic recycling is the difficulty in segregation of plastics in one of the different groups and also cleaning of the plastics from the various contaminants like food debris, wet paper etc. The cost and efforts to accomplish this is a major factor accountable for the dismal real world recycling efforts. Plastic can be recycled but to recycle them, plastic will have to be disposed of properly. These bags should be knotted up and then thrown into garbage bins dedicated to plastics from where they can be collected, and used for recycling.

Individuals should be encouraged to (re)use plastic bags and bottles as many times as possible thus curtailing their production. With sound campaigns people should be educated to carry old plastic bags when going for shopping. They could be reused to carry books by school going pupils. They could also be utilised as carrier bags in various sectors. Plastic bottles could be used as water bottles and milk containers. In some communities they are reused as paraffin containers. This will prevent unnecessary discarding of these bottles.

In conclusion the above recommendations cannot work in isolation whereby they are implemented singly. They need to complement each other and in most cases they must be carried out at the same time. Maybe the scourge of the plastic bag could be eradicated in Alice, in South Africa and world over.

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