The Case for Banning Single-use Plastic products in Malawi

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April 2019

Anchor Environmental Consultants Report No: AEC/1836/1
anchorenvironmental.co.za

Citation: Turpie, J., Letley, G., Ng'oma, Y & Moore, K. 2019. The case for banning single use plastics in Malawi. Report prepared for UNDP on behalf of the Government of Malawi by Anchor Environmental Consultants in collaboration with Lilongwe Wildlife Trust. Anchor Environmental Consultants Report No. AEC/1836/1. 72pp.

EXECUTIVE SUMMARY

Introduction

In 2015, Malawi became one of Africa's first countries to impose a ban on plastic bags, following global concerns around the environmental damages caused by single-use plastics and joining a surge of policy instruments to deal with the issue in Africa. However, this led to a backlash from the business community, who argued in court that the ban would lead to economic costs and job losses, following which Malawi stopped implementing the Environment Management (Plastics) Regulations of 2015 in accordance with a court order. Meanwhile, the Malawian government has signed and committed to the new United Nations Environment Assembly resolution on addressing single-use plastic products pollution. The country is now reconsidering its policies on plastics.

This paper summarises the case for banning single-use plastics in Malawi, based on available information from Malawi as well as research and experience from Africa and the rest of the world. The authors argue that not only should Malawi reinstate its ban on plastic bags, but extend the ban to all single-use plastics.

Why plastics are a concern

From the 1950s to the 1970s only a small amount of plastic was produced, so plastic waste was relatively manageable. By the 1990s, plastic waste generation had tripled in two decades. In the early 2000s plastics waste increased more in a single decade than it had in the previous 40 years. Today more than 300 million tonnes of plastic waste is produced every year. That is nearly equivalent to the weight of the entire human population. Globally, the impacts of plastics on the environment are estimated to result in natural capital losses of $40 billion per year. Marine ecosystem damages have been estimated to be in the order of US$13 billion per year.

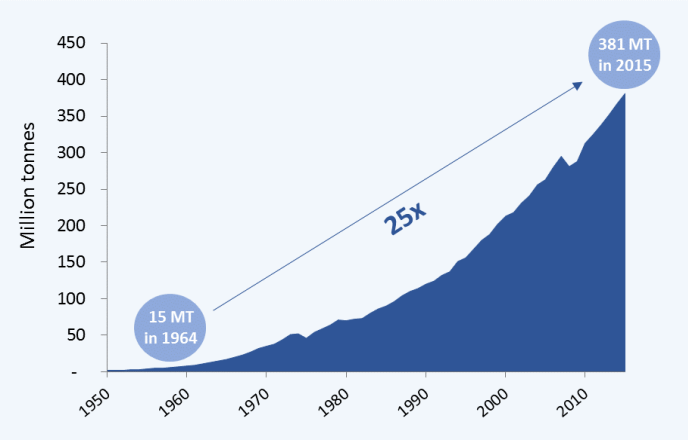

Figure I: Growth in global plastics production 1950-2015. Source: PlasticsEurope (2013, 2015), MacArthur Foundation (2017), Geyer *et al.* (2017).

The problem is that plastic can take thousands of years to decompose and therefore persists in the environment. Relatively little is recycled, and 79% ends up in landfills or the natural environment. Astoundingly, 47% of the plastic waste generated globally has only been used once.

Figure II: Plastics break down into tiny fragments and are ingested by aquatic animals. https://images.app.goo.gl/37V3KEX6xt7f8jqw8

Plastic litter blocks drainage systems and leads to flooding as well as environmental pollution. Left in the environment, plastics break down into fragments and ultimately into microscopic particles. These microplastics are ingested by aquatic animals where they accumulate in the body tissues, and are ultimately consumed by humans. Plastic debris washed into rivers, lakes, seas and oceans has entered every conceivable food chain, impacting on animal welfare, biodiversity, fishery production and the safety of aquatic foods, surface and groundwater for human consumption. In addition, both the production and incineration of plastic contribute to emissions and climate change. The chemicals in plastics are not only toxic, but contain hormone-like compounds that can negatively affect human development. The potential welfare impacts on future generations are almost inconceivable.

Africa has not yet reached the plastic consumption rates of the developed world. However, if substantial changes are not made now, waste pollution will increase by over 50% within the next 10 years, and Africa will be the world's fastest-growing region for solid waste generation by 2050. Given that most African countries already struggle to provide adequate waste disposal services, and that uncontrolled dumping is by far the most common waste disposal method, this is a looming environmental and human health disaster for the continent.

The escalation of plastic production and waste in Africa is already taking its toll on people, especially the poor. Cities across Africa already experience frequent and severe flooding, often bringing production to a standstill and leading to casualties and epidemics. This is a combined result of unplanned informal settlements, poor drainage systems, and poor waste management systems. Given the role that plastic already plays in clogging drainage systems, it is not difficult to imagine how these problems will escalate with a doubling of plastic waste. In Asia, cities such as Hanoi, Bangkok and Jakarta are spending millions of dollars to repair damage caused by drainage systems plugged by plastic debris. African cities do not have the financial resources to deal with this. In addition, there is increasing evidence of the negative impacts of plastic on fisheries and livestock, including in Malawi.

Figure III: Flooding in Lilongwe and in other cities in Malawi are likely to increase in frequency and intensity as plastic

Where does Malawi stand?

Malawi is a rapidly developing and urbanising country with a growing population. Incomes are rising and the nature of shopping is changing from street vendors and small businesses to supermarket chains and department stores. All of this translates into the potential for significant growth in demand for plastic. Consumer goods are increasingly being packaged and carried in plastic, most of this being single-use plastic. Vendors use thin plastic bags, retail outlets increasingly use plastic packaging and bags, beverage companies have switched from glass to plastic, and due to water quality concerns, demand for bottled water is on the rise. Malawians probably generate more than 0.20 kg of plastic waste per person per day.

Plastic still makes up a relatively small proportion of the solid waste that is generated in Malawi, estimated to range from about 8% in low income areas, to about 30% in high income areas. However, Malawians are producing more waste per capita than sub-Saharan counterparts, and waste management systems and public awareness are inadequate to cope with waste in general. The four largest cities in Malawi together generate over 1000 tonnes in solid waste per day. Wealthier households generate more than double the waste of poor households. Moreover, the plastic component of waste increases to 30% in more affluent areas.

Figure IV: Thin blue plastic bags and plastic water bottles end up as litter and are a growing concern in Malawi.
https://images.app.goo.gl/QBLTNnekkB43YJwn7; https://images.app.goo.gl/6BxCeS9rBicSozjV9

Waste collection rates are about 42%, and only about 4% of waste is recycled by municipalities. The gaps in capacity have stimulated private waste collection and community initiatives. Nevertheless, more than 280 000 tonnes of solid waste remains uncollected in urban areas each year. Given that plastic already makes up about 10% of waste, at least 28 000 tonnes of plastic waste enters the environment each year.

Malawi's use of plastics is still relatively modest but is escalating rapidly as a result of growing prosperity and consumerism. It will be a lot less costly to the economy, jobs and livelihoods to turn the problem around now than to deal with the consequences later. This may require the implementation of unpopular environmental policies as a vital step in securing the health and wellbeing of this generation of young Malawians as well as their progeny.

The counter argument to addressing this issue is damage to businesses and loss of jobs. Malawi is a low-income country in which development opportunities are valued. Plastics and packaging make up 29% of the exports of the manufacturing industry. The 15 plastic manufacturing companies currently in operation in Malawi produce an estimated 75 000 tonnes of plastic per year, of which some 80% is reportedly single-use plastic. The industry claims that 5000 jobs could be lost if plastic bags less than 60 microns thick are banned. However, the costs of plastic pollution for municipalities, fisheries, agriculture, tourism and human health are likely to be higher than the costs of a ban, especially when the likely adaptive response and regional trends are taken into account.

Eliminating disposable single-use plastics will stimulate the market for more durable alternatives, such as re-useable bags and glass bottles, creating new job opportunities. This has been observed in other countries regulations and incentives have reduced single-use plastic usage. Small business opportunities can be fostered and can potentially be of greater value to the poor. Moreover, as plastic reduction policies take hold across the continent, this also brings the continued viability of Malawi's plastic exports into question.

Figure VI: Eliminating single-use plastics creates a need for durable, eco-friendly alternatives

What is the solution?

Recycling can help to ameliorate plastic waste problems, but it is not the silver bullet. International consensus has moved from reliance on recycling to minimising the use of plastics. One after another, countries are implementing policies to reduce the production and use of plastic products. These range from taxes and charges to discourage production, to outright bans, or a combination of the two. So far, 26 African countries have introduced bans on plastic, more than half of these since 2014, and the most recent being neighbouring Tanzania in April 2019. Since 2014, more than 150 municipalities in the United States have implemented plastic bag bans or levies. In March 2019 the European Parliament approved a law banning a wide-range of single-use plastic items by 2021 and also agreed to collect and recycle 90% of beverage bottles by 2029. In response to consumer demand, retail businesses are also increasingly introducing policies to reduce plastic packaging.

Rwanda provides an excellent example. The production, use, importation and sale of all polyethylene bags was banned in 2008, and vigorously enforced. The country also introduced a monthly community service day and has used this to involve its population in regular clean ups. The country is now the cleanest in Africa. In January 2019, Rwanda drafted a law seeking to extend this ban to all single-use plastics, including plastic water

Figure V: The streets of Kigali, Rwanda are entirely free of litter. https://images.app.goo.gl/hLNTcrNkPYFurQMX7

bottles, disposables straws, plates, spoons and tumblers. This is strong evidence of the net economic success of its policies.

Although single-use plastics are particularly difficult to justify and can be dealt with relatively swiftly, it needs to be recognised that all plastics have environmental impacts. Ultimately there will be a need to find suitable alternatives for plastic in general.

Conclusions and recommendations

Malawi is still in the relatively early days of transition into reliance on plastic compared with higher income countries. Nevertheless, the quantities of plastic entering the environment in this densely populated country are very high. In conjunction with poor waste management systems that will continue to be challenged by resource shortages and informal settlements, the prospect of plastic waste reaching projected future levels bears serious and urgent consideration. Based on experiences in Africa and the rest of the world, inaction is likely to result in more frequent and serious urban flooding, costs to fisheries and tourism, and human health problems, as well as contributing to global climate change. Malawi has the opportunity to act timeously before the use of and dependence on single-use plastic becomes more entrenched. As a low income country, it cannot afford to deal with the consequences of a plastic problem that spirals out of control.

Based on international experience, an outright ban appears to be the most effective solution for dealing with single-use plastics, and one that can most successfully be used to stimulate alternative economic production and responsible tourism. Given global trends, Malawi will also be well placed to extend its ban from bags to all single-use plastics. To be really effective, a ban will need to be supported by a range of measures, including strong sanctions, monitoring, and enforcement. Advocacy and awareness campaigns that engage both the public consciousness and other stakeholders such as policy makers and the private sector have proven effective to inspire pro-environmental attitudes and action that result in behavioural, social and institutional change. Increasingly such bans can also be used in the marketing of responsible tourism, and provide opportunities for both private sector and community groups to diversify and meet a new demand for sustainable alternatives.

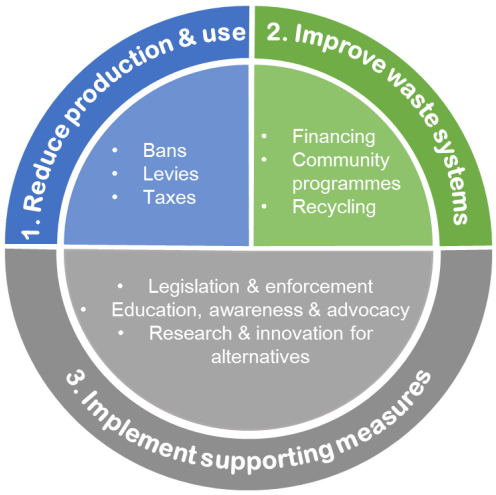

Figure VI: Measures identified as being key to addressing plastic pollution in Malawi. Source: authors.

Thus, in summary, the following key recommendations are made:

1. The ban on plastic bags should be upheld and extended to include all single-use plastic.
2. The ban should be supported by advocacy, public education and strict enforcement.
3. Subsidies or other forms of assistance should be provided to stimulate recycling and the development of alternatives to plastic packaging, where necessary
4. Introduce pollution taxes on the production and use of other plastics and use the revenues towards improved waste management.
5. Increase efforts to monitor the production, consumption of plastic and the management of plastic and other solid waste, and its impacts

ABBREVIATIONS AND ACRONYMS

AEJ	Association of Environmental Journalists
APEC	The Asia-Pacific Economic Cooperation
CARD	Churches Action in Relief and Development
CBO	Community-Based Organisation
CEPA	Centre for Environmental Policy and Advocacy
CURE	Coordination Union for the Rehabilitation of the Environment
CYDO	Christian Youth Development Organisation
DODMA	Department of Disaster Management Affairs
EAD	Environmental Affairs Department
EMA	Environmental Management Act
EPR	Extended Producer Responsibility
EU	European Union
HDP	High-density polyethylene
ICCM	International Conservation Clean-up Management
MCCN	Malawi Creation Care Network
MEET	Malawi Environment Endowment Trust
MIT	Ministry of Industry and Trade
MMPW	Mismanaged Plastic Waste
Mt	Million tonnes
MWK	Malawian Kwacha
NADMO	National Disaster Management Organisation of Ghana
NCST	National Commission for Science and Technology
NES	National Export Strategy
NGO	Non-Governmental Organisation
OECD	Organization for Economic Cooperation and Development
OWI	Our World International
PET	Polyethylene terephthalate
PMAM	Plastic Manufacturers Association of Malawi
PVC	Polyvinyl chloride
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIMA	University of Malawi
US	United States
WESM	Wildlife and Environmental Society of Malawi
WHO	World Health Organisation
ZEMA	Zambian Environmental Management Agency

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1 INTRODUCTION

1.1 Project background

Concerns around the impact of plastic use on the world's ecosystems and human wellbeing have been growing rapidly over the past few years. The impacts are of particular concern in developing countries where populations are increasing rapidly and waste generation is rising but where waste collection systems are weak, waste disposal is often uncontrolled and recycling is limited. This has stimulated a surge in the number of policies and economic measures implemented by governments in order to reduce the production and use of plastics, in particular, single-use plastics.

In Malawi, where solid waste management is already a significant challenge, increasing plastic consumption has already started to take its toll on the environment and the economy. Recognising this, the Government of Malawi, through the Ministry of Natural Resources, Energy and Mining, banned the manufacture, importation, distribution and use of plastics thinner than 60 microns in 2015 (see Appendix 1). The aim of the ban was to reduce and control the indiscriminate use and disposal of thin plastics, in particular thin plastic bags, and to encourage the use of alternative environmentally friendly products such as paper, hessian, cloth or sisal bags, palm baskets or thicker and biodegradable plastics.

However, in 2016, the Plastics Manufacturers Association applied to the High Court for a Stay Order restraining Government from implementing the ban, and requesting a judicial review of two decisions made by Government: (1) to close down the applicants' factories and impose fines on them and their distributors/customers for manufacturing/selling thin plastics of less than 60 microns in contravention to the Environment Management (Plastics) Regulations of 2015 without affording them a right to be heard, and (2) to adopt, implement and enforce the Plastics Regulations without due regard to relevant factors such as hardships that Plastic Manufacturers would suffer and similar regulations in the South African Development Community region and beyond. The Stay Order was granted, but the judicial review proceedings were dismissed and the Court allowed Government to resume implementation of the Plastics Regulations. However, the Plastics Manufacturers Association have since appealed the Decision of the High Court and the matter has been referred to the Supreme Court of Appeals. These recent developments are described in more detail in Appendix 1.

The Government of Malawi therefore wishes to gain a better understanding of the potential social, economic and environmental impacts of banning plastic in order to guide further policy decisions that may need to be made about plastics. Meanwhile, global initiatives to address plastics pollution have been increasing apace, including negotiations on the development of an international agreement banning the use of plastics. In March 2019, the Malawian government signed and committed to the new United Nations Environment Assembly resolution on addressing single-use plastic products pollution.

This study was based on a review of the literature and interviews with stakeholders in government and industry (Appendix 1). It provides a preliminary assessment of plastic pollution in Malawi and provides a case for banning single-use plastics in Malawi. Since there has been no previous monitoring of the production, import, use and disposal of plastic bags in Malawi, the study has made use of information gleaned from the international literature, government sources, case studies and interviews with government, communities and the private sector. Based on the findings, the authors argue that not only should Malawi reinstate its ban on plastic bags, but extend the ban to all single-use plastics.

1.2 Aim of the study

The aim of this study is to provide a preliminary assessment of plastic pollution and the ban on thin plastic bags in Malawi and advise on a way forward based on a review of available information and information gathering through semi-structured interviews with government and stakeholders, and local and international experience.

1.3 Structure of report

The study starts with a review of why plastics are a concern by considering the rise in plastics, the state of solid waste management and the costs and consequences of plastic pollution. We start each section with an overview of global or international studies and then discuss the situation or likely implications for Malawi. We then provide an overview of policy instruments, and regional and international experience of banning plastic bags. Following this, a discussion of the possible risks of banning single-use plastics in Malawi is presented. Finally, the report concludes by discussing the way in which people and the economy are likely to adapt to the plastic bag ban and elaborates on ways that government can help this process through public awareness, stimulating alternative industries and other measures.

1.4 Target audience

This report is designed to initiate a deeper understanding into the potential social, economic and environmental impacts of plastic pollution in Malawi and the impacts of banning thin plastics with the intention of providing ways in which people and the economy are likely to adapt to a ban on plastics and ways in which government and business can help this process in both the short- and long-term. The report is thus aimed at government policy makers and industry, but is also of importance to other stakeholders such as the retail sector, consumers, manufacturers, environmental groups and civil society.

2 WHY PLASTICS ARE A CONCERN

2.1 Plastic waste generation is growing exponentially

Plastics are increasingly used across the economy. Since their commercial development in the 1950s and thanks to their low cost, light weight, versatility, durability and hygiene benefits they have brought significant economic benefits to the packaging, construction, manufacturing, transportation, healthcare and electronics sectors (Jambeck *et al.* 2015, MacArthur Foundation 2017, UNEP 2018a). This wide demand for the material has led to the resulting rapid global growth in plastics production over the past few decades. Indeed, plastic production increased by twenty-five fold between 1964 and 2015 from 15 to 381 million tonnes (Mt, Figure 2.1; PlasticsEurope 2013, 2015, Geyer *et al.* 2017). This equates to a compound annual growth rate of 8.4% which is roughly 2.5 times that of the global gross domestic product during the same period (Geyer *et al.* 2017). The cumulative amount of plastic resins and fibres manufactured from 1950 to 2015 is about 7800 Mt, half of which was produced in the past 13 years (Geyer *et al.* 2017). Without action, production can be expected to double again in the next 20 years and almost quadruple by 2050 (MacArthur Foundation 2017).

Global plastic production could double in the next 20 years and quadruple by 2050

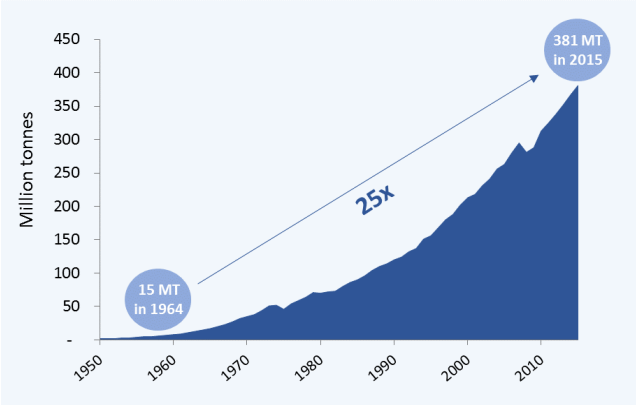

Figure 2.1. Growth in global plastics production 1950-2015. Source: PlasticsEurope (2013, 2015), MacArthur Foundation (2017), Geyer *et al.* (2017).

Most of this plastic is packaging (**Figure 2.2**), the growth in which was accelerated by a global shift from reusable to single-use packaging, including grocery bags, food packaging, bottles, straws, containers, cups and cutlery (Geyer *et al.* 2017, UNEP 2018a). Much of this is thrown away after only a single use, with the result that packaging accounts for 47% of all the plastic waste in the world (UNEP 2018a, Geyer *et al.* 2017). China is the largest worldwide generator of plastic packaging waste, while the USA, Japan and

Single-use plastic packaging accounts for 47% of global plastic waste

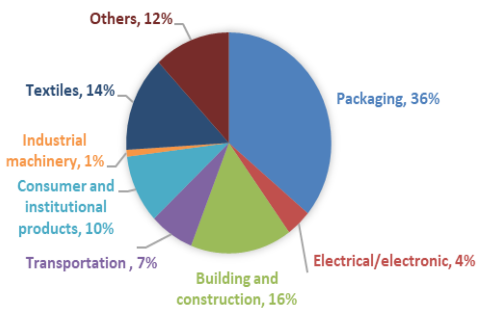

Figure 2.2. Global plastic production by industrial sector. Source: Geyer et al. (2017)

European Union are the largest producers of plastic packaging waste per capita (Geyer *et al.* 2017, UNEP 2018a).

Malawi is no exception to these trends. Estimates of total waste generated in Malawi in 2012 range from 1151 to 1655 tonnes per day (420 000 – 600 000 tonnes per year; Hoornweg & Bhada-Tata 2012, Scarlat *et al.* 2015). Most of this is from the four largest cities. In 2014, these cities were estimated to be jointly generating over 1000 tonnes per day in solid waste (Figure 2.3, NCST 2014). Estimates for Lilongwe alone range from 250 to 482 tonnes per day, and for Blantyre range from 275 to 820 tonnes per year (Barre 2014, NCST 2014, 100 Climate Solutions Project Campaign 2016). Taking population growth into account, the country's waste production is likely to be in the range of 530 000 to 750 000 tonnes in 2019. Three-quarters of this comes from households (Figure 2.3).

The four largest cities in Malawi together generate over 1000 tonnes of solid waste per day

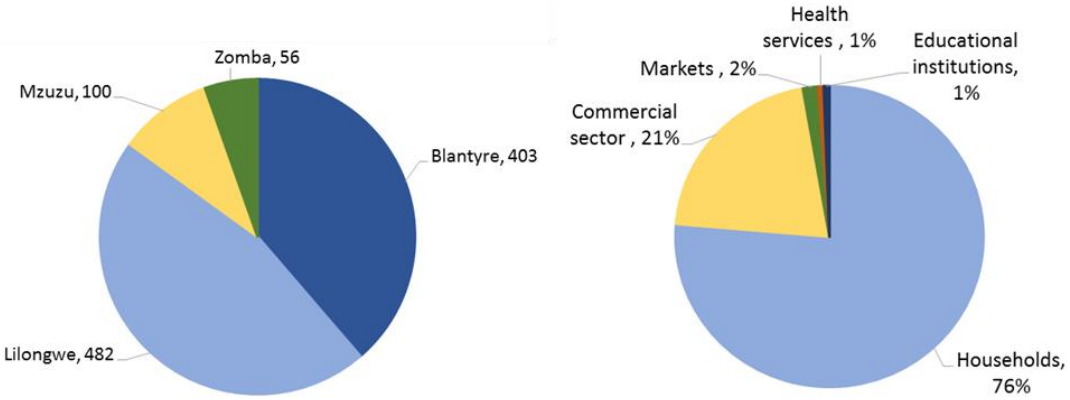

Figure 2.3. (a) Total waste generation for the four main cities in Malawi (tonnes per day); (b) the proportion of the total generated by each sector. Source: NCST (2014).

While plastic makes up a relatively small proportion of solid waste compared with the global average, this is fast changing, particularly in the more affluent areas of cities. One study estimates that 81% of the solid waste is organic, 10% plastic, 6% is paper, 1% metal and 1% is glass (100 Climate Solutions Project Campaign 2016), and in Lilongwe it has been estimated that 68% of solid waste by mass is organic matter, followed by soil, ash, stone and debris (9%), plastics (8.5%), paper and cardboard (8.1%), textiles (2.2%), metals (1.7%), glass (1.4%), wood, charcoal and rubber (0.6%) and e-waste (0.3%; NCST 2016).

Households in high income areas generate more than 7 times the plastic waste of those in low income areas

However, both waste production and the plastic component of waste increase with increasing wealth in Malawi. In the main urban areas waste generation was found to range from 0.20 kg/capita/day for low income households to 0.51 kg/capita/day for high income households (NCST 2014, **Error! Reference source not found.**). In Blantyre, plastic

waste in 2011 increased from 8% of total waste in low income areas to 30% in high income areas (Barre 2014).

Increasing plastic waste production in Malawi is associated with a shift towards more formal shopping where large consumer markets for plastic goods and plastic packaging are being created. Because single-use plastics are light weight, cheap, convenient and provide hygiene benefits there is increasing usage of these products by supermarkets and fast food outlets. Malawi has seen a boom in the amount of food packaging used in supermarkets. Where food products were previously sold loose, they are now packaged in plastic punnets and wrapped in thin plastics. Other single-use plastics that have become more popular include polystyrene containers, plastic utensils, plastic bags and plastic beverage bottles. Coupled with increases in population, the increasing demand for plastic will lead to exponentially increasing use of plastic in the absence of any intervention.

Usage of single-use plastics could rise significantly

Vendors, formal retailers, fast food restaurants, the beverage industry and tourists all make a significant contribution to plastic pollution:

- Informal traders make extensive use of thin plastic bags to package their wares.
- Growth in the establishment of supermarkets and fast food outlets has markedly increased the consumption of plastic carrier bags and other single-use plastic products.
- The beverage industry has switched from using returnable glass bottles to plastic bottles, and
- Tourists have become reliant on bottled water as it satisfies their need for convenient and clean water.

2.2 Plastic waste does not go away

Plastic waste does not decompose in the same way that organic material does. Plastic bags take 10-20 years to decompose, containers, bottles, disposable nappies and cling film take hundreds of years to decompose, and containers made of expanded polystyrene foam ("styrofoam") can take thousands or even millions of years to decompose.

Plastic can take thousands of years to decompose

Globally, only about 12% of all plastic has been incinerated and 9% has been recycled, so 79% of all the plastic waste produced (some 6300 Mt) has accumulated in landfills or in the natural environment since 1950 (Geyer *et al*. 2017). Based on current trends, this will grow to 12 000 Mt by 2050 (Geyer *et al.* 2017).

79% ends up in landfills or the natural environment

Estimates for plastic packaging are similar, with about 40% entering landfills and 32% leaking out of the collection system as litter and mismanaged waste (MacArthur Foundation 2017;

Figure 2.4). Furthermore, plastics that do get recycled are usually recycled into lower-value applications that are not again recyclable after use. The global recycling rates for both plastics and plastic packaging are far below the global recycling rates observed for paper (58%) and iron and steel (70-90%, MacArthur Foundation 2017). Recycling rates in Africa are much lower than global averages.

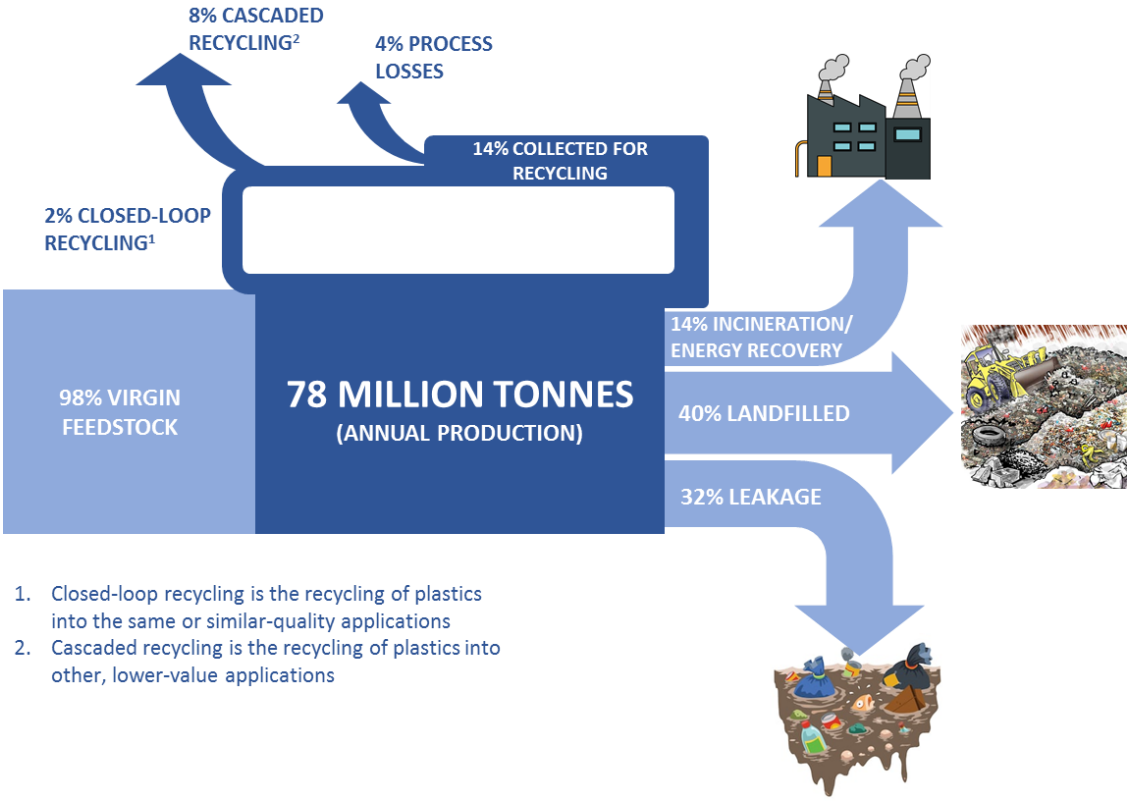

Figure 2.4. Global flows of plastic packaging materials in 2013. Source: MacArthur Foundation and McKinsey & Company (2016, http://www.ellenmacarthurfoundation.org/publications).

Mismanaged plastic waste, defined as waste material that is either littered or inadequately disposed of through dumping and open, uncontrolled landfills, is of most concern. Once littered (or leaked) it becomes costly to recover and due to its long decomposing time, it becomes a multigenerational problem (UNEP 2014, Jambeck *et al*. 2015).

Plastic waste is a multigenerational problem

2.3 Waste management is already a challenge

African cities lack the resources to deal with their current, let alone exponentially increasing, waste burdens. Waste collection rates in sub-Saharan Africa are very low in comparison to other regions, as a result of lower per capita GDP and lack of payment for services (Lall *et al*. 2017, White *et al.* 2017). For example, only 35% and 45% of residents in Moshi, Tanzania and Nairobi, Kenya pay for waste management services, respectively (UNEP 2018b). Although solid-waste management is one of the biggest items in municipal budgets a cross sub-Saharan Africa, total waste collected in 2012 was only 44% of what was generated (Hoornweg & Bhada-Tata 2012, Scarlat *et al*. 2015). Collection rates vary from as low 18% in Madagascar to over 80% in Ghana, Mauritius and Seychelles, and are about average in Malawi (42%, Scarlat *et al*. 2015). Coverage and the frequency of servicing also vary. Informal settlements, which account for an estimated 56% of the urban population in sub-Saharan Africa (UNEP 2018b), are poorly serviced.

In sub-Saharan Africa, only 44% of waste is collected

Furthermore, of the waste collected, some 47% ends up in uncontrolled dump sites. This waste is left untreated, uncovered and unsegregated which has significant implications for environmental and human health (UNEP 2018b). Only 29% makes its way into sanitary landfills. The recycling rate is estimated to be only 4% (Hoornweg & Bhada-Tata 2012), compared to 30% in the OECD countries (UNEP 2018b).

Only half of the waste collected is properly disposed of

With a population growth rate of 3.55% (UNEP 2018b), projected urbanisation rates of 2.5-3.5% per annum (White *et al*. 2017) and increasing middle-class population (Deloitte 2014), sub-Saharan Africa is expected to become the world's fastest-growing region for solid waste generation by 2050 **(**Hoornweg *et al*. 2013, 2015). Average waste generation is set to increase by 33% from 0.64 to 0.85 kg per capita per day (0.5 to 0.8 kg in Malawi), and total waste generation in sub-Saharan Africa is projected to more than double from 81 Mt per year in 2012 to 172 Mt per year in 2025 (0.6 to 2 Mt in Malawi; Scarlat *et al*. 2015).

Waste generation in sub-Saharan Africa will more than double from 2012 to 2025 and could triple in Malawi

Much of this is due to increasing demand for plastic. Consumer demand for plastic goods and plasti c packaging is growing, with supermarkets replacing informal shops and markets in most African cities (Deloitte 2014, Jambeck *et al*. 2018). In 2012, plastic made up 13% of solid waste in sub-Saharan Africa, with organic matter making up 57% (Hoornweg & Bhada-Tata 2012). However, this proportion will change as a result of increasing plastic packaging and paper waste (Hoornweg & Bhada-Tata 2012). This will require new investments in waste management infrastructure and technology, which will further burden African municipalities.

Like most rapidly urbanising cities in Africa, cities in Malawi face exponentially increasing waste generation amidst limited fiscal and waste management resources. Waste management policies, regulations and institutional frameworks do exist in Malawi. City Councils are responsible for waste management within their city boundaries, and are governed by the following legislation:

- The Public Health Act (34:01) of 1969 stipulates the duty of local authorities to keep administrative areas in a clean and sanitary condition;
- The Environment Management Act Cap. 60:02 of the Laws of Malawi (Part II) and National Environment Policy of 2004 specify that that every person has a right to a clean and healthy environment and a duty to promote and maintain a clean environment in Malawi;
- The Environment Management (Waste Management and Sanitation) Regulations, 2008 specifically provide for waste management and sanitation;
- The Local Government Act Cap. 22:01 of the Laws of Malawi includes specific legal provisions through the General Cleanliness and Solid Waste Management city By-Laws;
- The Physical Planning Act provides guidelines for the provision of waste management and sanitation services; and
- The National Sanitation Policy of 2008 identifies the need to promote recycling of solid waste to protect the environment and create wealth.

Despite the existence of these policies, regulations and frameworks, the management of solid waste in Malawian cities is a major problem. Most towns and cities have inadequate waste management facilities, poor institutional frameworks, a lack of infrastructure and inadequate capacity and fiscal resources to manage and maintain existing infrastructure and equipment (NCST 2014). These problems have escalated with rapid urbanisation.

In spite of legislation, Malawi's waste management systems are inadequate

Malawi is characterised by low waste collection rates and cities lack formal waste management systems. This has serious implications for the amount of plastic waste that remains uncollected and ends up in landfill or the environment. In 2012, the overall waste collection rate was estimated to be 42% in Malawi (Scarlat *et al*. 2015) which is slightly lower than the average for sub-Saharan Africa. None of the cities in Malawi have a conventional solid waste disposal facility and the waste that is collected is dumped in dumping sites situated on the periphery of the cities (Manda 2013). Collection rates range from 14-30% in Lilongwe, 19-28% in Blantyre, 10-16% in Mzuzu and 8-14% in Zomba (Barre 2014, NCST 2014). Based on these collection rates, it is estimated that between 280 000 and 320 000 tonnes of solid waste remains uncollected each year in these four cities alone. Much of this uncollected waste is disposed of indiscriminately in open spaces, waterways and along roadsides. The most common methods of disposal at

Some 300 000 tonnes of annual solid waste production remains uncollected, which means about 30 000 tonnes of plastic enters the environment per year

Figure 2.5. Thin blue plastic bags and plastic water bottles end up as litter and are a growing concern in Malawi.
https://images.app.goo.gl/QBLTNnekkB43YJwn7;
https://images.app.goo.gl/6BxCeS9rBicSozjV9;
https://images.app.goo.gl/DPFu2B1U6gUSeqtaA

household level are burning, dumping in open space and burying (NCST 2016). Assuming that about 10% of all solid waste generated in Malawi is plastic, this equates to 28 000 – 32 000 tonnes of mismanaged plastic waste entering the environment each year.

City councils lack the budget to improve waste collection. There is a shortage of adequate equipment and fuel. Waste skips are provided in areas of the city but are not regularly emptied due to a shortage of skip carriers, leading to overflowing waste along roadsides. In Lilongwe the number of waste collection vehicles has decreased from 13 vehicles in 1995 to just four vehicles in 2019[1]. Furthermore, most of the informal settlements do not have access roads making waste collection impossible. Most of the city councils own waste disposal sites that were originally commissioned as landfills but which are now managed as crude dumps. Waste is not segregated and the dumps receive both hazardous and non-hazardous waste in the form of refuse, paper, e-waste, plastics, scrap metal, glass, and medical and industrial products.

Public awareness is lacking

Furthermore, city councils lack the resources to implement public awareness campaigns on the importance of waste management and continue to struggle with indiscriminate littering and illegal dumping by residents. During an interview with the Assistant Director of Waste Management in Lilongwe City it was recognised that not enough was being done in terms of civic education. Consequently, the department is currently working on raising funds for a public awareness campaign that they hope to implement in conjunction with their waste management implementation plan. The City Council of Blantyre introduced an awareness campaign known as the "health week and clean premises competition" which ran for three months in 2017 with the intention of sensitising residents on the role that they can play in keeping the city clean and taking care of their surrounding environment.

[1] Interview with Mr. Kamtokoma, Assistant Director of Waste Management in Lilongwe City, February 2019

2.4 Unmanaged plastic waste can have serious consequences

Plastics packaging in the consumer sector alone results in natural capital losses of $40 billion per year

The economic impacts associated with plastic pollution are significant, amounting to billions of dollars each year. A report by the UN Environment Programme titled "*Valuing Plastic*" assessed the environmental and social impacts of plastic use within the consumer goods sector and expressed these impacts in monetary terms. Impacts considered in the analysis included greenhouse gas emissions, water use, pollution from collecting and treating plastic waste, end-of-life impact of chemical additives in plastic leaching into the environment, loss of amenity caused by litter, costs of litter to marine industries and the ecological cost linked to the loss of species (UNEP 2014). Based on this, the total natural capital cost[2] of plastics in the consumer goods sector was estimated to be US$75 billion per year, of which more than half (US$40 billion) is related to plastic packaging (UNEP 2014). Broken down by sector, food companies are the largest contributor to the overall natural capital cost at 23%, followed by the soft drinks sector (12%) and the non-durable household goods sector (10%). These sectors rely heavily on plastic packaging which has high upstream impacts from the manufacturing of plastics for packaging and high downstream costs associated with litter from single-use plastics[3]. Some of the environmental costs associated with plastic use and waste generation and their implications for Malawi are discussed in more detail below.

Figure 2.6. Plastic pollution comes at a great cost to society and the economy. Source: authors.

[2] The natural capital cost is the financial cost to companies were they to internalise the impacts associated with their current practices. This was calculated by converting physical quantities of different types of environmental impacts into a monetary cost and adding them together (UNEP 2014).

[3] Upstream impacts are generated from the extraction of raw materials to the manufacturing of plastic feedstock (e.g. greenhouse gas emissions). Downstream refers to the impacts generated once the product has been discarded by the consumer (UNEP 2014).

2.4.1 *Damage to habitats and injury to wildlife*

Unmanaged plastic waste is taking its toll on the environment at local to global scales. Much of this plastic is dumped or blown into natural and man-made drainage systems, then washed into rivers, lakes and the oceans. Globally, between 0.41 and 4 Mt of plastic waste is carried down rivers into the ocean every year (Lebreton *et al.* 2017, Schmidt *et al.* 2017). Ten rivers across Asia and Africa (Indus, Ganges, Amur, Mekong, Pearl, Hai he, Yellow, Yangtze, Nile, and Niger) are thought to be responsible for transporting 88-95% of the global plastic waste load into the ocean (Schmidt *et al.* 2017). The Zambezi River, into which Malawi's rivers drain, is ranked 23rd in the world, carries some 476 000 tonnes of mismanaged plastic waste into the sea every year (Figure 2.8). While research and monitoring has focused on the oceans, inland lakes such as Lake Malawi are also being seriously impacted.

Vast quantities of mismanaged plastic waste enters rivers, lakes and oceans

Figure 2.7. An estimated 476 000 tonnes of mismanaged plastic waste is generated in the Zambezi River catchment each year. https://goo.gl/images/octDct

Left in the environment, plastics break down into fragments and ultimately microscopic particles. This has significant impacts on wildlife (Xanthos & Walker 2017). Plastic items are ingested by animals causing blockages in breathing passages and stomachs, often leading to agonising death (UNEP 2018a). This has been well documented in the marine environment where the number of species reported to be affected by ingestion and entanglement between 1997 and 2012 increased by 40% (UNEP 2014).

MARINE LITTER
Source: UN 2018a

99% of seabirds will have ingested plastic by 2050

Marine litter harms over **600** marine species

15% of species affected by ingestion & entanglement from marine litter are **endangered**

The total natural capital cost to marine ecosystems of plastic littering has been estimated to be some US$13 billion per year (UNEP 2014). This includes the economic losses incurred by fisheries, aquaculture and tourism, as well as the time spent by volunteers cleaning up beaches and the amount that society would be willing to pay to prevent species loss through plastic ingestion and entanglement (UNEP 2014).

2.4.2 *Contamination of food and water*

Plastic packaging contains toxic and carcinogenic chemicals

Plastic packaging (e.g. Styrofoam) can contain harmful substances, such as toxic and carcinogenic chemicals. These chemicals are added during the manufacturing process but can be transferred or leached into the environment when broken down, heated or burnt, which can lead to soil and ground water contamination. There is also increasing evidence that toxic chemicals from microplastics, if ingested by fish or other marine life, can enter our food chain (UNEP 2014, UNEP 2018a). However, while research into the effects of microplastics has grown over recent years, not much is known about the exact impacts on human health (UNEP 2018a).

These microplastics ingested by aquatic animals accumulate in the body tissues, and are ultimately consumed by humans (Figure 2.13). The chemicals in plastics are not only toxic, but contain hormone-like compounds that can affect human development.

Figure 2.8. Plastics break down into tiny fragments and are ingested by aquatic animals. **https://images.app.goo.gl/37V3KEX6xt7f8jqw8**

Microplastics are now being found in surface and groundwater supplies, and the contamination of tap water has been found to be a worldwide problem[4].

2.4.3 *Reduced maritime and fishery production*

If unchecked, there will be more plastic than fish by 2050

It is estimated that, without action, there could be more plastic than fish, by weight, in the oceans by 2050 (Mac Arthur Foundation 2017; Figure 2.9). This affects more than just fisheries. Plastic marine debris can be a navigation hazard, damage ship propellers, are a potential threat to food security. It has been estimated that the cost of ocean plastics to the tourism, fishing and shipping industries in the 21 APEC member states was US$1.3 billion per annum (McIlgorm *et al.* 2008). In Scotland, the economic cost of the marine litter problem has been estimated at £16.8 million per annum (Potts & Hastings 2011). This includes the economic losses incurred by fisheries, aquaculture, and ports and harbours.

[4] https://www.theguardian.com/environment/2017/sep/06/plastic-fibres-found-tap-water-around-world-study-reveals

Similarly alarming accumulations are undoubtedly occurring in inland lakes, particularly in developing countries. The ingestion of plastics leads to loss of condition and fecundity as well as death of fish. This is thought to be having very serious consequences for fishery stocks and production, which are already under pressure from overfishing. This is a major concern in Malawi, where many livelihoods are linked to the fisheries of Lake Malawi and other floodplain wetlands.

Figure 2.9. By 2050, the ocean is expected to contain more plastic than fish. https://goo.gl/images/Vz9ZmA

2.4.4 *Reduced agricultural and livestock production*

When plastic waste is disposed of into the environment or buried in pits, chemicals leach into the soils and ground water, affecting crop production. In addition, livestock ingest plastic, causing blockages which leads to starvation and death. These problems can have significant negative impacts on small-scale farmers who are dependent on livestock and crop production as their main source of income.

Plastic pollution degrades soil, impacts water quality and threatens livestock

2.4.5 *Exacerbation of urban flooding and disease outbreaks*

Plastic litter clogs drains, sewers and waterways exacerbating flooding and inducing direct economic costs with potential adverse impacts on human livelihoods and health and other essential economic and societal systems (MacArthur Foundation 2017). Many rapidly urbanising cities are already dealing with increasing flooding problems as a result of development in both river catchment and downstream floodplain areas. Hardened surfaces in the catchment increase the size of floods and the area at risk downstream during high rainfall events. At the same time, the number of people at risk is also increasing as a result of increasing informal development within floodplain areas which present apparent opportunities for settlement close to urban centres. The resultant flooding not only leads to immediate damage to property, infrastructure and

Plastic litter clogs drains and waterways, exacerbating flooding

human life, but also disrupts traffic and exposes people to health risks as a result of exposure to waterborne diseases (White *et al*. 2017, Jambeck *et al.* 2018, UNEP 2018a). Unmanaged solid waste, particularly plastic, plays a significant role in exacerbating frequency and extent of flooding by clogging the existing drainage systems. These problems need to be addressed through much improved urban planning and drainage management, but many developing country cities cannot afford this.

In Asia, cities such as Hanoi, Bangkok and Jakarta are spending millions of dollars to repair damage caused by drainage systems plugged by plastic debris. Flooding is also a major problem in a number of African cities, frequently bringing them to a standstill as transport systems are disrupted. In Dar es Salaam's Msimbazi River floodplain, frequent flooding incurs structural damages averaging US$47.3 million per year (Turpie *et al.* 2016, de Risi *et al.* 2018). This does not include impacts on human health and businesses. In Ghana, the cost of managing flood damages increased from US$2 million to US$4 million per major flood event over the last decade (Amoako 2012) (Figure 2.10). For example, in Kampala poor waste management coupled with flooding has led to frequent outbreaks of cholera in the city in 1997, 1999, 2004, 2006 and 2008 (White *et al*. 2017).

Figure 2.10. During heavy rains in Accra in 2015 severe flooding as a result of clogged drains left more than 150 people dead (Jambeck *et al.* 2018) **https://goo.gl/images/ekU6SP**

Flooding is also a growing problem in Malawi. In the capital city of Lilongwe, flash flooding in January 2019 affected a total of 179 households with two people feared dead[5]. Without adequate waste collection services and improved recycling initiatives, more and more plastic will end up clogging drains and blocking Malawi's urban waterways. The impacts are likely to increase as flooding events increase in their frequency and intensity with more and more of the urban population becoming exposed to flood waters (Figure 2.12).

The frequency and extent of urban flooding is likely to increase with increasing levels of plastic pollution

[5] https://reliefweb.int/report/malawi/lilongwe-flash-floods-affect-179-households

Figure 2.11. Flood events in Lilongwe and other cities in Malawi are likely to increase in frequency and intensity. **https://images.app.goo.gl/rK8rHkhbvnDVW84T7; https://images.app.goo.gl/y2eYahwXZhR17t9R8**

Indeed, a number of government officials in Malawi have expressed concern about this problem[6]. The frequency and intensity of flood events increases every year as the urban population grows, cities expand and plastic pollution increases. Officials report that the current urban drainage systems are inadequate and collapsing and have not been maintained or expanded since their initial construction in the 1980s. There is very limited information on the extent to which drainage systems need to be cleared and the cost of these services. The Engineering Services Department is tasked with clearing drains which is done either on a monthly or *ad-hoc* basis. However, the cleared waste is often left on the road side as the Department does not have sufficient resources or equipment to adequately transport and dispose of the waste, leading to an endless cycle of litter and blocked drainage systems. The Salima District Council's contingency plan estimates the cost of response to a severe flooding event at MWK200 million (about US$274 000), and the World Bank "Malawi - Strengthening Safety Nets Systems" MASAF IV Project the cost of clearing a main section of the drainage system in the town was MWK100 million (US$137 000). It is estimated that a refurbished drainage system for the town would require MKW400 million (US$548 000). Given these estimates for Salima, it is assumed that flooding costs and the costs of cleaning drainage systems in the larger cities are exponentially higher.

Figure 2.12. Cholera outbreaks are common in Malawi after flooding. **https://images.app.goo.gl/oSK5tozVDGriaZuD9**

The Department of Disaster Management Affairs has also highlighted the link between plastic waste and waterborne diseases (e.g. cholera, Figure 2.14) during an interview and the growing concern surrounding the improper disposal of waste which leads to poor sanitation and increased

[6] Interviews were conducted with Dr. Stern Kita, Chief Mitigation Officer DODMA; Watson Maingo, District Information Officer Salima District Council; Mr. Kamtokoma, Assistant Director of Waste Management Lilongwe City Council; Patrick Medius Nyirenda, Environmental Officer EAD; Cleaverson Nyando, Director of Engineering Services Lilongwe City Council; Gomezgani E. Nyasulu, Director of Health and Social Services Zomba City Council; and Dr Emmanuel Kanjunjunju, Blantyre City Council; February 2019.

risk of outbreaks and infection, particularly during the rainy season. Incidences of cholera in Malawi are mostly found in high density settlements during the rainy season where the indiscriminate disposal of refuse leads to poor sanitation and increased risk of outbreaks and infection (EAD 2010). In 2018, Malawi registered 929 cholera cases and 30 deaths, with Lilongwe and Karonga being the worst affected (**Error! Reference source not found.**).[7]

2.4.6 Reduced tourism revenues

Visible plastic pollution can have significant negative impacts on both urban and nature-based tourism. This has been highlighted as a particular concern for coastal tourism, since tourists are sensitive to the cleanliness of beaches as well as the state of aquatic biodiversity. Increasing environmental degradation not only deters tourists but squanders opportunities for tourism development. Countries that depend on nature-based tourism are particularly vulnerable to the economic consequences of plastic pollution (Xanthos & Walker 2017, UNEP 2018a). In California, where littered beaches were costing local residents millions of dollars each year, a reduction in marine debris by 50% resulted in US$67 million in benefits being generated to residents over a three-month period (Leggett *et al*. 2014). In 2011, following heavy rainfall, a significant amount of marine debris washed up on the shores of popular Geoje Island in South Korea. This large pollution event caused a 63% decrease in the number of visitors to the island's beaches, from more than 890 000 visitors in 2010 to only 330 000 visitors in 2011, with associated revenue losses of between US$29-37 million (Jang *et al.* 2014).

Green, clean cities are far more likely to develop a strong tourism sector

Figure 2.13. Plastic pollution has a significant negative impact on coastal and lake tourism. **https://images.app.goo.gl/pf5PfqmAT7gprXw8A**

Unsightly plastic pollution is also a concern for cities, which attract a high proportion of tourism activity (White *et al.* 2017). Indeed, a green, clean city is far more likely to be able to develop a strong tourism sector and may also be more attractive for business and staging of

[7] https://mwnation.com/kauma-takes-on-cholera/

events (Runfola & Hughes 2014). This is evident in Kigali, Rwanda where the ban on all plastic bags in 2008 has resulted in the city becoming the cleanest in Africa (Figure 2.14). This has led to a significant boost in the number of regional and international meetings, conferences and exhibitions being held in the city each year which has had positive knock-on effects throughout the tourism sector[8].

Tourism is an important economic activity in Malawi which has the potential for further development. In 2017, tourism contributed MWK159 billion or 3.5% of Malawi's GDP and supported close to 233 000 jobs directly, representing 3% of employment in Malawi (WTTC 2018). The government has identified tourism as being key to the country's economic growth and aims to increase the contribution of tourism to GDP to 10% (Department of Tourism 2017). However, environmental degradation in key tourist hotspots (e.g. deforestation, overfishing, wildlife poaching, soil erosion and litter) has been identified as a major challenge to reaching these key targets (Department of Tourism 2017).

Figure 2.14. Rwanda's ban on plastic bags has resulted in Kigali becoming the cleanest city in Africa, which has had positive knock-on effects throughout the tourism sector.
https://goo.gl/images/H3vkve

In particular, pollution of Lake Malawi, a major tourist attraction which covers almost one fifth of the country, poses a significant threat. The Lake Malawi National Park is a UNESCO World Heritage Site and is of global importance for biodiversity conservation. The tourism industry on Lake Malawi relies on the lure of pristine beaches and clean waters. Pollution

[8] https://mitmagazine.co.uk/features/how-rwanda-is-cleaning-up-in-the-events-business/
https://www.independent.co.uk/travel/africa/rwanda-holidays-luxury-kigali-travel-packages-destination-flights-heaven-radisson-blu-marriott-a7979236.html

could incur significant economic costs to the tourism industry as a result of a loss in aesthetic value, and also threatens Lake Malawi's status as a World Heritage Site (Figure 2.15).

Figure 2.15. Plastic litter (in particular, plastic bottles) on the shores of Lake Malawi threatens tourism. https://images.app.goo.gl/BYEQQPGizda1So7fA

2.4.7 Contributing to climate change damages

The production of plastics and after-use incineration contributes to climate change

Plastic manufacturing and after-use incineration generate greenhouse gas emissions which are contributing to climate change. About 6% of global oil production is used in the production of plastics and in 2012 the resulting emissions amounted to approximately 390 Mt of CO_2 for all plastics (MacArthur Foundation 2017). With the anticipated increase in plastic consumption globally, this footprint is set to become even more significant. Based on current trends, the emission of greenhouse gases from the global plastics sector is expected to account for 15% of the global annual carbon budget by 2050, up from the 1% that it is today (MacArthur Foundation 2017). The effects of climate change add to the above-mentioned problems in that they also impact on biodiversity, flood frequency, fisheries, agriculture and human health.

2.4.8 Increasing clean-up costs

In 2010, the amount of litter collected along Scotland's beaches had increased by 25%, year on year, and the average number of plastic items per km stretch of coast was higher than the UK average (Potts & Hastings 2011). In Europe alone, the estimated costs for coastal and beach cleaning reach €630 million per year (UNEP 2018a). Communities on the west coast of the United States are estimated to be spending upwards of US$520 million per year to combat litter and curtail marine debris (Stickel *et al.* 2012).

In Malawi, clean-up projects take place on Lake Malawi (e.g. Save Lake Malawi Project). These initiatives include beach clean-up activities as well as awareness raising which aims to discourage the use of plastic bottles and bags along the Lake shore. The costs of such initiatives are set to increase as the levels of plastic pollution increase. However, government-led clean-ups and river cleaning programmes are limited due to funding shortages (Figure 2.16). There is a plan under the Integrated Waste Management Project (IWMP) to implement such a programme but this has not yet come into fruition. The estimated cost of such a programme is approximately MWK50 million (US$68 500)[9]. Through the IWMP the EAD has worked with journalists and private companies on awareness campaigns regarding the management of solid waste.

Clean-up operations are costly to government and local communities

Figure 2.16. (a) The Lingazi River in Lilongwe – a constant highway for plastic; (b) blue plastic bags are prominent on the banks of the Lilongwe River (Source: ICLEI Africa)

Clean up programmes are usually initiated when the costs of unmanaged plastic waste start to outweigh the costs of clean-up. Ideally, these costs should be avoided in the first place.

[9] Source: Patrick Medius Nyirenda, Environmental Officer EAD, February 2019. MWK730 = US$1.

3 HOW CAN PLASTIC WASTE BE REDUCED?

3.1 Overview of policy measures

There are a number of measures that can be used by the public, private sector and governments to reduce plastic pollution problems. These fall into three main categories: (1) reducing the production and use of plastics, (2) improving waste collection, disposal and recycling systems, and (3) supporting actions such as advocacy, education, enforcement and innovation. Ideally, the problem needs to be tackled in all of these spheres simultaneously.

The plastic pollution problem needs to be tackled on multiple fronts

Reducing the production and use of plastic is the primary strategy in this trio, and requires strong economic incentives and/or regulations such as bans relating to certain products. These measures need to be accompanied by supporting actions, including awareness campaigns, vigorous enforcement and the development and promotion of alternative, less damaging options. Improving waste collection systems will require the strengthening of community and private clean up and recycling initiatives. Again, this can only be achieved with supporting measures that inspire public co-operation.

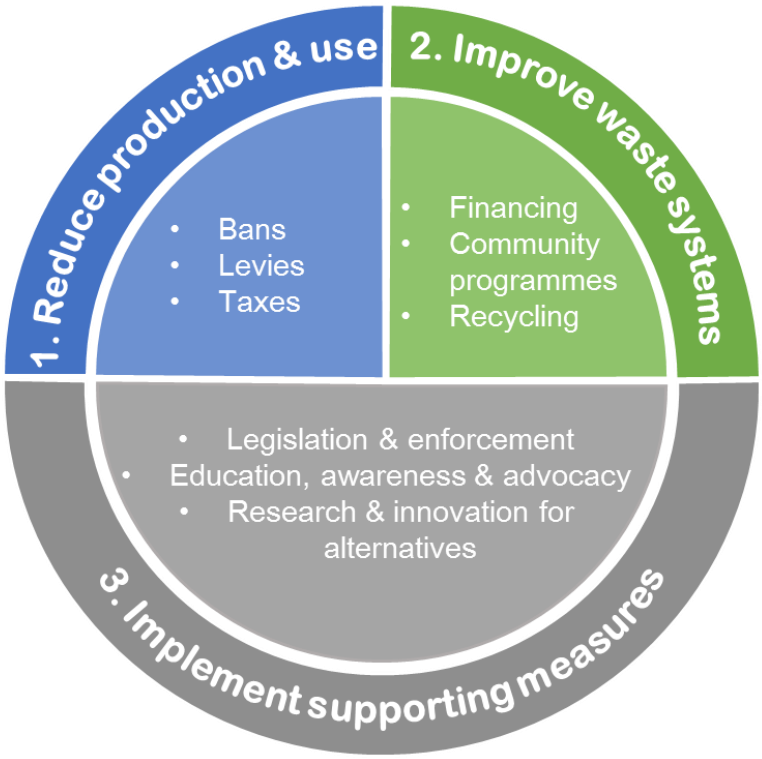

Figure 3.1. Measures identified as being key to addressing plastic pollution in Malawi. Source: authors.

3.2 Measures to reduce production and use

Environmental policy measures to reduce pollution include regulatory instruments, such as bans, and economic instruments, such as taxes or charges on production or consumption. Such policy instruments have become increasingly applied around the world in various forms (Table 3.1). Taxes or charges are typically implemented to encourage users to be less wasteful. These instruments are also used as revenue raising tools for government (taxes) or for clean-up operations (levies or charges). Bans are typically considered the safest choice when the consequences of the pollution are serious or deadly. Bans on plastic bags often pertain to a bags below a specified thickness. The rationale for this is that thicker bags are easier to recycle than thinner ones and that the higher cost of thicker bags will lead to a curtailment in consumption. Governments tend to have chosen to either implement a total or partial ban on single-use plastics, use economic instruments such as a levy or employ a combination of these two measures.

Table 3.1. Policy tools used by governments to limit the production and use of plastic bags. Source: UNEP (2018a).

Policy tools	Type	Features
Regulatory instruments	Ban	Prohibition of a particular type or combination of single-use plastics (including plastic bags, foamed plastic products, etc.). The ban can be total or partial (for those of certain specifications, e.g. plastic bags <50µ thickness).
Economic instruments	Tax/levy on suppliers	Levy paid by producers or importers of plastic products (e.g. plastic bags). For such a tax to be effective in inducing behavioural change, it should be fully passed on from suppliers to retailers, encouraging retailers to (i) charge consumers for plastic bags or (ii) offer a rebate/reward to consumers who do not ask for plastic bags, promoting use of reusable bags.
	Tax/levy on retailers	Levy to be paid by the retailer when purchasing plastic bags. The retailers are not obligated to convey the tax to the consumers.
	Tax/levy on consumers	Charge on each bag sold at the point of sale; standard price defined by law.
Combination	Ban & levy	Combination of ban and levy (i.e. a ban on thin plastic bags and a levy on thicker ones)

The number of policies and economic measures that have been implemented by national governments over the last decade in order to reduce the production and use of plastic bags has been significant (Figure 3.2). In 2017 alone a total of 17 new policies were implemented worldwide. The number of national policies regulating single-use plastics is likely to continue increasing in the future as more and more countries commit to taking

Globally, the number of policies addressing the production and use of single-use plastics continues to increase

action in order to meet the vision of a "Pollution Free Planet" as laid out by the United Nations Environment Assembly (UNEA)[10].

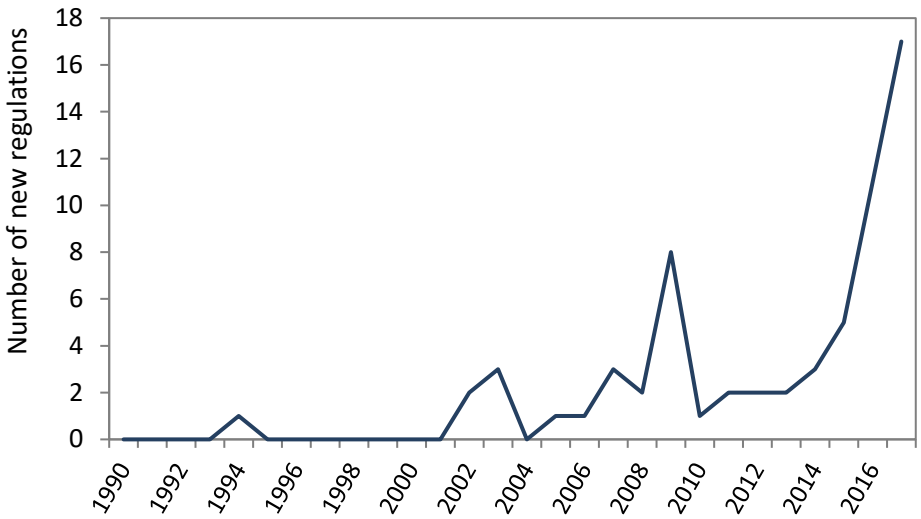

Figure 3.2. Estimated number of new regulations on single-use plastics entering into force at the national level worldwide (1992-2017). Source: UNEP 2018a.

Africa has the largest number of countries that have instituted a total ban on the production and use of plastic bags and of the 25 African countries (~50% of all African countries) that had introduced national bans by 2018, 58% of these shifted into implementation between 2014 and 2017 (UNEP 2018a). More recently, in March 2019 the European Parliament approved a law banning a wide-range of single-use plastic items by 2021[11]. Europe has also agreed a target to collect and recycle 90% of beverage bottles by 2029. In the United States and Canada, policies are implemented at the sub-national level. In the United States, plastic policies have been enacted at the state level (e.g. American Samoa, Hawaii and California) and at the municipal level (e.g. Cambridge, Massachusetts; Portland, Oregon; Austin, Texas; San Francisco, California; Chicago, Illinois; New York City, New York). As of 2014, more than 150 municipalities in the United States have implemented plastic bag bans or levies (UNEP 2018a). However, some states, such as Michigan, Idaho, Arizona and Missouri, have enacted laws that prohibit local governments from banning or imposing fees on plastic bags (UNEP 2018a).

[10] This includes Malawi, as of 2019.
[11] https://edition.cnn.com/2019/03/28/europe/eu-single-use-plastics-ban-intl-scli/index.html

In many cases it is still too early to draw any robust conclusions. Furthermore, there is little academic literature that has assessed the effectiveness of introduced interventions. The UNEP (2018a) review found that in 50% of the cases information about the impact of the ban or levy was lacking, either because the country had only recently adopted the ban/levy or because monitoring was inadequate. For countries where adequate data were available, about 60% had registered major decreases in the consumption of plastic bags within the first year of implementation, with the remaining 40% of countries reporting little or no change (UNEP 2018a). From this, the study concluded that the main problems in the countries where the ban/levy had been unsuccessful were a lack of enforcement and a lack of affordable alternatives (UNEP 2018a). In many of the developing countries in Africa, the lack of alternatives has led to increases in smuggling and the rise of black markets for thin plastic bags or the use of thicker plastic bags that are not covered by the ban (UNEP 2018a). Indeed, Martinho *et al.* (2017) found that the change in consumer behaviour to a plastic bag levy in Portugal occurred not only because of the tax but because affordable alternatives, in the form of reusable bags, were widely available and offered by supermarkets.

The impact that these policy measures have had on reducing plastic bag use and curtailing plastic pollution vary significantly across countries.

The effectiveness of banning plastic bags is context specific and dependent largely on how the ban is implemented and enforced.

For example, the Australian Capital Territory (ACT) Government implemented a ban on lightweight plastic bags in ACT in 2011 with positive impacts (UNEP 2018a). An independent review in 2012 and 2014 revealed strong compliance by retailers and a significant increase in the proportion of consumers bringing their own reusable shopping bags. Furthermore, there has been a 36% reduction in plastic bags entering landfill (Marsden Jacob Associates 2016). Other countries that have experienced reductions in the use of plastic bags since the implementation of a plastic bag ban include Israel, Rwanda, Eritrea, Colombia, Honduras, Italy, and some states and cities in the US. In Colombia the ban on disposable plastic bags smaller than 30x30cm and a levy on single-use plastic carrier bags resulted in a 27% reduction in the use of plastic bags (UNEP 2018a). In Italy, since the implementation of a ban on non-biodegradable plastic bags less than 100 microns in 2011, there has been a reduction in plastic bag consumption by more than 55% (UNEP 2018a). In California a ban on single-use plastic bags and a levy on thicker reusable ones has resulted in a 4.4% decrease in the amount of plastic bags collected during Coastal Clean-up days between 2010 and 2017. A study in the US city of San Diego examined the potential environmental and economic impacts that a plastic bag ban could have for the city and found that a ban could successfully achieve an 86% reduction in single-use bags (Equinox Project 2013).

Ireland banned thin plastic bags and introduced a levy on thicker bags in 2002. This saw an immediate decrease in the consumption of plastic bags by consumers by 90% from 328 bags per inhabitant per year to 21 bags per inhabitant (O'Neill 2016). However, after a few years plastic bag consumption started to increase (~33 bags per inhabitant per year) and in 2007 the levy was reviewed following a Regulatory Impact Assessment, increasing from €15 cents to €22 cents per bag and again in 2009 to €44 cents. In 2011 legislation allowed the levy to be amended once a year, with a ceiling of €70 cents per bag and by 2015 usage had dropped as low as 12 bags per inhabitant per year (O'Neill 2016). Revenues generated from the bag tax were paid to an Environment Fund. The levy has resulted in a change of behaviour amongst consumers who, over time, have become aware of the negative environmental impacts associated with plastic pollution and accept annual increases in the levy. Furthermore, the ring-fencing of the proceeds from the levy for environmental purposes has assisted in the public acceptance of the instrument (O'Neill 2016).

South Africa and Zimbabwe also introduced a combination of a plastic bag ban and a levy. The ban restricts the production and use of plastic bags less than 30 microns and a levy is placed on consumers for thicker plastic bags. In these countries there was an initial decrease in plastic bag consumption by consumers but over time there has been erosion in public cooperation and the consumption of plastic bags has increased to pre-levy usage (Dikgang *et al.* 2012, Chitotombe 2014). In South Africa the bag levy was applied to the manufacturers of plastic bags at six cents per bag and this is then passed onto the consumers who purchase bags at supermarkets for varying prices (from about 50-60 cents per bag). In 2018 the plastic bag levy was increased by 50% to 12 cents per bag for manufacturers. It is yet to be seen whether this price increase has had any impact on the consumption of plastic bags. Another reason for the limited impact of the levy on plastic bag consumption in South Africa is the realisation that only about half of the R1.8 billion raised by the plastic bag levy since its introduction 14 years ago has been officially allocated to the recycling sector[12]. The levy was originally meant to be ring-fenced in its entirety to develop the recycling sector and promote employment. However, the money collected from the levy is now channelled into the National Revenue Fund and allocated to various government departments. Consumers are less likely to accept the levy and make behavioural changes if they are aware that the money being generated is not being redirected into environmental or recycling projects. Indeed, the literature suggests that levies that are implemented without other reinforcement instruments such as educational programs are only effective in the short term (Dikgang *et al.* 2012).

Reinforcement instruments such as educational programs are important

[12] https://www.businesslive.co.za/bd/national/2018-03-19-only-half-of-plastic-bag-levy-has-gone-to-support-recycling/ Accessed: 13 February 2019.

In Africa, countries which banned plastic bags in general have reported high levels of success. Eritrea banned the importation, production, sale and distribution of plastic bags in 2005. This has resulted in major cost savings as a result of significant reductions in blocked drainage systems, spread of disease, loss of livestock and general pollution (Figure 4.4). The ban on plastic bags was characterised by stiff fines and regular spot checks. Eritreans now use cloth, nylon or straw bags which are manufactured locally – a new market that emerged as a result of the ban.

Figure 3.3. In Eritrea the ban on plastic bags has had a noticeable impact. Streets are clear of litter. **https://images.app.goo.gl/wfjdsJhAbdw4rMGh7**

Rwanda also banned plastic bags altogether. In 2008, after a four year consultative process and a large amount of community sensitisation, the Rwandan government banned the production, use, importation and sale of all polyethylene bags. Businesses made the transition to using paper and other environmentally friendly bags. The ban is enforced effectively and those that violate the law face heavy fines or even jail time (Danielsson 2017, de Freytas-Tamura 2017). Luggage is searched at airports and border posts for any plastic bags, which are confiscated. Smugglers of plastic bags into Rwanda from neighbouring countries face heavy punishment in the form of jail time if caught. Today, the country has developed an international reputation for its cleanliness and in 2008 Kigali was named the cleanest city in Africa by UN-Habitat. The streets in Kigali and elsewhere across the country are almost entirely free of litter (**Figure 3.4**). The country also observes a national clean-up day on the last Saturday of every month where communities band together to clean up their neighbourhoods. The Rwandan government has taken further steps to becoming environmentally sustainable and in January 2019, the government drafted a law seeking to prohibit the manufacture, use and sale of all single-use plastics, including plastic water bottles, disposables straws, plates, spoons and tumblers (Mugisha 2019).

African countries with long-standing bans have felt the benefits and are now extending their measures

Figure 3.4. (a) The streets of Kigali are entirely free of litter. (b, c) Signs in the airport
https://images.app.goo.gl/hLNTcrNkPYFurQMX7; https://images.app.goo.gl/aM8V72GEYtaC2qX98; https://images.app.goo.gl/ZmLBiZa6QVeZ2Tj9A

However, not all plastic bag bans have been effective. In Delhi, India a wide-ranging ban on the use of plastic bags in market places, introduced in 2009 was found to be ineffective largely due to a lack of enforcement (Gupta 2011). Results of the impact study found that after one year of the ban being in place about 94% of the consumers continued to use plastic bags in blatant violation of the law (Gupta 2011). The study concluded that a blanket ban was not the best possible solution given the poor enforcement capacity in the city and that a policy-mix of low cost consumer information interventions, the availability of substitutes to plastic bags and the implementation of subsidies on the use of reusable plastic bags could provide a more effective solution. Similarly, in Bangladesh, a ban on polyethylene plastic bags in 2002 saw an initial positive response from the public, but due to a lack of enforcement and affordable alternatives the use of plastic bags increased again. In Nepal, survey information collected from retailers and consumers in 14 municipalities showed that a partial ban on plastic bags less than 20 microns thick did not help to reduce plastic bag use (Bharadwaj 2016). The results from the study indicated that a complete ban on plastic bag use with stringent fines would be more effective and could reduce the number of plastic bags used by consumers by about 95% (Bharadwaj 2016). In Cameroon, the lack of any inexpensive alternatives has resulted in a significant increase in the smuggling of plastic bags from neighbouring countries. Both Guinea Bissau and Somaliland have banned disposable plastic bags but because the law has not been strongly enforced, and in the case of Guinea Bissau has been met with resistance from consumers and retailers, the impact has been minimal and plastic bags are still widely in use.

A lack of enforcement and lack of affordable alternatives can compromise the success of a plastic bag ban

Over the last five years more and more African countries have implemented either a partial or full ban on plastic bags, including Benin, Burkina Faso, Cameroon, Cape Verde, Côte d'Ivoire, Gambia, Guinea-Bissau, Mauritania, Mauritius, Mozambique, Niger, Senegal, Kenya, Zambia and Tunisia (see UNEP 2018a for details). However, the impact of these bans is largely unknown due to a lack of any monitoring information or because the ban has been in force for only a short period of time. Kenya's plastic bag ban came into effect in August 2017 and is a punitive total ban on the production, sale, importation and use of all plastic carrier bags. Offenders face fines of up to US$38 000 or four year jail terms, making it the most severe plastic bag ban in the world (UNEP 2018a). While there is yet no clear account of the impact of the ban, government has started with a monitoring programme to assess the overall impact of the ban (UNEP 2018a).

Evidence from these studies suggest that a total ban is better than a partial ban but that implemented alone will unlikely solve the problem entirely unless such a ban is accompanied by educational programs and community sensitisation that help create awareness regarding the underlying environmental problem of plastic pollution, as well as ensuring durable and affordable reusable bag alternatives are available (Ayalon *et al.* 2009,

A total ban is more effective than a partial ban

UNEP 2018a). Furthermore, monitoring and enforcement are key to the success of any plastic bag ban. Without effective enforcement it becomes easy for producers and consumers to break the law and fall back into previous habits. This is particularly evident in developing countries where enforcement capacity is often poor and resources are limited.

The majority of stakeholders interviewed in this study appreciated the importance of a plastic bag ban in Malawi, but raised concerns with regards to its enforcement and practicality. Government departments reiterated the lack of resources and funding to properly implement and enforce such a ban on the ground. Some private companies suggested that a tax levied on producers and consumers of plastic products could be a more practical approach that would generate revenue which could be ring-fenced for improving plastic waste management. Other companies suggested that providing incentives to industry in the form of tax breaks or by keeping eco-friendly materials tax free, would encourage a more holistic approach to business through recycling and other environmentally friendly measures. This suggests that Malawi should consider a combination of (i) a ban on the most damaging products such as most single use plastics, (ii) taxes on other plastic products to discourage their consumption, and (iii) subsidies to incentivise alternatives.

3.3 Measures to improve waste systems

3.3.1 Private sector and community partnerships to improve waste collection

Even if the volumes of plastic waste being generated are reduced by the above measures, countries will take years to clean up the consequences of increasing plastic use over the last five decades. This will require strengthening waste management services and infrastructure, and incorporating measures to increase recycling, inasmuch as this is a feasible option for certain types of plastics.

In many cases this will require making solid waste management a political priority and partnering with the private sector and community based organisations (CBOs) to ensure more cost-effective, inclusive and efficient waste services and improved solid waste collection. This would help to shift the role of city councils from service operation and delivery to service management. While certain measures are already in place in some cities (e.g. providing private operators with licenses to operate), a more comprehensive and coordinated partnership programme would go a long way to improving current systems. Not only will such public-private partnerships improve waste management but they also create jobs and raise awareness within communities.

Public-private partnerships and community programmes are needed to improve collection systems

In Malawi, waste collection is in theory only handled by the city council services or by companies that own a license that has been issued by the council of the Ministry (Barre 2014). However, because the council reportedly collects less than 30% of the waste generated in Lilongwe and most of this comes from middle and high income areas of the

city, private initiatives have emerged to address the waste problem. There are currently about 20 registered private waste operators in Lilongwe and this is set to increase as more than 45 companies have applied for a license to operate[13]. Some of these are described in Table 3.2[14].

Gaps in capacity have stimulated private waste collection

The private companies charge a fee to households or businesses for daily or weekly collection and use their own vehicles and equipment for collection and disposal. The companies sort the waste, compost the organic waste and either sell or recycle the plastic and paper waste that is collected. In some cases glass and plastic bottles are sold to drink industries for recycling and reuse (Barre 2014). Most of the private operators, such as ICCM, CYDO and IWO, have a social and environmental motivation and promote recycling and waste innovation with a specific focus on community engagement and sustainability.

Private waste collectors interviewed during this study employed more than 100 people and covered all areas (residential, corporate, industrial and communal) of Lilongwe. By scaling programmes such as this and making it easier for private companies and CBOs to operate through specific government frameworks, coverage and impact could be further increased. In addition, community initiatives, such as community stewardship programs, can help improve waste management while at the same time having multi-sectoral impacts.

Community programmes can have multi-sectoral impacts

In African cities, formal waste management services will nevertheless find it difficult to reach many areas, especially informal settlements. They will also find it difficult to move waste to appropriate areas as a result of poor transport infrastructure and congestion. Thus it is necessary to initiate and support community cleaning systems. Community stewardship programmes can have multi-sectoral impacts as they generate employment opportunities, provide awareness, safeguard communities and provide city-wide services such as functioning river systems and/or green open spaces that are clean and clear of litter. These programs operate by forming cooperatives which are responsible for various cleaning interventions within their communities. For example, within a river cleaning program, a cooperative will maintain a section of river. Such programs require support from government as well as funding from donors and the private sector.

Projects such as these could be initiated in the informal settlements of Lilongwe and Blantyre where plastic litter is a major problem and waste collection services non-existent. By generating employment opportunities and providing education and awareness to communities, such projects, could have significant positive impacts in Malawi.

[13] Interview with Mr. Kamtokoma, Assistant Director of Waste Management in Lilongwe City, February 2019
[14] Information collected during interviews with the private operators, February 2019

Table 3.2. A summary of five private waste collectors currently operating in Lilongwe. Source: Private interviews with operators, February 2019. CYDO= Christian Youth Development Organisation, ICCM= International Conservation Cleanup Management, OWI= Our World International. MWK730 = US$1.

	Capital Cleaners	CYDO	ICCM	Lizulu Produce Market Committee	OWI
Established	2014	2002	2016	2016	2012
Number of employees	51	15 employees, 20+ volunteers	11	10 committee members, 15 volunteers	7 full time employees, 50 part time recyclers & collectors, 100 volunteers
Equipment owned & used	2 trucks	Truck, gum boots, work suits, masks, shovels and bins	None owned by ICCM	Rakes, garden hoes, shovels & face masks	Push carts & wheelbarrows
Frequency of waste collection	Daily	Weekly	Weekly & monthly	Daily	Weekly
Types of waste collected & composition	Municipal solid waste, 40% plastic, 20% glass, 20% paper, 20% organic waste	Municipal solid waste	Recyclables only, plastic papers & containers, paper & cardboard, metal tins & cans, glass bottles	70% organic, 20% plastics, 10% metals & glass	Municipal solid waste, 72% organic, 15% plastic, 13% glass, paper & metal
Areas of operation	Residential, industrial and commercial	Residential and corporate	Residential and corporate	Lizulu Market only	Residential
Clients and fees charged (per month)	Residential: MWK5-10k SME's: MWK18-35k Corporate: MWK35-66k Industrial: MWK95-150k	Residential: min MWK3k Corporate: min MWK5k Lower rates charged to those that sort their waste at source.	Residential: MWK4k, Corporate: MWK5-10k. Collect from a community shop & a school for free.	Produce sectors, hardware sector, and electronics sector. Free service	Residential clients only. MWK2k
Number of clients	100+ residential, 10 SME, 10 commercial and industrial	700+ residential, 15 corporate entities	40	1 market	50
Amount of solid waste recycled (per month)	No data	Waste capacity of 80 000 tonnes. Recycle organic waste into compost & bio char.	Approximately 6 tonnes	No data. Mostly recycle organic waste into compost	100% of organic waste is recycled. 5% of plastics are recycled by us and 10% are sold to recycling companies
Proportion of plastic recycled	No data	Do not recycle plastics	10%	Minimal	15%
Recycled plastic use	Plastics recycled by communities used to make jewellery.	N/A	Plastics used to make eco-bricks, maize bags & woven mats	The little plastic that is recycled is made into door mats	Weaved into different materials, e.g. mats.
Price for plastics resold to recycling companies	MWK50/kg of plastics	MWK100/kg of plastics	Currently do not sell to recycling companies	MWK300/kg of plastics	MWK85/kg

There is evidence from the region that community-based cleaning projects can be successful and sustainable:

- In South Africa, the Sihlanzimvelo Stream Cleaning Project was initiated in 2011 to maintain and clean approximately 490 km of watercourses throughout the eThekwini (Durban) Municipality. Most of the rivers and streams included in the project are located in poor, densely populated suburbs. The project focuses on cleaning rivers of litter and alien vegetation, providing employment opportunities and educating communities on the benefits provided by clean and safe environments. The results have been impressive. The risk of flooding has reduced and the communities feel safer as the areas have become more accessible and crime has decreased. Residents have become more aware of the benefits that are derived from healthy river systems and have an incentive to keep it clean. The Sihlanzimvelo Stream Cleaning Project is funded by the eThekwini Municipality and the South African government's Expanded Public Works Programme (EPWP) and includes a contractor development component. More than 700 jobs have been created.
- In Tanzania, the Mlalakua River Restoration Project was initiated in 2012, and has been successful in raising awareness in communities and in cleaning the Mlalakua River in the Kinondoni Municipal Area in Dar es Salaam. The restoration project formed part of the International Water Stewardship Programme (IWaSP), an international programme for water security managed by GIZ and had a range of project partners from government departments and city councils to private companies and NGOs. Project activities include physical clean-up of the Mlalakua River, the establishment of sustainable solid waste and wastewater management systems, such as introducing private waste collectors and developing new recycling centres, building capacity of service providers, raising awareness in communities, improving household sanitation, and implementing effective law enforcement measures.
- In Rwanda, "Umuganda" which translates into "coming together in common purpose", is described as community work and is a national interventions to promote community involvement and cleanliness. On the last Saturday of every month communities come together to do a variety of public work, including clearing streets and waterways of litter, cutting grass and trimming bushes along roads, repairing public facilities, repairing roads, building houses for vulnerable persons or cleaning wells. All Rwandans between the ages of 18 and 65 are required to participate for three hours from 8am to 11am. This includes the president and all government officials. It is reported that sensitization campaigns have increased citizens' participation to more than 80% and that Umuganda has, over the period 2007-2016, saved the country approximately US$128.5 million[15].

[15] https://ktpress.rw/2017/01/rwandans-brace-first-umuganda-of-2017/

3.3.2 Recycling

Recycling was initially the foremost solution proposed to deal with increasing plastic waste. Globally, it has been recognised that while recycling helps to some extent, it will not be sufficient, and should take second place to efforts to reduce plastic production and use. Nevertheless, at 4% (UNEP 2018b), recycling rates in Africa are very low compared to international levels and could be improved.

There is little government support for recycling

In Malawi, as is the case for many African countries in sub-Saharan Africa, there is a lack of knowledge about waste recycling and associated opportunities (UNEP 2018b). Recycling is not a priority for city councils and as a result only a very small percentage of solid waste is recycled each year. The recycling systems tend to be informal and as such there are no accurate estimates of the amounts of waste being recycled. However, through interviews with private plastic recycling companies in Lilongwe and Blantyre, Barre (2014) managed to capture some useful information. The study found that willingness of government to promote private initiatives in the waste sector is seriously lacking. Companies identified lack of support and weak regulations as a major challenge for recycling and waste management in general.

Plastic recycling has over recent years become more developed in Malawi. Indeed, most plastic companies practice plastic recycling and pay informal waste pickers to collect plastic waste from collection sites and dumps or pay private waste operators for their plastics. Plastic recovery is mostly handled by large scale companies. The two companies that were interviewed by Barre (2014) stated that they started recycling plastics to limit the purchase of virgin plastic from abroad which had increased significantly in price and for environmental reasons it seemed logical given the growing amount of plastic waste in cities (Barre 2014). The two companies interviewed stated that they each collected 1000-1300 tonnes of plastic waste in 2012, of which 500-650 tonnes was recycled.

During this study one plastic recycling company was interviewed[16]. Shore Rubber have been in operation for some 14 years. However, two years ago the company scaled-up and invested in the necessary machinery to operate at a larger scale. The company recycles about three tonnes of plastic waste per day which equates to 90 tonnes/month or 1080 tonnes/year. Thin plastics, carrier bags and woven sacks are currently recycled but the company is looking into recycling plastic bottles in the future. The recycled plastic is made into black polyethylene sheets in varying thickness for use in tobacco curing and construction. Discounts are offered to farmers who collect their old sheets from the previous tobacco growing season so that these sheets can be recycled again. The thicker black sheets are sold for MWK28 500 (US$39/sheet) and the thinner sheets for MWK3000 (US$4/sheet).

[16] Interview conducted with Bilal Miladi of Shore Rubber, February 2019.

Plastic recycling companies face a number of challenges. Recycling of plastics in Malawi is an expensive operation as there is little to no support from government and cleaning of plastic waste that is bought from waste operators takes time and is costly (a problem associated with the lack of any sorting of waste at source). Furthermore, daily power outages have a significant impact on operations as machines can take three hours to heat up.

The evidence suggests that while recycling should be facilitated in Malawi, it is unlikely that the recycling industry will be able to handle the ever-increasing amount of plastic waste forecast to be produced over the next decade. Therefore, recycling cannot be considered a long-term solution to the plastic problem.

3.4 Critical supporting measures

All of the above measures require the implementation of a range of supporting measures to ensure their success. In addition to applying the appropriate level of monitoring and enforcement, these include raising public awareness, advocacy and innovation directed at finding alternative solutions to plastic. This was also strongly recommended by stakeholders in this study.

Public awareness is crucial for the success of any policy initiative that is aimed at having a broad scale social impact.

In order to really effect change, a simple and focused civic education programme is required in addition to social awareness campaigns that are rolled out nationally or sub-nationally. Based on the information gathered on consumer attitudes and the high level of public noncompliance in terms of littering and illegal dumping it is clear that a lot more needs to be done in terms of educating the public on the social and environmental impacts of plastic pollution. There tends to be a lack of ownership of the waste problem by local communities. Individuals do not take responsibility for the waste that they produce and are of the opinion that the waste problem falls solely with government. Communities need to better understand the environmental, social and economic impacts of plastic pollution and why it should be of concern to them. This can be communicated through a number of methods, for example:

- Environmental education programmes, including through school curricula, focused environmental workshops at schools and community centres, or community driven waste management projects;
- Distribution of simple communications such as pictographic pamphlets that clearly illustrate the impacts of plastic pollution, and ways to improve waste management practices at the household level;
- Multimedia awareness raising campaigns (radio, newspaper, television, twitter, Facebook etc.);
- Distribution of alternative options to single-use plastic bags; and
- Door-to-door campaigns (proven to be particularly successful in smaller towns or at the community level, UNEP 2018a).

These campaigns need to be well crafted, have a clear and simple message, targeting specific behaviours, and should clarify why particular policies have been chosen. Social awareness campaigns need to be initiated before the implementation of major policies such as bans, and should ideally continue post implementation so as to facilitate acceptance over the long term (UNEP 2018a).

State and non-state sector advocacy will also be critical. Driving social and behavioural change goes beyond targeting the behaviour of the individual to the individual's environment. Working together with the organisations that shape it can have a significant impact[17]. The private sector, for example, can initiate significant changes in consumer behaviour by 'shifting the default'. For example, Japan increased the refusal rate of plastic bags to 40% after six months of cashiers simply asking people if they wanted a bag[18]. At a government level, inter-agency cooperation has proven effective in tackling other complex environmental challenges. For example, in Malawi the Inter-Agency Committee for Combatting Wildlife Crime brought together regulatory and enforcement agencies to tackle the issue of illicit financial flows, border security and corruption that facilitates the illegal supply chains. Raising awareness within other ministries will be important to maintain the pressure. For examples, the Ministry of Agriculture should be made aware of the impact of plastics pollution on soil quality, or the Malawi Revenue Authority on benefits of reducing taxes for sustainable alternatives. Private sector advocacy highlighting the new opportunities can also help to encourage investment and diversification.

A plastic ban will lead to technological innovations which will stimulate sustainable consumption and production.

New technologies and innovations will also require support and funding from government and the private sector. Funding and support could stimulate the creation of micro-enterprises. Through training workshops these enterprises can learn new skills related to the making and marketing of environmentally friendly alternatives. Indeed, the ban on single-use plastics provides opportunities for SMEs to grow through developing and marketing innovative eco-friendly alternatives. Switching from disposable plastic bags to sustainable alternatives is an investment that will continue in the long-term. Eliminating the need for disposable bags creates the need for reusable bags which will generate manufacturing jobs for more durable alternatives. This is evident in Rwanda where the plastic bag ban in 2008 created opportunities for investors to establish alternative packing and recycling industries and SMEs to innovate and create eco-friendly alternatives from a wide variety of materials, including papyrus, sisal, starch and cassava. Not only do these industries now produce an array of packaging products, including paper bags for flour

[17] https://www.bi.team/wp-content/uploads/2019/04/2019-BIT-Rare-Behavior-Change-for-Nature-digital.pdf
[18] https://www.sciencedirect.com/science/article/pii/S0921344914000020

packaging, eco-friendly shopping bags, wax-coated paper for packaging bread, confectionary bags and seed bags, they have created numerous jobs.

Plastic industries should be responsible for adopting more advanced production and recycling technologies. This is usually achieved through incentives such as tax-subsidy systems or Extended Producer Responsibility (EPR). Extended Producer Responsibility (EPR) regulations encourage manufacturers to extend their responsibility on products beyond consumption, i.e. it focuses on the end-of-use treatment of consumer products with the aim of holding producers responsible for the costs of managing their products at end of life (Watkins *et al*. 2017). EPR can take the form of a reuse, buyback or recycling programme and aims to promote technological change and innovation in recycling. The EPR approach is used to target a reduction in waste volumes and virgin plastic usage within the plastic industry by implementing instruments such as tax-subsidies, recycling fees and norms on recycling (e.g. products must be 80% recyclable). The EPR approach is implemented in the European Union with 26 of the 28 EU Member States currently having EPR schemes in place for packaging waste (Watkins *et al*. 2017). Varying approaches are taken in each of the member states but all schemes include some form of fee modulation where different fees are charged to producers for each type of packaging material, with fees for plastic and for composite packaging materials being significantly higher than fees for other packaging materials (Watkins *et al*. 2017). Some schemes charge specific fees for different types of plastic (e.g. PET/HDPE, beverage cartons, expanded polystyrene, bio-plastics/bio-degradable plastics and plastic bags; Watkins *et al*. 2017). The EPR schemes in the EU have helped to reduce disposal and increase recycling, have in many cases reduced the burden on public budgets for municipal waste management, increased the cost efficiency of collection and recycling processes, and fee modulation has encouraged producers towards eco-design (Watkins *et al*. 2017).

For example, the Zambian Environmental Management Agency (ZEMA) notified the country of the introduction of the Extended Producer Responsibility (EPR) regulations, Statutory Instrument (SI) No. 65 of 2018. ZEMA gave manufacturers of packaging materials 180 days to register with them and on 14 February 2019 the EPR took effect. The EPR forces manufacturers to extend their responsibility on products beyond consumption, with the aim to stimulate innovation and promote diversification and competitiveness in the manufacturing sector. The Zambian Government is using EPR regulations to manage packaging materials such as plastics and their waste, as well as for regulating non-returnable glass and plastic bottles, cartons, beverage cans, waste oils, pesticides or chemical containers, used tyres, electrical and electronic equipment.[19] The EPR regulations also include the banning of plastic carrier bags and flat bags that are below 30 microns in thickness.

[19] http://www.zema.org.zm/index.php/lusaka-3rd-december-2018-issuance-of-statutory-instrument-no-65-on-extended-producer-responsibility-regulations/

4 WHAT ARE THE RISKS OF BANNING SINGLE USE PLASTICS?

Plastics and packaging are a priority export cluster in Malawi

The main concern about implementing a ban on plastic products in Malawi is the effect on the plastics industry. The plastics industry is one of the 17 industrial sectors promoted by the Malawian Ministry of Industry and Trade, with plastics and packaging identified as a priority export cluster in their National Export Strategy (NES) 2013-2018. A priority cluster was identified as having high growth potential to drive exports through value addition to neighbouring and regional markets in a way that can maintain the increasing pressure of imports (MIT 2012). Plastics and packaging make up 29% of exports within the manufacturing sector and their export value has risen from US$2 million in 2001 to US$22 million in 2010, making it Malawi's seventh main export by value after tobacco, services, uranium, tea, sugar and pulses (MIT 2012).

The plastic and packaging sector consists of five main products; sacks and bags made of ethylene polymers, household and toilet articles, plates and/or strips of cellular plastic, rigid tubes, hoses and pipes of PVC, and articles for conveyance and packaging (ITC 2018). Plastic and packaging products made in Malawi are almost exclusively exported to regional partners. The demand for plastics is driven by construction needs and the convenience of using plastic articles to replace steel and glass (ITC 2018). Almost half (49%) of Malawi's total plastic export value goes to Zimbabwe, followed by Mozambique (30%), Zambia (15%), South Africa (4%) and Tanzania (1%). The two main export products, household and toilet articles and bags and sacks, account for almost half of all regional exports (ITC 2018).

Table 4.1 provides a list of the plastic and packaging products indicating potential for export for each product, the scale of exports in 2011, targets markets and potential markets. Standard plastic products such as buckets, cups, crates and bottles, PVC pipes and PET preforms have been identified as having high short- and long-term product potential. The product potential for plastic bags in both the short- and long-term was listed as "none". PET preforms, HDP bottles for juices and cartons and paper sacks were listed for the domestic market (Table 4.1). The ITC (2018) reports that the current economic situation in Zimbabwe has halted many export flows in the sector. In the plastics and packaging sector, almost all plastic primary materials (plastic pellets) are imported within the region. Primary forms of ethylene polymers and propylene polymers valued at more than US$60 million were imported by Malawi in 2015 (ITC 2018). The primary imports come mainly from South Africa, in particular the company Sasol, which is a key supplier of these inputs across the region. Primary plastics are also imported from India and the United States.

The data presented in Table 4.1 suggests that a ban on plastic bags is unlikely to have much of an impact given the export potential for other plastic products. This suggests that additional measures need to be in place to regulate the production of other plastics. All the

plastic products listed in the table have environmental impacts and are associated with biodegradability issues. In the long-term there will be a need to find suitable alternatives.

Table 4.1. Target markets and product potential for the plastics and packaging cluster. Source: MIT 2012. PET= Polyethylene terephthalate, PVC= Polyvinyl chloride, HDP= High-density polyethylene.

Products	Potential in long term	Potential in short term	Current markets	Target/potential markets (incl. current markets with growth potential)
Standard plastic products: buckets, cups, crates, bottles, tubs, PET, etc.	High	High	Zambia, RSA	Zambia, Zimbabwe, Botswana, Mozambique, Tanzania, DRC
PVC pipes	High	High	Mozambique, Zambia	Zambia, Mozambique
Packaging labels	Medium	Medium	None	Zambia
Flexible packaging	None	None		
Liquid packaging (cartons)	Medium	Medium		Zimbabwe, Mozambique
PET preforms and closures	High	High	Zimbabwe, Zambia, Mozambique	Mainly domestic, possibly Zambia, Zimbabwe & Mozambique
Bottle tops	Some	Some	Zimbabwe, Zambia, Mozambique	Mainly domestic, possibly Zimbabwe & Mozambique
HDP bottles for juices	Domestic	Domestic		Domestic
Plastic bags	**None**	**None**		
Cartons, paper sacks	Some	Some	Zambia, Mozambique, Swaziland	Domestic, Mozambique, Zimbabwe, Tanzania, Zambia
Glass packaging	Some	Some	Zambia	Zambia

There is limited detail at industry level. According to the Ministry of Industry, Trade and Tourism there are 15 plastic manufacturing companies currently in operation in Malawi[20]. Most or all of these are international firms. The industry reportedly produces approximately 75 000 tonnes of plastic products per year, of which 80% is single-use plastic[21]. However, further detail on operations or revenues is not available. Such information is crucial for

Plastic manufacturing companies in Malawi are producing 60 000 tonnes of single-use plastic per year

[20] Interview with Mr. Chisale, Director of Industry in the Ministry of Industry, Trade & Tourism. 12 March 2019. These include Plastico Industries Ltd, GM Polyplast, Rainbow Plastics, Flexo Pack Ltd, Royal Products (Pvt) Ltd, Polypack, Anchor Industries, Easypack, Starplex, Arkay Plastics and AERO Plastics Industries.

[21] Interview with Mr. Chisale, Director of Industry in the Ministry of Industry, Trade & Tourism. 12 March 2019.

understanding the types of single-use plastic products being produced, how much is locally consumed versus exported and how changes to operations with respect to the plastic bag ban will impact jobs and economic outputs.

The plastics industry was instrumental in suspending the enforcement of the plastic bag ban in Malawi and continue to oppose the regulations, citing that proper consultation was not followed and that the ban would have a significant negative impact on the plastic manufacturers, their distributors and their consumers in the form of lost jobs and lost revenue. The industry also opposes the minimum limit of 60 microns for plastic bags and aims to have this limit lowered. An article published online in the Nyasa Times (16 June 2018)[22] reports that the industry estimates that more than 5000 people will lose their jobs if the ban is implemented.

However, eliminating the need for disposable single-use bags creates a need for reusable bags, which would create business opportunities, jobs and the creation of more durable alternatives. For example, in South Africa, a small black-owned company was engaged to produce reusable shopping bags for Woolworths. The company produces some 20 – 30 000 bags every week, made from 55% recycled plastic. It now employs 85 people, many of whom lost their jobs when many of Cape Town's clothing factories closed a few years ago[23]. This is an example of many firms that have gone into production in South Africa since the introduction of a minimum plastic bag thickness. In Malawi, there are oppunitites for developing products out of biodegradable natural materials, including unwanted invasive alien plant biomass.

Box 4.1. Food Lovers Market is taking a progressive approach towards plastic packaging

Food Lovers Market is a fresh fruit, vegetable and grocery store that has recently opened its doors in the capital city of Lilongwe and is taking a progressive approach to reducing the consumption of plastic bags. The supermarket discourages the use of thin plastic bags by weighing all fruits and vegetables at the till which reduces the need for separating different types of produce into the thin plastic bags commonly seen in fruit and vegetable sections of supermarkets. The supermarket also provides cardboard boxes, previously used to package their fresh produce, to customers to use for packaging their groceries on leaving. These measures encourage customers to rethink their usage of plastic bags.

[22] https://www.nyasatimes.com/5-000-families-to-suffer-with-job-loses-on-closure-of-plastic-firms-impact-to-malawi-economy/

[23] http://www.supernews.co.za/reusable-shopping-bags-at-woolworths/

5 CONCLUSIONS AND RECOMMENDATIONS

Malawi is still in the relatively early days of transition into reliance on plastic compared with higher income countries. Nevertheless, the quantities of plastic entering the environment in this densely populated country are very high. In conjunction with poor waste management systems that will continue to be challenged by resource shortages and informal settlements, the prospect of plastic waste reaching projected future levels bears serious and urgent consideration. Based on experiences in Africa and the rest of the world, inaction is likely to result in more frequent and serious urban flooding, costs to fisheries and tourism, and human health problems, as well as contributing to global climate change. Malawi has the opportunity to act timeously before the use of and dependence on single-use plastic becomes more entrenched. As a low income country, it cannot afford to deal with the consequences of a plastic problem that spirals out of control. Indeed, it will be a lot less costly to the economy, jobs and livelihoods to turn the problem around now than to deal with the consequences later.

While some countries have had moderate success with the introduction of taxes and levies to discourage plastic use, this has only been temporary. Banning of plastics appears to be the most effective solution, and one that can most successfully be used to stimulate alternative economic production and responsible tourism. Given global trends, Malawi will be well placed to extend its ban to all single-use plastics. To be really effective, a plastic ban will need to be supported by a range of measures, including strong sanctions, monitoring, enforcement, and advocacy campaigns. Increasingly such bans can also be marketed to the growing market of responsible tourism.

Banning plastic bags and single-use plastics may lead to an initial loss in production. However, the costs avoided (in the form of tourism revenues, damages to the environment, livestock losses, human health impacts and global marine pollution) outweigh these losses. Furthermore, the ban will encourage innovation, resulting in the development of alternatives. Indeed, in Rwanda, while the banning of plastic bags resulted in an initial reduction in production, it forced industry to adapt and stimulated the development of new markets for various alternatives. In January 2019, the Rwandan government expanded their plastic bag ban to include all single-use plastic. This suggests that the ban, implemented in 2008, has been effective and that the positive benefits have outweighed any initial losses.

Broadening the ban to include all single-use plastics will bring into focus the plastic packaging problem which extends to unnecessary food and goods packaging which has proliferated in Malawi over the last few years. The plastic regulations of 2015 list a number of exemptions to the ban, including plastic bread wrapping, plastic bags and wraps for fresh meat, fish and poultry, plastic bags used to package various food, hardware and medicinal products and laundry dry cleaning bags. While plastic packaging for fresh meat products is important from a hygiene perspective and few better alternatives exist for packaging fresh meat and fish products, there are numerous alternatives available that could be used for packaging the other products listed. For example, bread can be wrapped in paper; plastic

cutlery can be replaced by wooden or bamboo cutlery; plastic and polystyrene punnets can be replaced by cardboard punnets, plastic carrier bags can be replaced by cotton bags, wicker baskets, mesh bags or cardboard boxes.

This study suggests that due to its longevity, reliance on plastic should be reduced in general. At the very least, the external costs of plastic production, which includes carbon emissions, should be internalised. Thus plastic products other than those being banned should be taxed appropriately to reduce their use and stimulate more sustainable alternatives. The revenues raised should ideally be ring-fenced and used to improve waste collection systems. Government can implement a standalone tax on all plastics being produced or could implement a tax-subsidy system which involves taxing manufacturers based on the environmental performance of the products they are producing to finance subsidies for research and development in the recycling sector and to promote improved waste management interventions. Subsidies on recyclable or recycled products would further incentivise manufacturers to recycle products or use materials that are easily recyclable, thus promoting the recycling sector and the use of more environmentally-friendly plastic materials. Positive incentives can also be developed for business through scoring systems that encourage environmental best practices that help them to leverage finance and influence. While this is much broader than plastic, plastic would need to be an important element.

Advocacy, public education and proper enforcement will be critical for ensuring the success of a ban on plastics. This should include a high vigilance for illegal imports. If enforcement measures are not in place to prevent the emergence of a black market for plastic bags then the ban is unlikely to have the desired outcomes. Government will need to be convinced of the need to allocate scarce resources to these activities. Rwanda, a developing country with meagre infrastructure and resources, was able to effectively enforce a plastic bag ban through strong political leadership.

Finally, Malawi should increase its efforts to monitor the production, consumption of plastic and the management of plastic and other solid waste and its impacts. It should carefully monitor the effectiveness of policy interventions so that these can be adjusted to be more effective where necessary.

Thus, in summary, the following key recommendations are made:

6. The ban on plastic bags should be upheld and extended to include all single-use plastic.
7. The ban should be supported by advocacy, public education and strict enforcement.
8. Subsidies or other forms of assistance should be provided to stimulate recycling and the development of alternatives to plastic packaging, where necessary
9. Introduce pollution taxes on the production and use of other plastics and use the revenues towards improved waste management.
10. Increase efforts to monitor the production, consumption of plastic and the management of plastic and other solid waste, and its impacts

6 APPENDIX 1. RECENT DEVELOPMENTS IN MALAWI PERTAINING TO THE BANNING OF PLASTICS

In 2015 the Government of Malawi through the Ministry of Natural Resources, Energy and Mining banned the manufacture, importation, distribution and use of thin plastics (see Box 6.1 for details). The aim of the ban was to reduce and control the indiscriminate use and disposal of thin plastics, in particular thin plastic bags, and to encourage the use of alternative environmentally friendly products such as paper, hessian, cloth or sisal bags, palm baskets or thicker/biodegradable plastics.

Box 6.1. Malawi's plastic bag regulations of 2015

The Environment Management (Plastics) Regulations of 2015 provide a legal basis for regulating thin plastics in Malawi. The regulations, listed below, outline the scope of the ban, exemptions to the ban, additional requirements, and offences and penalties as described in the Environment Management (Plastics) Regulations of 2015. The regulations only cover the use and production of plastics, plastic bags and plastic sheets made of plastic film with a wall thickness of less than 60 micrometres. The law does not regulate other single use plastics such as single use plastic bottles, nor does it regulate the importation of microbeads and plastic pellets. The regulations promote the reuse of thicker plastic bags that can be used several times, as well as the use of paper, cotton and sisal bags.

Environment Management (Plastics) Regulations of 2015 issued by the Environmental Affairs Department within the Ministry of Natural Resources, Energy and Mining. Source: EAD 2015.

Regulation	Explanation
Regulation 3: Scope of the ban	Regulation 3 **prohibits** the importation, manufacture, trade and commercial distribution of plastics, plastic bags and plastic sheets made of plastic film with a wall thickness of less than 60 micrometres.
Regulation 4: Exemptions to the ban	Regulation 4 **exempts** the following from the prohibition set out in regulation 3; a) plastic bread wrapping; b) plastic bags, plastic wrap and plastic sheets used solely to contain or wrap – i. fresh meat and fresh meat products ii. fresh fish and fresh fish products; and iii. fresh poultry and fresh poultry products; whether pre-packaged or not; c) plastic bags used as primary packaging solely used to package - i. fruits or nuts; ii. confectionary products; iii. dairy products; iv. cooked food whether hot or cold; v. liquid or frozen products; vi. seeds; vii. small hardware items; viii. medicinal products; and

	ix. veterinary products; d) polythene tubes for seedlings; e) laundry dry cleaning bags; f) plastic bags used in waste storage and disposal such as bin liners and refuse; and g) any other plastic bags that the Minister may designate as exempt from the ban.
Regulation 5: Additional requirements	Regulation 5 **requires** each plastic bag to have printed on it in English and a Local language the following: a) The name and registration number of the manufacturer; and b) The thickness of the bag. Each recyclable plastic bag should have written on it the words 'recycled' or 'reusable' or a symbol indicating that it is recyclable or reusable.
Regulation 6: Offences and penalties	Regulation 6 states that any person who imports, manufactures, trades or engages in commercial distribution of plastics, plastic bags and plastic sheets made of plastic film with a wall thickness of less than sixty micrometres commits an **offence**. a) If a person is found committing an offence the matter must be taken to court and upon conviction, that person shall be liable to imprisonment for a term of three months. b) In addition to a court convicting a person for any of the offences mentioned above the court may make an order for confiscation or forfeiture of any equipment or property which is associated with the offence.

The laws of Malawi provide that the maximum punishment that can be imposed through the Regulations is three months imprisonment or a fine of MK1000 (~US$1.40) - punishment the Environmental Affairs Department (EAD) believes is extremely inadequate. As such, the EAD is seeking to amend principal legislation through the Environmental Management Act (EMA) to provide that the "Regulations made under the Act could impose a fine of up to MWK1 million (~US$1400)". Furthermore the Environment Management Bill was passed in 2017 (Environment Management Act of 2017) which gives inspectors broader powers to impose more stringent fines and penalties.

There are four stages of enforcement action that form part of the Plastic Regulations. The first stage is voluntary compliance which encourages the public to regulate themselves by setting standards and codes of practice; the second stage applies to minor violations of the law and involves the use of negotiation, notice letters or warnings, telephone calls and site visits; the third stage involves administrative action in which the regulatory authority issues notices and orders to secure compliance; and stage four is legal action through criminal enforcement in the form of a fine and/or imprisonment (EAD 2015).

The Government of Malawi started to engage with stakeholders as early as 2004 with regards to the problems associated with plastic waste. This included consultative meetings with government agencies, city councils, plastic manufacturers, NGOs, retail supermarkets and media. In 2015, after the plastic ban was announced the Ministry of Natural Resources,

Energy and Mining consulted with several key stakeholders and the general public through meetings and radio programmes in order to create awareness on the ban and brief stakeholders on the importance, rationale and scope of the ban before its implementation.

In 2016 the Plastics Manufacturers Association applied to the High Court for a Stay Order restraining Government from implementing the ban, which was granted, and requesting for a judicial review of the two decisions made by Government. The first decision was that of closing down the applicants 'factories and imposing fines on them and their distributors/customers for manufacturing/selling thin plastics of less than 60 microns in contravention to the Environment Management (Plastics) Regulations of 2015 without affording them a right to be heard. The second was the decision by Government to adopt, implement and enforce the Plastics Regulations without due regard to relevant factors such as hardships that Plastic Manufacturers would suffer and similar regulations in the South African Development Community region and beyond. The Government was successful in having the judicial review proceedings dismissed and the Court allowed Government to resume implementation of the Plastics Regulations. However, one month later, the plastics manufacturers association appealed the decision of the High Court and as of the current date the Government cannot implement the plastics ban until the Supreme Court of Appeals makes a decision on the matter.

A number of NGOs (Wildlife and Environmental Society of Malawi (WESM), Centre for Environmental Policy and Advocacy (CEPA), Malawi Environment Endowment Trust (MEET), Malawi Creation Care Network (MCCN), Association of Environmental Journalists (AEJ), the Polytechnic at the University of Malawi (UNIMA) , Churches Action in Relief and Development (CARD), Coordination Union for the Rehabilitation of the Environment (CURE), Green Africans, Concerned Youth Organisation and Muslim Association of Malawi) have expressed interest in joining the case with the Government when the hearing is finally heard in the Supreme Court of Appeals.

The future of the plastic regulations is currently under debate. Meanwhile, Malawi has signed and committed to the new United Nations Environment Assembly (UNEA) resolution on addressing single-use plastic products pollution at the United Nations Environment Assembly of the United Nations Environment Programme in Nairobi in 2019[24]. This means that Malawi is now obliged to find a permanent solution to the problem.

[24] https://papersmart.unon.org/resolution/uploads/k1900861.pdf#overlay-context=node/271

7 APPENDIX 2: STAKEHOLDERS INTERVIEWED

Group	Stakeholder	Name & title of person interviewed	Date of interview
Government departments and entities	Zomba City Council	Gomezgani E. Nyasulu, Director of Health and Social Services	18.03.19
	Department of Disaster Management Affairs (DODMA)	Dr. Stern Kita, Chief Mitigation Officer	05.03.19
	Salima District Council	Watson Maingo, District Information Officer	18.02.19
	Lilongwe City Council, Department of Waste Management	Mr. Kamtokoma, Assistant Director of Waste Management	14.02.19
	Environmental Affairs Department (EAD)	Patrick Medius Nyirenda, Environmental Officer	11.02.19
	Lilongwe City Council, Engineering Services Department	Cleaverson Nyando, Director of Engineering Services	15.02.19
	Blantyre City Council	Dr Emmanuel Kanjunjunju	19.02.19
	Ministry of Industry, Trade and Tourism	Mr. Chisale, Director of Industry	12.03.19
Plastic manufacturers and plastic recycling companies	Shore Rubber	Bilal Miladi	15.02.19
Private waste management	Our World International (OWI)	Stephen Chiunjira, Executive Director	20-02-19
	Cool Runnings	Samantha Ludick, Manager	17.03.19
	Lizulu Produce Market Committee	Chikondi January, market committee member	21.02.19
	International Conservation Cleanup Management (ICCM)	Nyomi Rowsell, Founder & Director	14.02.18
	Christian Youth Development Organisation (CYDO)	Max Howard Mgala, Executive Director	18.02.19
	Capital Cleaners	Jeff Kaiche, Manager	13.02.19
Retail	Food Lovers Supermarket	Manay, Manager	13.03.19
	Peoples Trading Centre (Spar City Centre)	Charles Matita, Manager	05.03.19
	Sana Supermarket	Hasan Sunny Bajwa, Manager	28.02.19
	Masamba Gardens Restaurant	Joe Maulawu, Owner	15.02.19
Researchers & NGOs	University of Leicester	Professor Sosten Chiotha, Researcher	28.02.19
	Ripple Africa	Geoff Ripple, Founder	28.02.19

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