



# SINGLE-USE PLASTICS

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A Roadmap  
for Sustainability

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## Foreword



Plastic is a miracle material. Thanks to plastics, countless lives have been saved in the health sector, the growth of clean energy from wind turbines and solar panels has been greatly facilitated, and safe food storage has been revolutionized.

But what makes plastic so convenient in our day-to-day lives – it's cheap – also makes it ubiquitous, resulting in one of our planet's greatest environmental challenges. Our oceans have been used as a dumping ground, choking marine life and transforming some marine areas into a plastic soup. In cities around the world, plastic waste clogs drains, causing floods and breeding disease. Consumed by livestock, it also finds its way into the food chain.

Plastic packaging accounts for nearly half of all plastic waste globally, and much of it is thrown away within just a few minutes of its first use. Much plastic may be single-use, but that does not mean it is easily disposable. When discarded in landfills or in the environment, plastic can take up to a thousand years to decompose.

The good news is that a growing number of governments are taking action and demonstrating that all nations, whether rich or poor, can become global environmental leaders. Rwanda, a pioneer in banning single-use plastic bags, is now one of the cleanest nations on earth. Kenya has followed suit, helping clear its iconic national parks and save its cows from an unhealthy diet.

Learning from the experience of countries that have introduced bans and regulations on single-use plastics, this assessment analyses what has worked well, what hasn't, and why. The report is therefore a tool for policymakers who intend to introduce measures to regulate the production and use of disposable plastics.

The assessment shows that action can be painless and profitable – with huge gains for people and the planet that help avert the costly downstream costs of pollution. In addition, action will drive the kind of innovation that will underpin the future global economy we need.

Plastic isn't the problem. It's what we do with it. And that means the onus is on us to be far smarter in how we use this miracle material.

A handwritten signature in black ink that reads "Erik Solheim".

Erik Solheim

Head of UN Environment

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## Acronyms

**CO<sub>2</sub>** Carbon Dioxide

**EPS** Expanded Polystyrene

**EU** European Union

**GDP** Gross Domestic Product

**HDPE** High-Density Polyethylene

**LDPE** Low-Density Polyethylene

**MSW** Municipal Solid Waste

**Mt** Metric ton

**NEMA** National Environmental Management Authority

**NGO** Non-Governmental Organization

**PE** Polyethylene or polythene

**PET** Polyethylene Terephthalate

**PHA** Polyhydroxyalkanoates

**PLA** Polylactic Acid

**PP** Polypropylene

**PS** Polystyrene

**PVC** Polyvinylchloride

**SIDS** Small Island Developing States

**UNDP** United Nations Development Programme

**UNEP** United Nations Environment Programme

**WTP** Willingness to Pay



## Executive summary

The benefits of plastic are undeniable. The material is cheap, lightweight and easy to make. These qualities have led to a boom in the production of plastic over the past century. This trend will continue as global plastic production skyrockets over the next 10 to 15 years. We are already unable to cope with the amount of plastic waste we generate, unless we rethink the way we manufacture, use and manage plastics. Ultimately, tackling one of the biggest environmental scourges of our time will require governments to regulate, businesses to innovate and individuals to act.

This paper sets out the latest thinking on how we can achieve this. It looks at what governments, businesses and individuals have achieved at national and sub-national levels to curb the consumption of single-use plastics. It offers lessons that may be useful for policymakers who are considering regulating the production and use of single-use plastics.

### The Age of Plastic – why we need to change

Since the 1950s, the production of plastic has outpaced that of almost every other material. Much of the plastic we produce is designed to be thrown away after being used only once. As a result, plastic packaging accounts for about half of the plastic waste in the world. Most of this waste is generated in Asia, while America, Japan and the European Union are the world's largest producers of plastic packaging waste per capita.

Our ability to cope with plastic waste is already overwhelmed. Only nine per cent of the nine billion tonnes of plastic the world has ever produced has been recycled. Most ends up in landfills, dumps or in the environment. If current consumption patterns and waste management practices continue, then by 2050 there will be around 12 billion tonnes of plastic litter in landfills and the environment. By this time, if the growth in plastic production continues at its current rate, then the plastics industry may account for 20 per cent of the world's total oil consumption.

Most plastics do not biodegrade. Instead, they slowly break down into smaller fragments known as microplastics. Studies suggest that plastic bags and containers made of expanded polystyrene foam (commonly referred to as "Styrofoam") can take up to thousands of years to decompose, contaminating soil and water.

The most common single-use plastics found in the environment are, in order of magnitude, cigarette butts, plastic drinking bottles,

plastic bottle caps, food wrappers, plastic grocery bags, plastic lids, straws and stirrers, other types of plastic bags, and foam take-away containers. These are the waste products of a throwaway culture that treats plastic as a disposable material rather than a valuable resource to be harnessed.

Plastic waste causes a plethora of problems when it leaks into the environment. Plastic bags can block waterways and exacerbate natural disasters. By clogging sewers and providing breeding grounds for mosquitoes and pests, plastic bags can increase the transmission of vector-borne diseases like malaria. High concentrations of plastic materials, particularly plastic bags, have been found blocking the airways and stomachs of hundreds of species. Plastic bags are often ingested by turtles and dolphins who mistake them for food. There is evidence that the toxic chemicals added during the manufacture of plastic transfer to animal tissue, eventually entering the human food chain. Styrofoam products, which contain carcinogenic chemicals like styrene and benzene, are highly toxic if ingested, damaging the nervous systems, lungs and reproductive organs. The toxins in Styrofoam containers can leach into food and drinks. In poor countries, plastic waste is often burned for heat or cooking, exposing people to toxic emissions. Disposing of plastic waste by burning it in open-air pits releases harmful gases like furan and dioxin.

The economic damage caused by plastic waste is vast. Plastic litter in the Asia-Pacific region alone costs its tourism, fishing and shipping industries \$1.3 billion per year. In Europe, cleaning plastic waste from coasts and beaches costs about €630 million per year. Studies suggest that the total economic damage to the world's marine ecosystem caused by plastic amounts to at least \$13 billion every year. The economic, health and environmental reasons to act are clear.

## Key findings and recommendations

Plastic bag bans, if properly planned and enforced, can effectively counter one of the causes of plastic overuse. Nevertheless, to tackle the roots of the problem, governments need to **improve waste management practices** and introduce **financial incentives** to change the habits of consumers, retailers and manufacturers, enacting strong policies that push for a more **circular model** of design and production of plastics. They must finance more research and development of **alternative materials**, raise **awareness** among consumers, fund innovation, ensure plastic products are properly labelled and carefully weigh possible solutions to the current crisis. Governments must engage a broad range of stakeholders in the decision-making process as they seek to tackle the crisis. To meet

the rising tide of plastics, we urgently need strong government leadership and intervention.

Governments around the world are increasingly awake to the scale of plastic pollution. More than 60 countries have introduced **bans** and **levies** to curb single-use plastic waste. Plastic bags and, to a certain extent, foamed plastic products like Styrofoam have been the main focus of government action so far. This is understandable. These plastic products are often the most visible forms of plastic pollution. It is estimated that one<sup>1</sup> to 5 trillion<sup>2</sup> plastic bags are consumed worldwide each year. Five trillion is almost 10 million plastic bags per minute. If tied together, all these plastic bags could be wrapped around the world seven times every hour.

It is too early to draw robust conclusions on the **environmental impact** that **bans and levies** have had. In 50 per cent of cases, information about their impact is lacking, partly because some countries have adopted them only recently and partly because monitoring is inadequate. In countries that do have data, about 30 per cent have registered drastic drops in the consumption of plastic bags within the first year. The remaining 20 per cent of countries have reported little to no change.

Of the countries that have reported little to no impact, the main problems appear to be (i) a lack of enforcement and (ii) a lack of affordable alternatives. The latter has led to cases of smuggling and the rise of black markets for plastic bags or to the use of thicker plastic bags that are not covered by the bans. This has increased environmental problems in some cases.

**Public-private partnerships** and **voluntary agreements** can be good alternatives to bans. Voluntary reduction strategies allow citizens time to change their consumption patterns and provide an opportunity for affordable and eco-friendly alternatives to hit the market. The promotion and adoption of reusable bags is an example of a reduction strategy where the choice lies with the consumer. This strategy has changed consumer behaviour and reduced the use of conventional plastic bags in many regions.

Given the broad range of possible actions to curb single-use plastics and their mixed impact, UN Environment has drawn up a **10-step roadmap for governments** that are looking adopt similar measures or improve on current ones. The steps are based on the experiences of 60 countries around the globe:

1 Earth Policy Institute (2014). [http://www.earth-policy.org/press\\_room/C68/plastic\\_bags\\_fact\\_sheet](http://www.earth-policy.org/press_room/C68/plastic_bags_fact_sheet)

2 The Worldwatch Institute estimates that 4-5 trillion plastic bags were produced in 2002, ranging from large trash bags to thick shopping totes to flimsy grocery sacks. Assuming that the number has remained stable since then, the value used is the upper estimate of 5 trillion. [http://www.theworldcounts.com/counters/waste\\_pollution\\_facts/plastic\\_bags\\_used\\_per\\_year](http://www.theworldcounts.com/counters/waste_pollution_facts/plastic_bags_used_per_year)

1. **Target the most problematic single-use plastics** by conducting a baseline assessment to identify the most problematic single-use plastics, as well as the current causes, extent and impacts of their mismanagement.
2. **Consider the best actions to tackle the problem** (e.g. through regulatory, economic, awareness, voluntary actions), given the country's socio-economic standing and considering their appropriateness in addressing the specific problems identified.
3. **Assess the** potential social, economic and environmental **impacts** (positive and negative) of the preferred short-listed instruments/actions. How will the poor be affected? What impact will the preferred course of action have on different sectors and industries?
4. **Identify and engage** key **stakeholder groups** – retailers, consumers, industry representatives, local government, manufacturers, civil society, environmental groups, tourism associations – to ensure broad buy-in. Evidence-based studies are also necessary to defeat opposition from the plastics industry.
5. **Raise public awareness** about the harm caused by single-used plastics. Clearly explain the decision and any punitive measures that will follow.
6. **Promote alternatives.** Before the ban or levy comes into force, assess the availability of alternatives. Ensure that the pre-conditions for their uptake in the market are in place. Provide economic incentives to encourage the uptake of eco-friendly and fit-for-purpose alternatives that do not cause more harm. Support can include tax rebates, research and development funds, technology incubation, public-private partnerships, and support to projects that recycle single-use items and turn waste into a resource that can be used again. Reduce or abolish taxes on the import of materials used to make alternatives.
7. **Provide incentives to industry** by introducing tax rebates or other conditions to support its transition. Governments will face resistance from the plastics industry, including importers and distributors of plastic packaging. Give them time to adapt.
8. **Use revenues** collected from taxes or levies on single-use plastics **to maximize the public good**. Support environmental projects or boost local recycling with the funds. Create jobs in the plastic recycling sector with seed funding.

9. **Enforce** the measure chosen effectively, by making sure that there is clear allocation of roles and responsibilities.
10. **Monitor** and **adjust** the chosen measure if necessary and update the public on progress.

## Target audience

Drawing from the experience of over 60 countries, this report is designed for policymakers considering the introduction of measures to curb consumption and improve management of single-use plastics.

## Structure

The assessment starts with an overview of the global and regional trends of plastic production, consumption and end-of-life management. The assessment continues by examining the environmental, social and economic impacts of mismanaged and problematic single-use<sup>3</sup> plastics, in particular bags and foamed plastic products.

The study then presents a global mapping of actions introduced by both public and private sector actors to reduce the production and consumption of plastic bags and foamed plastic products, followed by selected case studies from each region of the world. A roadmap for policymakers looking to reduce single-use plastic pollution is found in the concluding chapter.

---

<sup>3</sup> The terms “single-use plastics” and “disposable plastics” are used interchangeably in this paper.



Chapter  
1

## The plastic context

## 1.1 Definitions

**Plastic** is a lightweight, hygienic and resistant material which can be moulded in a variety of ways and utilized in a wide range of applications. Figure 1.1 presents an illustrated overview of the two main categories of plastics.

Unlike metals, plastics do not rust or corrode. Most plastics do not biodegrade, but instead photodegrade, meaning that they slowly<sup>4</sup> break down into small fragments known as **microplastics**.<sup>5</sup> The fragmentation of large plastic items into microplastics is common on land such as beaches because of high UV irradiation and abrasion by waves, while the degradation process is much slower in the ocean due to cooler temperatures and reduced UV exposure.<sup>6</sup> The assertions made in this document refer mostly to fossil-derived plastics and not to plastics of biogenic origins, although reference to the latter group is made in section 2.1.1.

**Single-use plastics**, often also referred to as disposable plastics, are commonly used for plastic packaging<sup>7</sup> and include items intended to be used only once before they are thrown away or recycled. These include, among other items, grocery bags, food packaging, bottles, straws, containers, cups and cutlery. Figure 1.1 introduces the main polymers used to manufacture single-use plastic items and indicates their most common applications.

## 1.2 Production

Since the 1950s, growth in the production of plastic has largely outpaced that of any other material,<sup>8</sup> with a global shift from the production of durable plastics to single-use plastics (including packaging), as shown in Figure 1.2. The production of plastic is largely reliant on fossil hydrocarbons, which are non-renewable resources.<sup>9</sup> If the growth in plastic production continues at the current rate, by 2050 the plastic industry may account for 20% of the world's total oil consumption.<sup>10</sup>

More than one-fourth of the resins globally used in the production of single-use plastics<sup>11</sup> are manufactured in Northeast Asia (China, Hong Kong, Japan, Republic of Korea and Taiwan). This is followed by North America, the Middle East and Europe (Figure 1.3).

## 1.3 Consumption

Global consumption of plastic can be estimated by observing the amount of plastic waste produced (Figure 1.4). Plastic packaging is mostly single-use, especially in business-to-consumer applications, and a majority of it is discarded the same year it is produced.

8 Geyer, Jambeck, and Law, 2017.

9 Ibid.

10 World Economic Forum, 2016.

11 LDPE, HDPE, PS and EPS



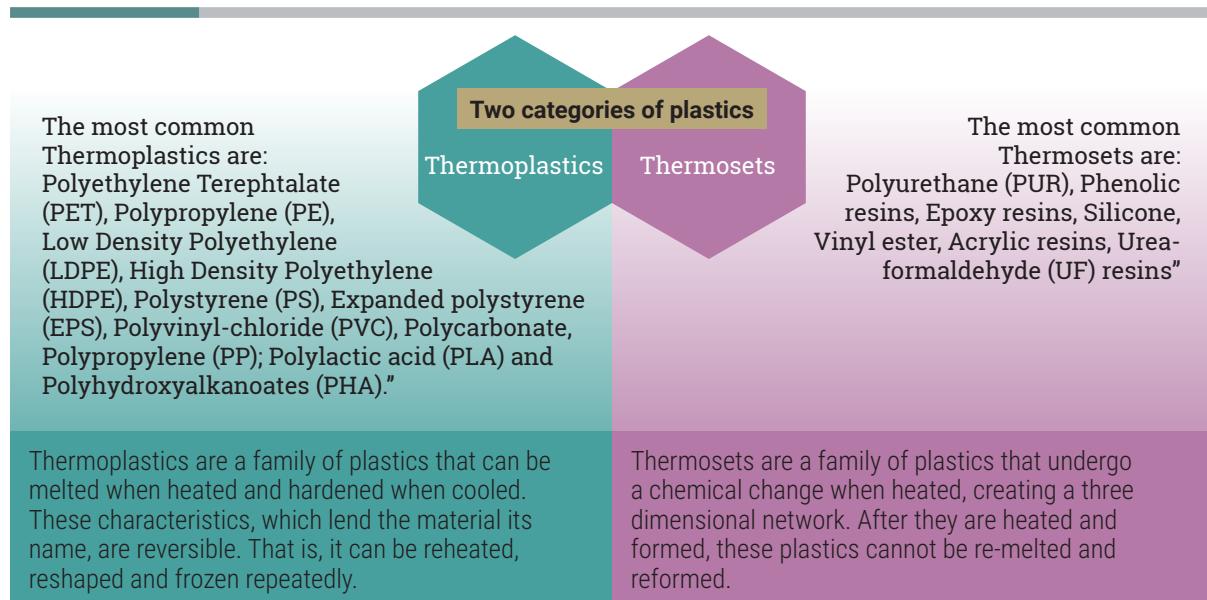
4 Clapp and Swanston, 2009

5 Primary microplastics are those originally produced at the micro-size level for applications such as cosmetics or industrial scrubbers; secondary microplastics are fragments at the micro-size level that have resulted from the breakdown of larger plastic products. Source: GESAMP, 2015b.

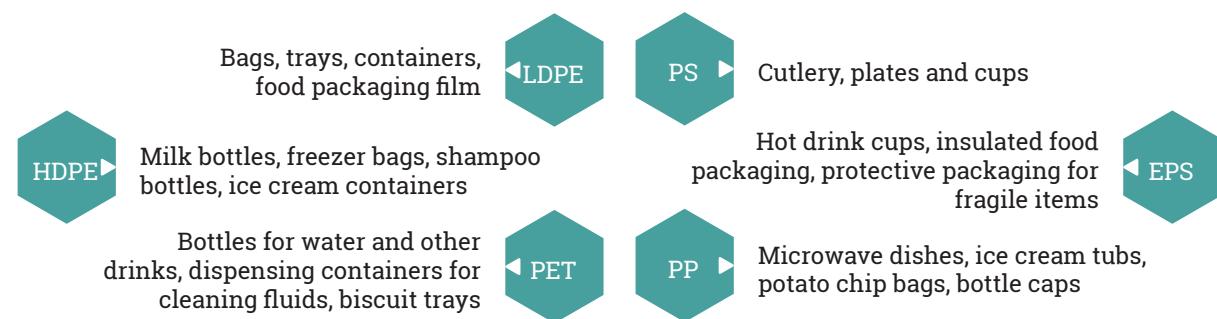
6 GESAMP, 2015a.

7 Ten Brink, 2016.

Figure 1.1. The two main categories of plastics and their single-use applications



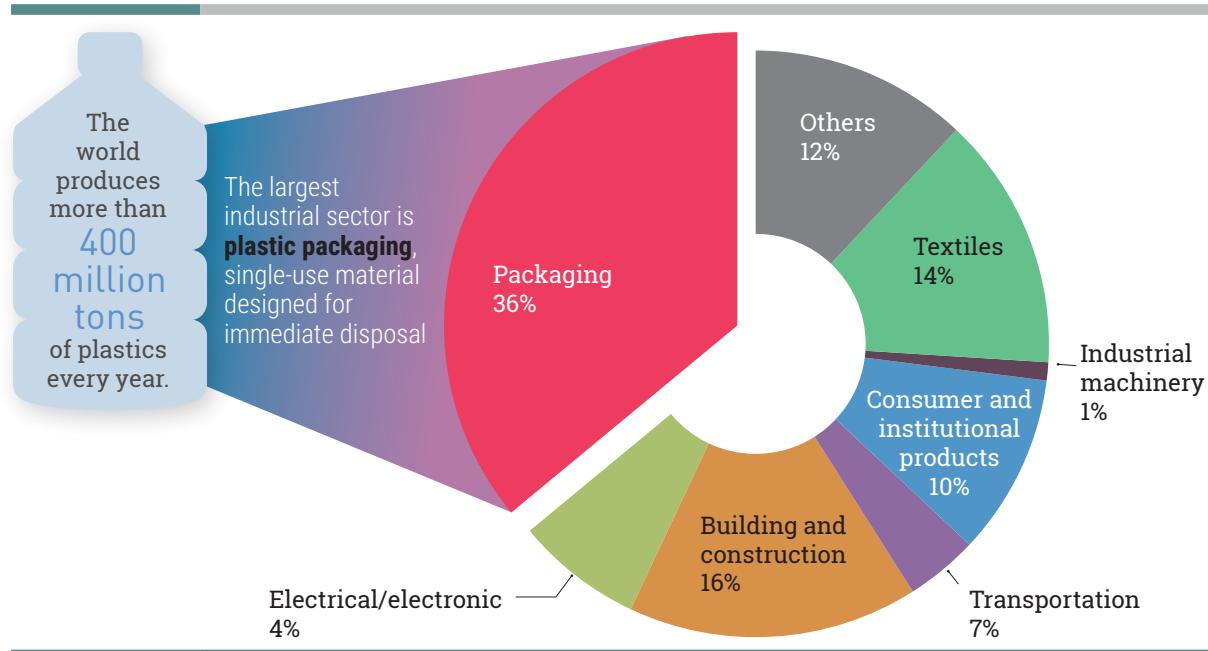
#### Main polymers used in the production of single-use plastics



#### Plastics replacing the traditionally used materials

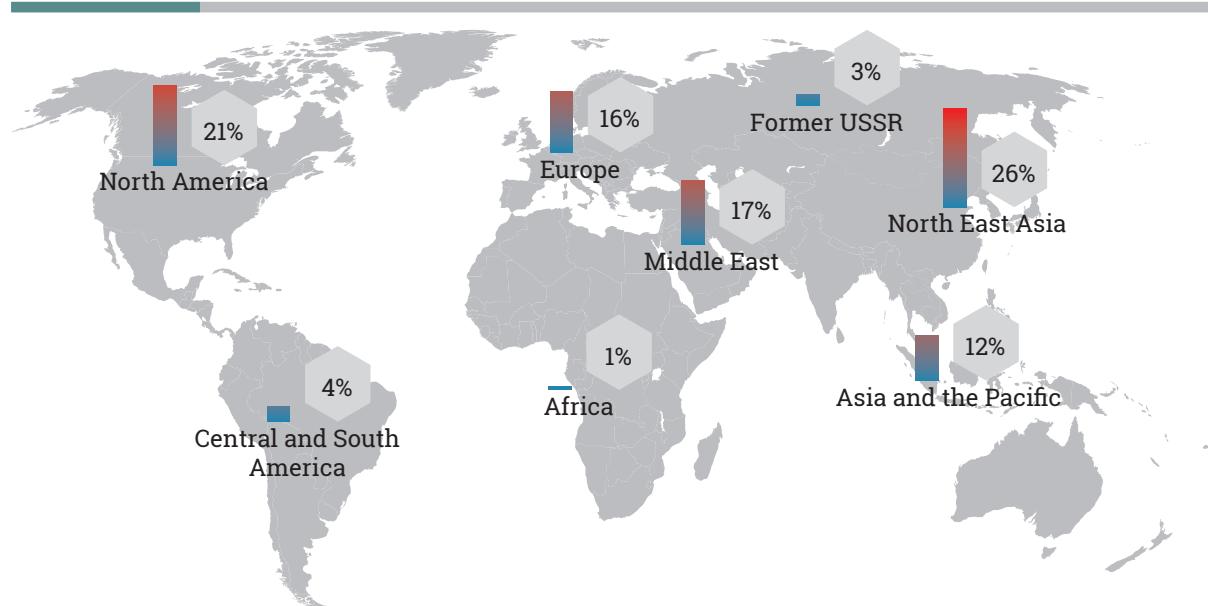
Product	Previous typical packaging material	Current typical packaging material
Milk, edible oil	► Glass, metal	► 3 or 5 layer film pouches
Toiletries (soap/shampoos)	► Paper, glass	► Plastic pouches or films
Cement, fertiliser	► Jute	► PP/HDPE woven sack
Toothpaste	► Metal	► Plastic lamitube

Figure 1.2. Global plastic production by industrial sector, 2015



Source: Adapted from Geyer, Jambeck, and Law, 2017

Figure 1.3. Distribution of single-use plastic<sup>12</sup> production by region (2014)



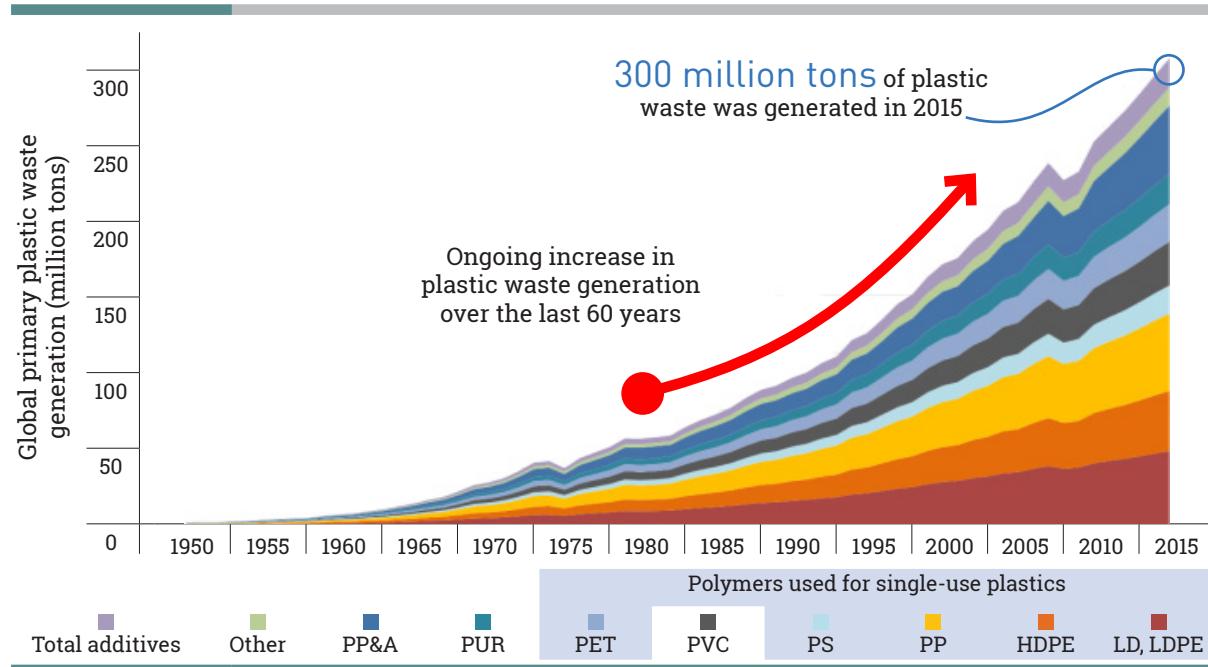
Source: Adapted from ICIS Supply and demand database (2014)

12 The graph reflects data on the production of virgin and recycled LDPE, HDPE, PS and EPS. PET and PP are excluded from the analysis due to lack of region-specific data.

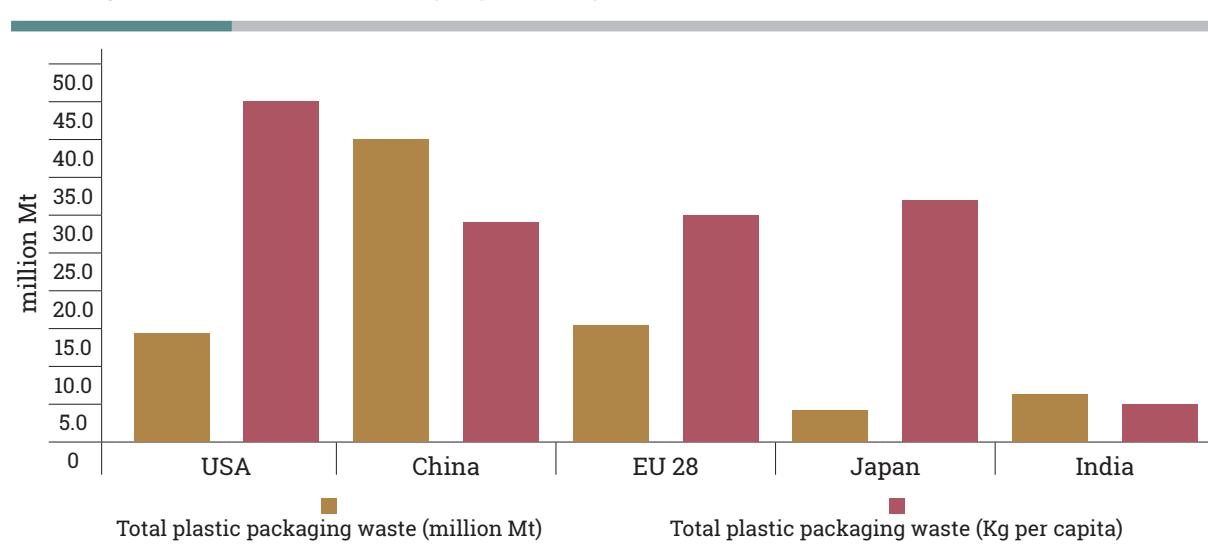
In 2015, plastic packaging waste accounted for **47%** of the **plastic waste<sup>13</sup>** generated globally, with half of that appearing to come from Asia. While **China** remains the largest worldwide generator of plastic packaging

waste,<sup>14, 15</sup> the **USA** is the largest generator of plastic packaging waste on a per-capita basis, followed by **Japan** and the **EU** (Figure 1.5).

**Figure 1.4. Global primary plastics waste generation, 1950 - 2015<sup>16</sup>**



**Figure 1.5. Plastic packaging waste generation, 2014 (million Mt)<sup>17</sup>**



13 Geyer, Jambeck, and Law, 2017.

14 China, Ministry of Commerce, 2017.

15 Due to a lack of robust data, it is difficult to determine the exact amount of plastic packaging waste generated in China.

16 "Primary plastics" are plastics produced from virgin materials.

17 The chart is based on an aggregation of datasets. For China, since no reliable data on plastic packaging is available, the overall packaging waste data (including plastic) is used in the graph.

## 1.4 End of life

At the end of its lifetime, a product or packaging is recycled, incinerated, landfilled, dumped in uncontrolled sites, or littered in the environment. According to recent estimates,<sup>18</sup> 79% of the plastic waste ever produced now sits in landfills, dumps or in the environment, while about 12% has been incinerated and only 9% has been recycled (Figure 1.6). Although it is not yet possible to show a similar regional breakdown due to a lack of robust data, regional action has been recorded recently. For instance, the European Council, European Parliament and European Commission reached a preliminary political agreement in December 2017 to set a target for packaging recycling at 65% by 2025, to be increased to 70% by 2030, and a specific target for plastic packaging recycling at 50% by 2025, to be increased to 55% by 2030.



18 Geyer, Jambeck, and Law, 2017.

Figure 1.6 also shows the nations generating the largest amounts of **mismanaged plastic waste**.<sup>19,20</sup> If current consumption patterns and waste management practices do not improve, by 2050 there will be **about 12 billion tons of plastic litter** in landfills and the natural environment.<sup>21</sup>

Energy recovery processes are preferable to landfilling or improper forms of disposal (Figure 1.7). However, if the desire to recoup the large investment required to set up energy recovery infrastructures indirectly discourages policies geared at reducing plastic waste generation, this would be problematic. In the waste management hierarchy, prevention of waste should always take first priority.

### Box 1. Plastic recycling market: China

Imports into China account for 56% (by weight) of the worldwide imports of waste plastic<sup>1</sup> destined for recycling. In July 2017, the Chinese government announced that the importation of eight types of plastic scraps including PE, PS, PET and PVC will be banned starting from 2018.<sup>2</sup> Chinese officials reported that the decision was taken to protect the environment and public health, since hazardous waste was found mixed inside the waste imported. While this announcement was initially met with worldwide alarm, it can present an opportunity for countries that have historically counted on China as a plastic waste importer to identify new strategies to deal with plastic waste and strengthen their local recycling industry.

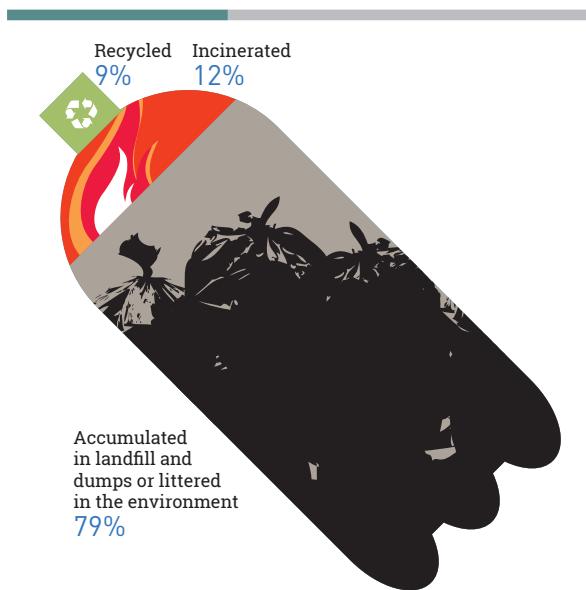
Source: <sup>1</sup>Velis, 2014; <sup>2</sup>Toloken. 2017

19 Mismanaged waste is estimated as the sum of inadequately managed waste plus 2% littering.

20 Jambeck et al. (2015) provides estimates of the 20 largest waste generators for 2010, ranked by mass of mismanaged plastic waste. The paper calculates total mismanaged plastic waste for populations within 50 km of the coast in 192 countries.

21 Geyer, Jambeck, and Law. 2017. As of 2015, the total amount of plastic ever produced amounts to approximately 6,300 million tons.

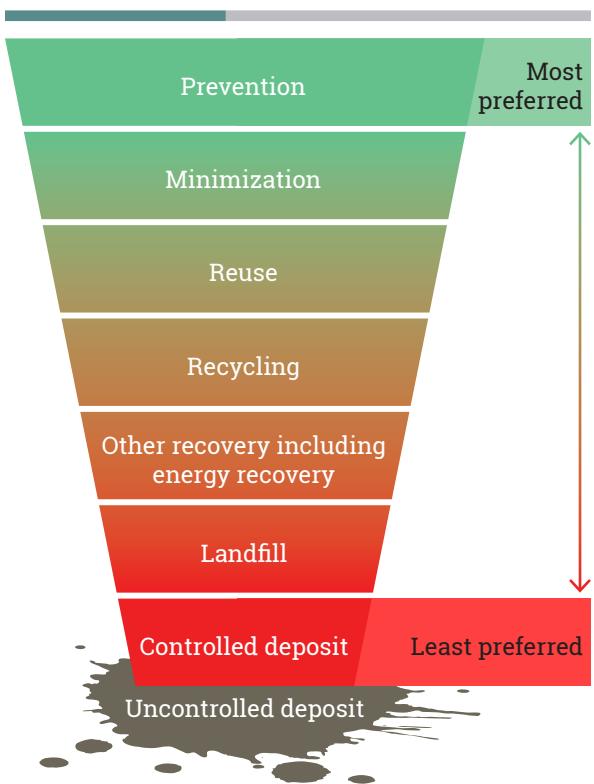
**Figure 1.6. Disposal of all plastic waste ever generated (as of 2015)**



Largest generators of mismanaged plastic waste (2010)		
China	8.8 million Mt/year	27% of world total
Indonesia	3.2 million Mt/year	10% of world total

Source: Adapted from Geyer, Jambeck, and Law, 2017; Jambeck et al., 2015

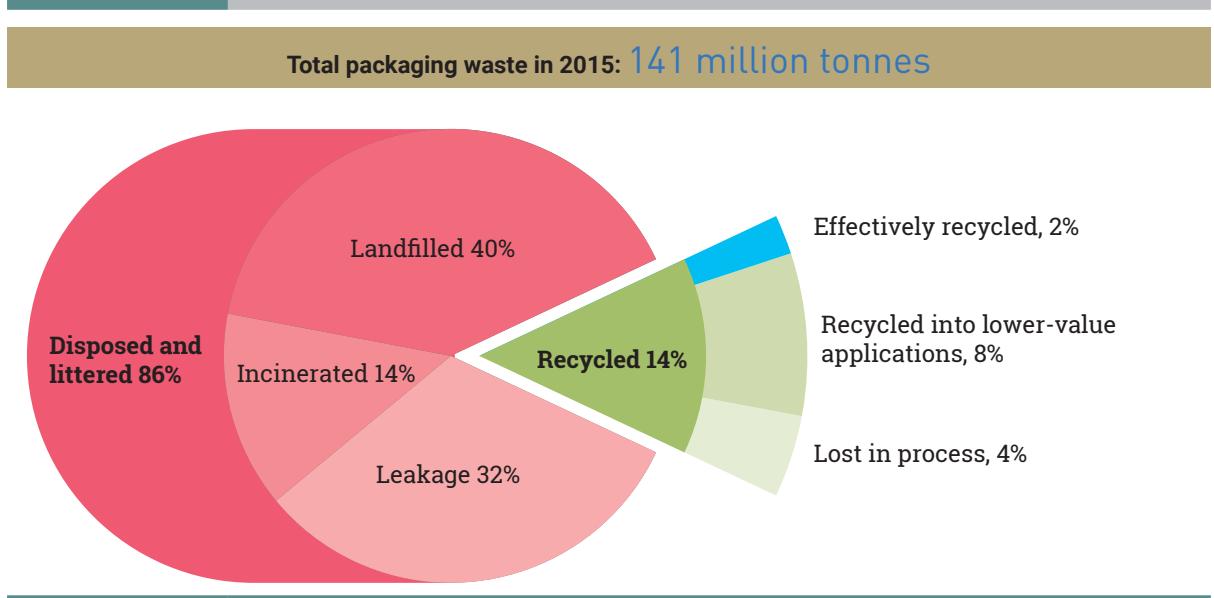
**Figure 1.7. Waste management hierarchy**



Source: Global Waste Management Outlook, UNEP, 2015.

An overview of the global flow of plastic packaging waste is illustrated in Figure 1.8.<sup>22</sup>

**Figure 1.8 Global flow of plastic packaging waste, 2015**



Source: World Economic Forum, 2016

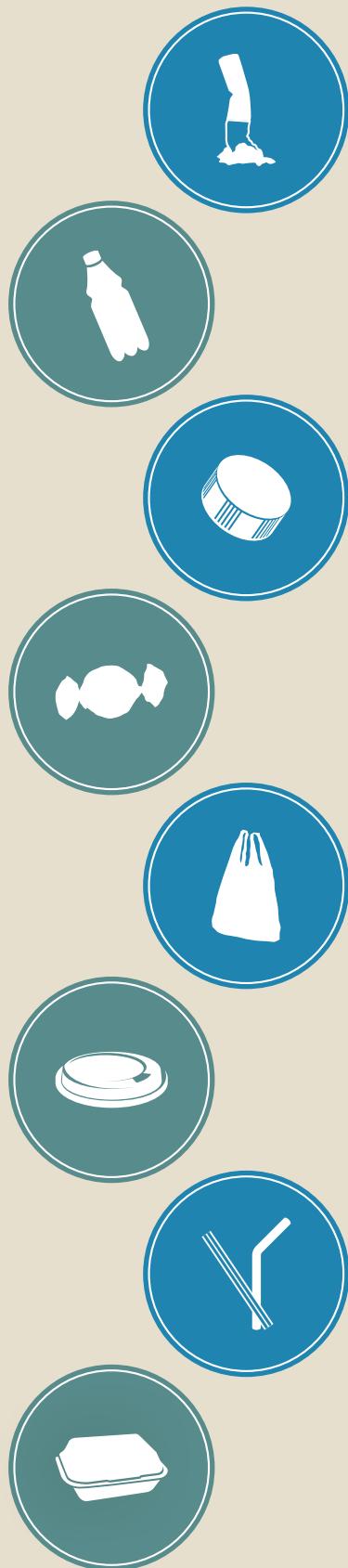




Chapter  
2

## Problematic single-use plastics

**Most common single-use items found on beaches**



**A**ccording to a recent report,<sup>23</sup> the most common finds during international coastal cleanups are, in order of magnitude, cigarette butts, plastic beverage bottles, plastic bottle caps, food wrappers, plastic grocery bags, plastic lids, straws and stirrers, glass beverage bottles, other kinds of plastic bags, and foam take-away containers. Single-use plastics took most of the spots in this Top Ten and it is not hard to imagine the rankings for waste found inland would be similar.

In addition to people's negligence, the large presence of single-use plastics in the environment is symptomatic of poor or failing waste management systems.

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Single-use plastics end up littering the environment in part because of irresponsible individual behavior. But poor waste management systems also play an enormous role.

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To reduce plastic pollution, action should be taken in line with the waste management hierarchy (Figure 1.7) and the circular economy approach (Figure 3.2), to minimize plastic waste generation first of all, improve the state of solid waste collection services, strengthen the recycling industry and ensure safe disposal of waste to controlled landfills.

Although there are some successful initiatives that aim to tackle other types of single-use plastics (such as plastic bottles, with an example given in Box 2), the recent drive for action by governments largely focuses on plastic bags and, to a certain extent, foamed plastic items. **Plastic bags and foamed plastic products seem to be perceived by governments as the most problematic single-use plastics, given their easily observable**

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<sup>23</sup> International Costal Cleanup Report 2017: Ocean Conservancy. [https://oceanconservancy.org/wp-content/uploads/2017/06/International-Coastal-Cleanup\\_2017-Report.pdf](https://oceanconservancy.org/wp-content/uploads/2017/06/International-Coastal-Cleanup_2017-Report.pdf)

## Box 2. Reducing PET bottle litter

In several developed and developing countries, the introduction of **Extended Producer Responsibility (EPR)** and **deposit-return schemes**<sup>1</sup> have proven effective in reducing littering from PET bottles while boosting the recycling sector.

Germany, Japan and South Africa are among many successful examples where the responsibility for recycling used PET bottles is embraced by manufacturers (either voluntarily or by act of law).

The initiative introduced by the **PET Recycling Company** (PETCO<sup>2</sup>) in South Africa, for instance, shows how the introduction of EPR (even when voluntary) can help develop local end-use markets for recycling and build the country's resilience to global shocks in the recycling market. In South Africa EPR has created jobs and business opportunities, while addressing one kind of problematic single-use plastics. While some other African countries are now starting to consider banning PET bottles, the South African example shows what can be achieved if due consideration is given to the socio-economic context and the most appropriate policy instrument (not necessarily banning) is selected.

1 <https://www.unenvironment.org/fr/node/19362>

2 <http://petco.co.za/>

presence (as an eyesore) in the environment, such as windblown bags clinging onto fences or trees or floating in rivers.

In the next sections the focus will be mainly on plastic bags and foamed plastic containers, noting that lessons that are drawn for these items could be applicable to the broader category of single-use plastics.

## 2.1 Plastic bags and foamed plastic products

**Single-use plastic bags** are used to carry goods and usually provided to customers at the point of sale. The most common shopping bags are made of a type of plastic called polyethylene – or polythene – a tough, light, flexible, synthetic resin obtained by polymerizing ethylene.<sup>24</sup>

**Foamed plastics**, commonly but often erroneously referred to by the brand name "Styrofoam",<sup>25</sup> is the material most widely used to produce food containers as it is rigid, lightweight, and has good insulation properties. There are two main types of foamed plastics: foamed polystyrenes and foamed polyurethanes. Foamed polystyrenes can be further categorized – based on the production method – into expanded polystyrenes (EPS) and extruded polystyrenes (XPS). To make the contents of this assessment more easily understandable to non-specialists, this paper will generally not distinguish between the different types of foamed plastics, and instead refer to all types of single-use polystyrene foam

25 "Styrofoam" is a Dow Chemical Company trademarked name for closed-cell extruded (not expanded) polystyrene foam used primarily in construction as insulation and water barrier for roofs, walls, and foundations. In contrast, coffee cups, food trays, box packaging, and other daily life items commonly referred to as "Styrofoam" are actually expanded polystyrene (EPS) foam, which has been moulded into blocks from expanded resin. This means that none of these daily life products are in fact made from "Styrofoam." Despite the inaccuracy of using "Styrofoam" to refer to foamed single-use products, this paper makes use of the term to refer to such daily-life items because of the high degree of penetration of this colloquial expression among the general public, while more accurate terms such as "EPS foam products" or "single-use polystyrene foam products" are often unrecognizable to non-specialists.

and other foamed plastic products by the colloquially accepted (but in fact inaccurate) term "Styrofoam."



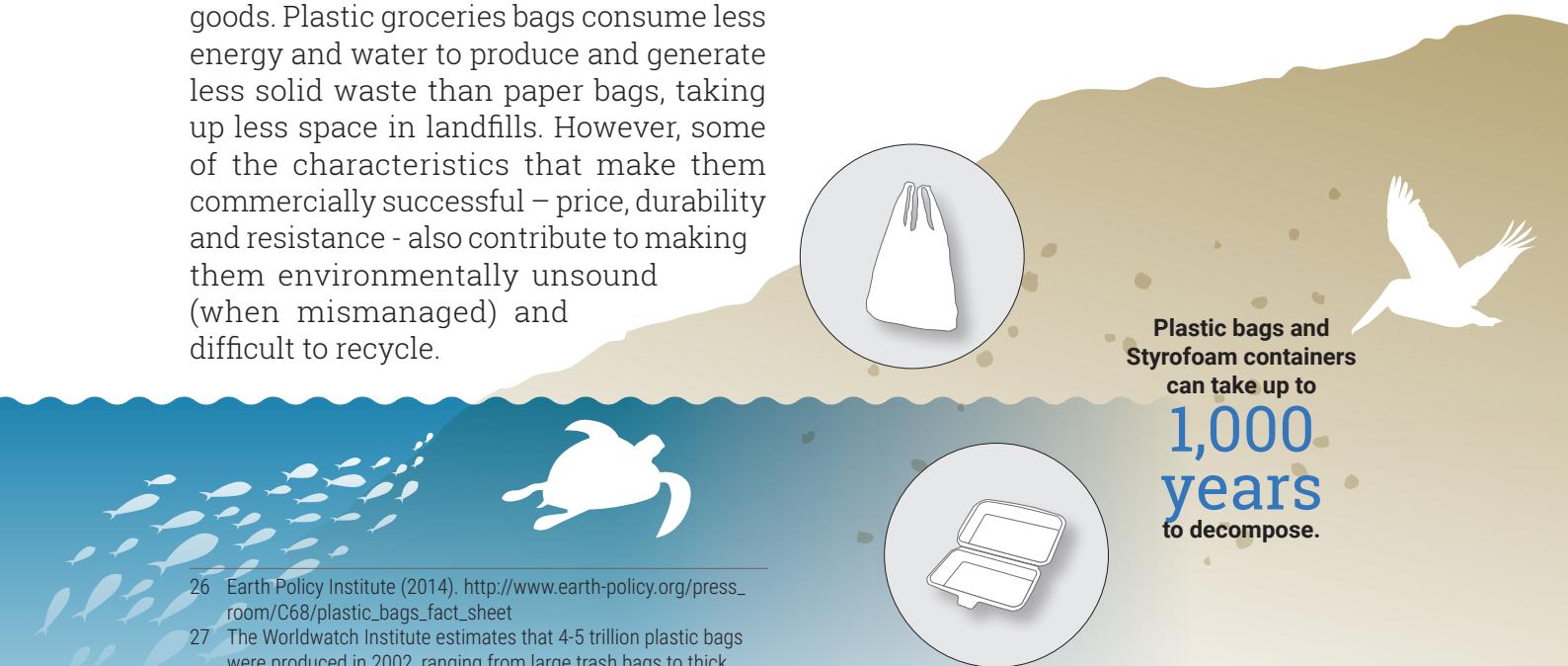
It is estimated that between one<sup>26</sup> to five<sup>27</sup> trillion plastic bags are consumed worldwide each year. Five trillion is almost 10 million plastic bags a minute. If tied together, they would go around the world seven times every hour and cover an area twice the size of France.<sup>28</sup>

Single-use plastic bags and Styrofoam products are widely used because they are strong, cheap and hygienic ways to transport goods. Plastic groceries bags consume less energy and water to produce and generate less solid waste than paper bags, taking up less space in landfills. However, some of the characteristics that make them commercially successful – price, durability and resistance - also contribute to making them environmentally unsound (when mismanaged) and difficult to recycle.



## 2.1.1 Environmental impacts

While it is still unclear, some studies suggest that plastic bags and Styrofoam containers can take up to thousands of years to decompose, contaminating soil and water, and posing significant ingestion, choking and entanglement hazards to **wildlife** on land and in the ocean (Box 3). Due to their light weight and balloon-shaped design, plastic bags are easily blown in the air, eventually ending up on land and in the ocean.



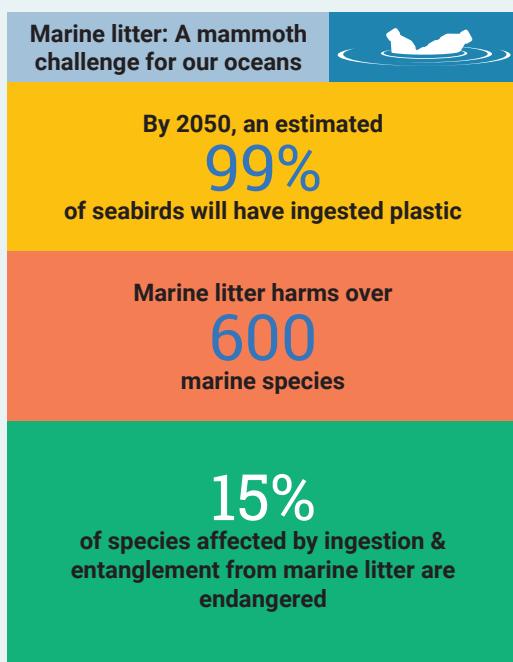
26 Earth Policy Institute (2014). [http://www.earth-policy.org/press\\_room/C68/plastic\\_bags\\_fact\\_sheet](http://www.earth-policy.org/press_room/C68/plastic_bags_fact_sheet)

27 The Worldwatch Institute estimates that 4-5 trillion plastic bags were produced in 2002, ranging from large trash bags to thick shopping totes to flimsy grocery sacks. Assuming that the number has remained stable since then, the value used is the upper estimate of 5 trillion.

28 [http://www.theworldcounts.com/counters/waste\\_pollution\\_facts/plastic\\_bags\\_used\\_per\\_year](http://www.theworldcounts.com/counters/waste_pollution_facts/plastic_bags_used_per_year)

**Box 3. Biodiversity loss and food chain contamination**

Plastics in the environment pose significant hazards to wildlife both on land and in the ocean. High concentrations of plastic materials, particularly plastic bags, have been found blocking the breathing passages and stomachs of hundreds of different species. Plastic bags in the ocean resemble jellyfish and are often ingested by turtles and dolphins who mistake them for food. There is emerging evidence that the toxic chemicals added during the manufacturing process transfer from the ingested plastic into the animals' tissues, eventually entering the food chain for humans as well. When plastic breaks down into microplastic particles, it becomes even more difficult to detect and remove from the open oceans. Therefore, **the most effective mitigation strategy is to reduce their input.**

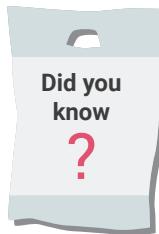


Jambeck et al., 2015

#CleanSeas



The **Irish** have coined the term



**"witch's knickers"** to refer to windblown plastic bags caught in trees?

...that in **South Africa**, there are so many plastic bags littering the environment that many joke that plastic bags are "**the new national flower**".<sup>29</sup>

Plastic bags can choke waterways and exacerbate natural disasters. In 1988, poor drainage resulting from plastic bag litter clogging drains contributed to devastating **floods** in Bangladesh, causing several deaths as two-thirds of the country was submerged<sup>30</sup> (see case study 4.3.2).

Styrofoam products, due to their low density and light weight - like plastic bags - can be blown away by the wind. They can float in water and break down into smaller pieces that are highly toxic if ingested.

According to 2015 estimates, 16 of the top 20 countries contributing to marine plastic litter are **middle-income countries**, whose economic growth is outpacing waste management infrastructure development.<sup>31</sup>

29 Ritch, Brennan, and MacLeod, 2009.

30 Ibid.

31 Jambeck et al., 2015.

**Box 4. Biodegradable plastic: The unintended consequences**

In an effort to reduce plastic pollution, many governments have outlawed conventional plastic bags, allowing only the use and production of "biodegradable" bags.<sup>32</sup> Nonetheless, to limit leakage and damage to the environment, the presence of sound waste management systems are as relevant for the so-called bio-degradable options as for fossil fuel-based plastics. Often "biodegradable" plastic items (including single-use plastic bags and containers) break down completely only if exposed to prolonged high temperatures above 50°C (122°F). Such conditions are met in incineration plants, but very rarely in the environment. Therefore, even **bioplastics** derived from renewable sources (such as corn starch, cassava roots, or sugarcane<sup>33</sup>) or from bacterial fermentation of sugar or lipids (PHA<sup>34</sup>) **do not automatically degrade in the environment** and especially not in the ocean.<sup>35</sup>



## 2.1.2 Health and Social impacts

Styrofoam items contain **toxic chemicals** such as styrene and benzene. Both are considered carcinogenic and can lead to additional health complications, including adverse effects on the nervous, respiratory and reproductive systems, and possibly on the kidneys and liver.<sup>36</sup> Several studies have shown that the toxins in Styrofoam containers can transfer to food and drinks, and this risk seems to be accentuated when people reheat the food while still in the container.<sup>37</sup> In low-income regions, domestic waste - including plastics - is often burnt for heating and/or cooking purposes, exposing largely women and children to prolonged **toxic emissions**. Illegal disposal practices of

plastics often take the form of open burning, accentuating the release of toxic gases that include furans and dioxins.

Research has shown that in developed as well as in developing countries, littering of plastic bags and Styrofoam containers can lead to perceived '**welfare losses**' associated for instance to the visual disamenity of a park being contaminated with litter. This increases the indirect social costs of plastic pollution.<sup>38</sup>

In developing countries with inadequate solid waste management regulations, plastic bag litter can aggravate pandemics. By blocking sewage systems and providing breeding grounds for mosquitoes and other pests, plastic bags can raise the risk of transmission of **vector-borne diseases** such as malaria.<sup>39</sup>

As previously mentioned, plastic waste and microplastics, if ingested by fish or other marine life, can enter our **food chain**. Microplastics have already been found in common table salt<sup>40</sup> and in both tap and bottled water.<sup>41</sup> Although in recent years research on the effects of microplastics has

32 Biodegradable plastic materials include thermoplastics such as polylactic acid (PLA) and polyhydroxyalkanoates (PHA).

33 These types of bioplastics are called polylactic acid or PLAs. They are a thermoplastic derived from renewable resources, such as cornstarch (in the United States, Canada and China), cassava roots, chips or starch (mostly in Asia), or sugarcane (in the rest of the world). In 2010, PLA had the second highest consumption volume of any bioplastic in the world. <https://www.ceresana.com/en/market-studies/plastics/bioplastics/>

34 Polyhydroxyalkanoates or PHAs are thermoplastics produced by numerous microorganisms, including through bacterial fermentation of sugar or lipids. <https://www.tandfonline.com/doi/abs/10.1080/15583720903048243>

35 UNEP, 2016c.

36 Agency for Toxic Substances and Disease Registry.

37 For instance, a study published in Environmental Health Perspectives conducted by the Tokyo Metropolitan Research Laboratory of Public Health (2001) found that styrene gas from food containers is a cause for the proliferation of human breast tumour cells.

38 Eunomia, 2013. Exploring the direct and indirect costs of litter.

39 Clapp and Swanston, 2009.

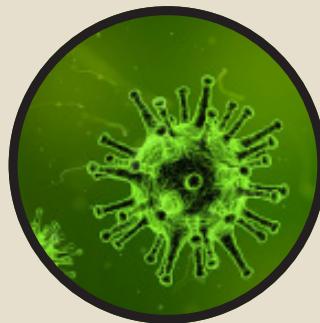
40 Yang, Shi, Li, Li, Jabeen, and Kolandhasamy, 2015.

41 Kosuth, Wattenberg, Mason, Tyree, and Morrison, 2017.

## Negative impact of Styrofoam on our health

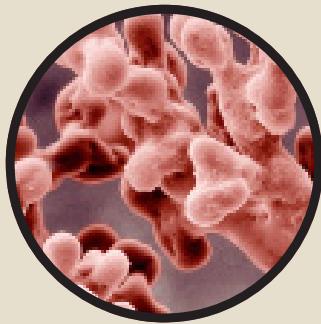
Many of our **food containers** are made of **foamed plastic** or Styrofoam

These items contain styrene and benzene, which are



**Toxic and Carcinogenic**

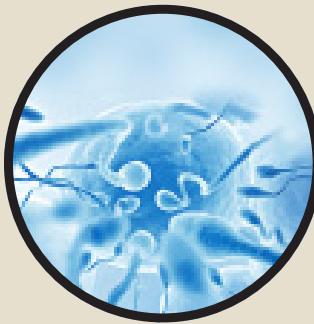
They adversely impact our



**Respiratory system**



**Nervous system**



**Reproductive system**

been growing, still little is known about the exact impacts on human health.

### 2.1.3 Economic impacts

Stranded single-use plastics create visual pollution and are increasingly becoming a priority especially in countries that rely heavily on tourism as a major source of GDP, such as Small Island Developing States. For instance, Asia-Pacific Economic Cooperation (APEC) estimated a \$1.3 billion<sup>42</sup> economic impact of marine plastics to the **tourism, fishing** and **shipping** industries

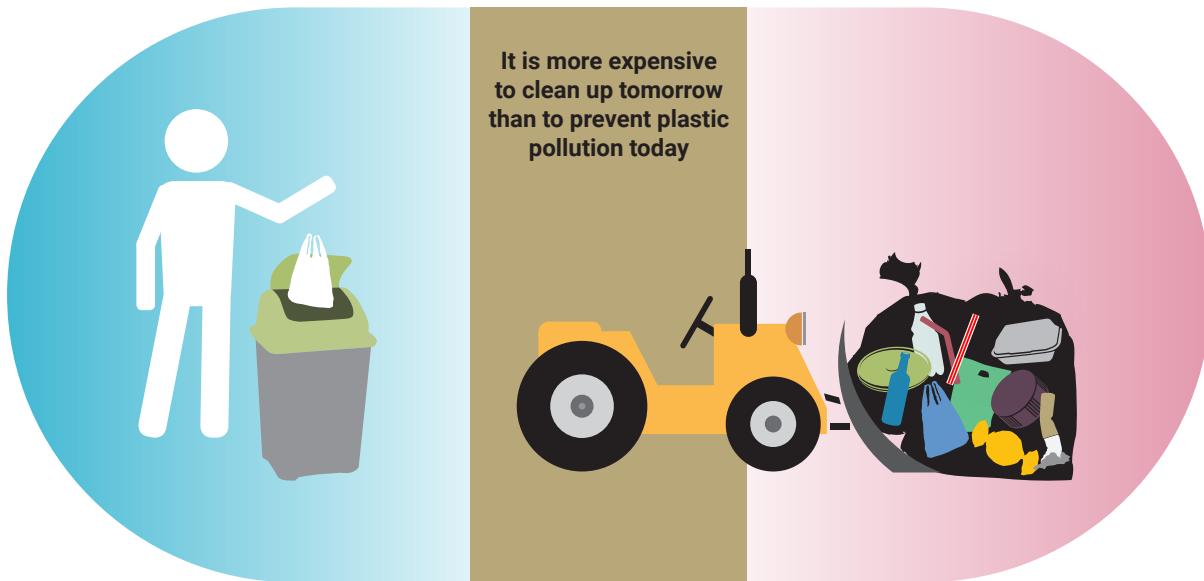
in that region alone.<sup>43</sup> Styrofoam products present challenging recovery dynamics, making **recycling** – although technically possible – **often financially unviable**.<sup>44</sup> For instance, Styrofoam usually can't be recycled locally but must instead be transported to a centralized plant. In addition, 95% of Styrofoam is air, making it not cost-effective to store or ship for recycling purposes. Because of the porosity of foamed plastic products, cleaning such products, which are often contaminated with food or drinks, is difficult and energy-intensive, further increasing the cost of recycling.

<sup>42</sup> In this report, the \$ symbol indicates US dollars, the € symbol indicates euros, and the £ symbol indicates British pounds. For other currencies, the ISO currency code is used.

<sup>43</sup> APEC, 2009.

<sup>44</sup> The Styrofoam products that are recycled are often remanufactured into things like cafeteria trays or packing fillers.

## Plastic Mismanagement: the future cost



Finally, the **future costs** of removing all single-use plastics accumulating in the environment is estimated as higher than the costs of preventing littering today. In Europe alone, the estimated costs for cleaning shores and beaches reach €630 million per year<sup>45</sup> and studies suggest that the annual economic damage plastics impart on the world marine ecosystem is at least \$13 billion.<sup>46,47</sup>

45 European Commission, 2015.

46 UNEP, 2014.

47 The overall economic impact of plastic pollution is still unclear and being studied.



Chapter  
3

## Actions to minimize plastic bags and Styrofoam products



The global commitments against single-use plastics underline a general sentiment to act against plastic pollution.

The following sections map a different set of actions taken by the public, private sector entities and governments aimed at minimizing the production and use of plastic bags and Styrofoam items. The objective is to identify the features that lead to the most favourable outcomes, with success stories to

be further detailed through the case studies given in chapter 4.

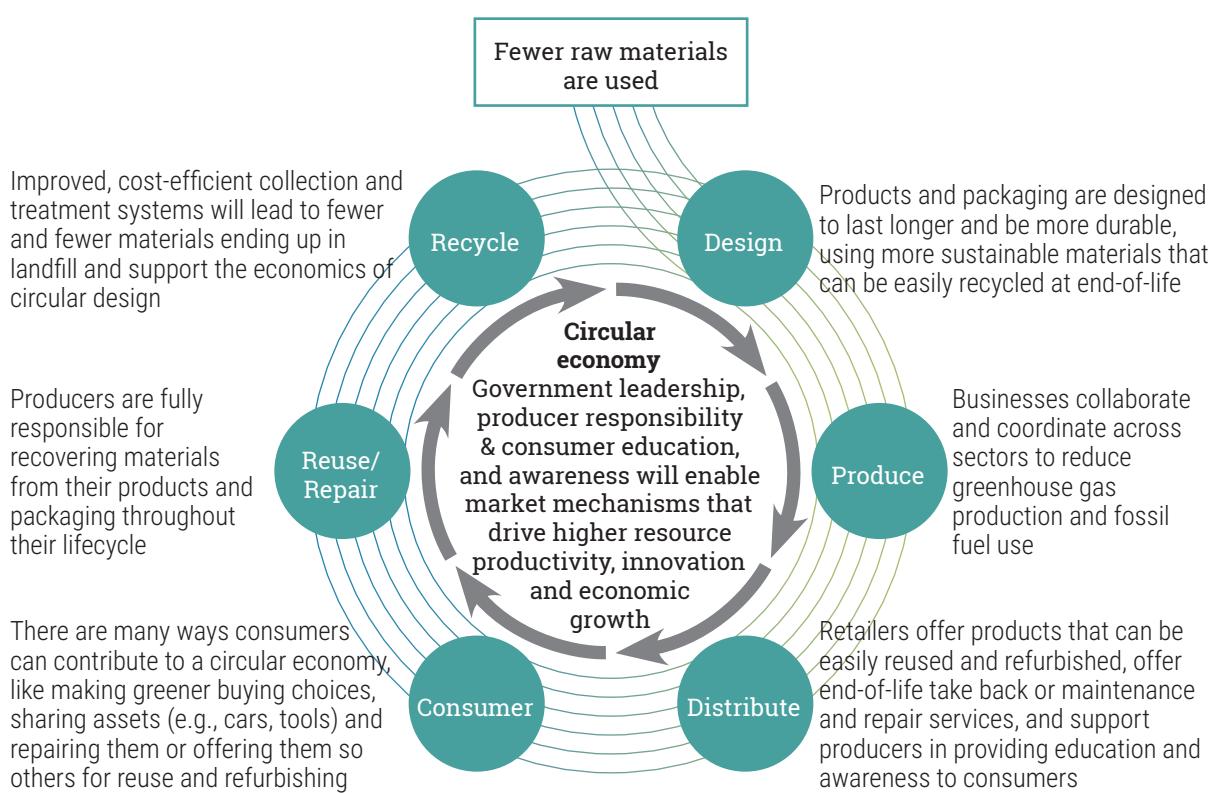
### 3.1 Waste management system improvements

Bans on plastic bags and Styrofoam items can effectively counter some of the symptoms of plastic overuse. However, better waste management systems, along with circular thinking, can help achieve long-term

Figure 3.1. Waste management system design to reduce landfilling and illegal dumping



Figure 3.2. Overview of a circular economy



Source: 2017 strategy for a waste-free Ontario. Building the circular economy.  
<https://www.ontario.ca/page/strategy-waste-free-ontario-building-circular-economy>

impacts and better address the problem of plastics in the environment.

### 3.2 Promotion of eco-friendly alternatives

By working together with industry, governments can support the development and promotion of sustainable alternatives in order to phase out single-use plastics progressively.

By introducing economic incentives, supporting projects which upscale or recycle single-use items and stimulating the creation of micro-enterprises, governments can contribute to the uptake of eco-friendly alternatives to single-use plastics. More details are provided as part of the Roadmap for Policymakers in section 5.3.6.

### 3.3 Social awareness and public pressure

**Social awareness** and **education** are essential to shape and encourage changes in consumer behaviour, but a gradual, transformational process is necessary. A longstanding change in cultural attitudes towards environmental matters is often not attainable through brief or stand-alone awareness campaigns. It is instead best achieved through embedding messaging in regular didactic practices and school curriculums from a very young age. Public awareness strategies can include a wide range of activities designed to persuade and educate. These strategies may focus not only on the reuse and recycling of resources, but also on encouraging responsible use and minimization of waste generation and litter. The relevance of education and awareness is highlighted in several case studies in section 4 as well as in the concluding chapter.

**Public pressure** can act as a trigger for policy decision-making. In Bali for instance, the “Bye Bye Plastic Bags” initiative is a social campaign lead by youth to mobilize people in Bali to say no to plastic bags. Two teenagers campaigned for over four years to get plastic bags banned from the island, starting with a petition that collected over 100,000 signatures. Despite initial resistance from the local government, the governor eventually signed a memorandum of understanding to phase out plastic bags by 2018.<sup>48</sup>

Similarly, in New Zealand, a petition launched by a group of high school students calling on the central government to impose a NZD 0.10 levy on all plastic bags in supermarkets gained more than 17,000 signatures. The public support for action led mayors from across New Zealand to sign an open letter, asking the central government to impose a nation-wide plastic bag levy.<sup>49</sup> Since the change in the ruling party following the general elections in September 2017, the government has been considering levies and bans for single-use plastic bags, although no official announcement has yet been made.<sup>50</sup>

Public pressure is also widely recognized as precipitating private sector choices, given that demand drives supply.

### 3.4 Voluntary reduction strategies and agreements

**Reduction strategies** are another option to lessen the number of plastic bags and the amount of single-use plastic packaging. As opposed to bans and taxes, the value of reduction strategies is that they do not attempt to force sudden changes in the market. They build on the understanding that for the change to be long-lasting, it needs to be voluntary and based on choice. These strategies recognize the complexity

48 Prisco, 2017.

49 Cann, 2017.

50 The status of this report is as of February 2018.

### Box 5. The controversy of reusable bags

There are many types of reusable bags available on the market. They are often produced using different materials that are heavier and durable to give the bag added strength.

Although more environmentally friendly than traditional single-use plastic bags, recycling reusable bags can be complicated, time intensive, and costly as they often require different processes from those locally available. Depending on their composition, reusable bags might have to be deconstructed in the recycling process to separate the different materials. Consequently, in many cases reusable bags are not recycled. This means that millions of reusable bags, currently displacing conventional plastic shopping bags, will end up in landfills at the end of their useful life.<sup>51,52</sup>

**Suggestion:** Before choosing the type of reusable bags to use or promote, it would be important to consider the options available locally for recycling or upcycling the reusable bags at the end of their life.

of needs linked to bag usage, often leaving the choice up to the consumers. For the reduction strategies to be successful, adequate social awareness is necessary, as discussed in section 3.1.

The promotion and **adoption of reusable bags** as alternatives to plastic bags is an example of a reduction strategy where the choice rests with the consumer. This strategy has been effective in many local and national contexts to change consumer behaviour and reduce the use of conventional plastic carrier bags. Linked with social pressure and image, in Canada for instance, reusable bags have been widely embraced, as they were promoted as the “green” choice and often offered free of charge as a promotional item by various organizations.<sup>51,52</sup>

**Voluntary agreements** are another example of reduction strategies driven by the supply side. Voluntary agreements between the government and producers/retailers can act as an alternative to bans and be an effective instrument demonstrating public-private collaboration (see the Austria case study in section 4.1.2). Retailers and producers are indeed critical partners in effecting behavioural change by building awareness and providing alternatives.

For instance, in New Zealand in 2017, given the considerable public pressure from various groups to act on single-use plastic bags, and considering the lengthy process needed for a law to be enacted, the Ministry of Environment decided to pursue a voluntary agreement. Officials engaged with the two largest supermarket chains to encourage them to either charge for, or voluntarily ban, single-use carrier bags. Soon after the meetings, both chains announced the complete phase-out of such bags by the end of 2018.<sup>53</sup>

51 CIRAG, 2017.

52 Controversy and recyclability, 2011.

53 <https://www.stuff.co.nz/business/98308042/how-the-supermarkets-plastic-bag-bans-will-work>

### How to read the Summary Table?

The table is organized by continent and country, summarizing examples of retailers, municipalities and other public-private cooperation instituted to reduce the use of plastic bags and Styrofoam without the implementation of a policy measure. The column "Features" overviews the initiative and the measures implemented as well as their impact, if information is available.

## Summary of examples of public-private initiatives to reduce single-use plastic bags and Styrofoam products

Area	Country	Year	Action	Type	Features
Asia	Indonesia	2017	Government commitment	Memorandum of understanding	<p><b>Type:</b> Because of a four-year campaign organized by citizens to get plastic bags banned in Bali, the governor signed a memorandum of understanding to phase out plastic bags by January 2018 (Prisco, 2017).</p> <p><b>Impact:</b> Information not available</p>
		2009	Public-private campaign	Discount to consumers	<p><b>Type:</b> Local authorities initiated a 45-day campaign in Bangkok to reduce the consumption of plastic bags. Many supermarket chains, local markets and other stores took part in the campaign and offered a one-baht (around \$0.03) discount for every THB 100 (nearly \$3.00) purchase if they brought their own cloth bags. In 2009, the campaign targeted a cutback of 4.4 million plastic bags (Corporal, 2010).</p> <p><b>Impact:</b> Information not available</p>
Europe	Austria	2016	Public-private agreement	Levy	<p><b>Type:</b> Levy on plastic bags in major supermarkets. Agreement signed by Ministry (BMLFUW) and major trade companies and environmental protection organizations. Its target surpasses that of the EU-Directive (United Nations, 2017a).</p> <p><b>Impact:</b> Drop in consumption of plastic carrier bags per person per year from 54.3 very light weight and 3.1 light-weight (15-50 microns) in 2015 to 44 very lightweight and 4.3 lightweight in 2016 (Ministerium für ein lebenswertes Österreich, 2017).</p>
		2016	Public-private agreement	Levy	<p><b>Type:</b> Voluntary agreement between the Ministry of Agriculture and Environment and the Federation of Finnish Commerce to undertake measures to reduce the consumption of plastic bags. The measures include: advice and information to reduce consumption and prevent litter, a fee on shopping bags &gt;15µ and &lt;50µ and no self-service of thin plastic carrier bags (Plastic Carrier Bag Agreement, 2016).</p> <p><b>Impact:</b> Information not available</p>
	Germany	2016	Public-private agreement	Ban or levy	<p><b>Type:</b> Voluntary ban or levy on plastic bags (retailers can decide whether to phase out plastic bags or to apply a fee of €0.05 to €0.50 (about \$0.06 to \$0.60). The agreement was made by the Ministry, the German Retail Federation and participating companies to curb the use of plastic bags. Many more companies participate without having signed the agreement.). (German government, 2016, Surfrider, 2017)</p> <p><b>Impact:</b> Information not available</p>

Area	Country	Year	Action	Type	Features
Europe	Luxembourg	2004	Public-private agreement	Levy	<p><b>Type:</b> 85 brands (including all big distributors) participate in the "Eco-sac" ("Öko-Tut") initiative, a cooperative project between the Ministry of the Environment, the Luxembourgian Trade Confederation and the non-profit association Valorlux to reduce the consumption of lightweight plastic bags by replacing them with the so-called "Öko-Tut" (a reusable bag).</p> <p><b>Impact:</b> Plastic bag consumption dropped by 85% in nine years and the "Öko-Tut" has replaced most free plastic bags at supermarkets across the country (Luxembourger leads way, 2013; Bänsch-Baltruschat et al., 2017).</p>
		2008	Public-private agreement	Levy	<p><b>Type:</b> Voluntary agreement since at least 2008 between main retail associations and regional authorities to promote prevention and reduce the consumption of plastic carrier bags. Some charge a fee for the bags; others grant a small pay-back if plastic carrier bags are not used.</p> <p><b>Impact:</b> Pacto por la Bolsa in Catalonia, signed in 2009. Its target was a reduction of consumption of "single-use" bags by 50% by 2012. By 2010, a reduction of 40% had been achieved (European Commission, 2013).</p>
	Sweden	1970	Private initiative	Levy	<p><b>Type:</b> Levy on consumer. Since the 1970s, grocery stores started to charge consumers for plastic and paper carrier bags (around SEK 2; about \$0.24). (Surfrider Foundation Europe, 2017; Radio Sweden, 2007)</p> <p><b>Impact:</b> The charge on plastic bags has led to "better quality plastic carrier bags" and reduced use of plastic bags in the first years after implementation. Demand increased again thereafter (Radio Sweden, 2007).</p>
		2016	Public-private agreement	Levy	<p><b>Type:</b> Switzerland's largest supermarket chains introduced a plastic bag levy based on a voluntary agreement, which was approved by the parliament as an alternative to a total ban (Swiss supermarkets, 2016).</p> <p><b>Impact:</b> Demand for plastic bags dropped by 80-85% (Price tag, 2017).</p>
North America	Canada	2016	Private initiative	Levy	<p><b>Type:</b> A big supermarket chain announced that it will start charging consumers CAD 0.05 (around \$0.04) per single-use plastic bag and CAD 0.25 per reusable bag (The Canadian Press, 2016).</p> <p><b>Impact:</b> Information not available</p>
Oceania	Australia	2017	Private initiative	Ban or levy	<p><b>Type:</b> Some major supermarkets announced that they will phase out lightweight plastic bags or provide bags but charge AUD 0.15 (\$0.12) per bag (Pearlman, 2018).</p> <p><b>Impact:</b> Information not available</p>

### 3.5. Policy instruments

Policy interventions to reduce single-use plastic bags and Styrofoam products

have been implemented at national and subnational levels. Governments have introduced different policy tools, from bans, to economic instruments such as taxes (see Table 1).

**Table 1. Policy tools to limit the use of plastic bags**

Policy tools		Features
Regulatory instruments	Ban	Prohibition of a particular <b>Type</b> 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 <30µ thickness).
Economic instruments	Levy on suppliers	Levy paid by suppliers of plastic bags (domestic producers or importers). For such a tax to be effective in inducing behavioural change, it should be fully passed on from suppliers to retailers, enticing the latter to (i) charge consumers for plastic bags or (ii) offer a rebate/reward to consumers who do not ask for plastic bags, promoting the use of reusable ones.
	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.
	Levy on consumers	Charge on each bag sold at the point of sale; standard price defined by law.
Combination of regulatory and economic instruments	Ban and levy	Combination of ban and levy (for instance a ban on thin plastic bags and a levy on thicker ones)

Governments around the world have defined and regulated the thickness of the plastic bags allowed or banned. For instance, the European Union has defined "lightweight" bags as those with a thickness not exceeding 50 microns (0.05 millimetres).<sup>54</sup>

#### Box 6. The "ban on banning"

While globally people and governments have joined hands to fight plastic pollution, in 2017 the government of Michigan (USA) enacted a law prohibiting local governments from regulating or restricting the use of disposable plastic items, including plastic bags, Styrofoam containers and other forms of plastic packaging. Also, in other states such as Idaho, Arizona and Missouri, "bans on banning" disposable plastics have been introduced, allegedly in an attempt to protect the industry.

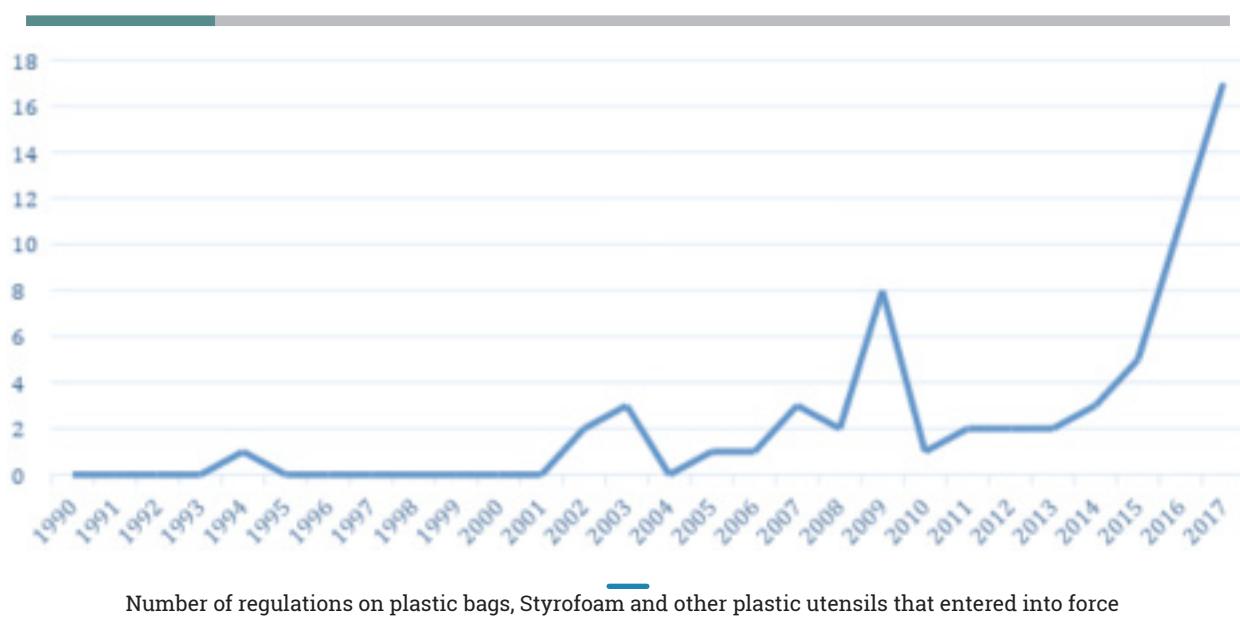
#### 3.5.1 Global trends

The remarkable number of national and local governments that over the last decade have developed and implemented policies and economic measure to reduce plastic bags and Styrofoam products keeps growing. The number of policies regulating plastic bags and Styrofoam products at the national level increased steeply after 2015 (see Figure 3.3). This is partially due to EU Directive 2015/720,<sup>55</sup> which encourages member states to set reduction targets or adopt economic instruments to achieve a sustained reduction of "lightweight" carrier bags. EU member states are for instance invited, among other options, to reduce the amount of lightweight plastic bag consumption to a maximum of 90 per person a year by the end of 2019, and to a maximum of 40 by the end of 2025. Another reason behind the recent growth in the number of plastic bag policies enacted at the national level is the visibility gained by governments that introduce bans on the importation, production and use of single-use plastics.

54 EU Directive 2015/720.

55 EU Directive 2015/720.

**Figure 3.3. Estimated number of new regulations on single-use plastics entering into force at the national level worldwide**



Source: Data independently collected by authors

The number of national policies regulating single-use plastics is likely to continue increasing in the future. Action has been taken in developed countries and recently governments from around the world joined hands at the third meeting of the United Nations Environment Assembly (UNEA 3), committing to the vision of a "Pollution Free Planet". Resolution UNEP/EA.3/L.20 specifically addresses marine litter and microplastics and encourages member states to reduce unnecessary plastic use and promote the use of environmentally sound alternatives while prioritizing policies to reduce the amount of plastics entering the marine environment.<sup>56</sup>

### 3.5.2 Regional, national and local trends

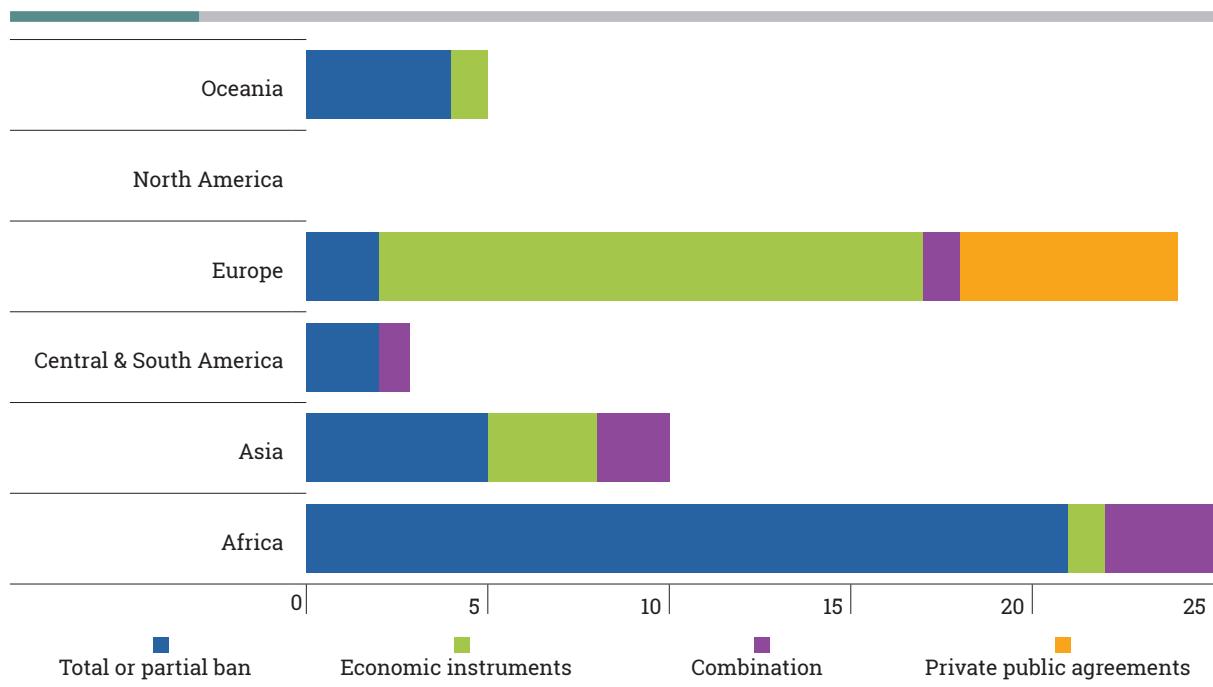
Based on the type of policy instruments introduced to minimize plastic bags and Styrofoam products, it is possible to observe regional trends.

**Africa** stands out as the continent where the largest number of countries instituted a total ban on the production and use of plastic bags. Of the 25 African countries having introduced national bans on plastic bags, more than half (58%) shifted into implementation between 2014 and 2017.

In **Asia**, several countries have attempted to control the manufacture and use of plastic bags through levies, and some governments already introduced plastic bag bans more than a decade ago, such as in Bangladesh. Nonetheless, the enforcement of regulations has often been poor, and single-use plastic bags continue to be widely used and mismanaged despite prohibitions and levies.<sup>57</sup> In contrast, another Asian example is Japan, where no bans are in place on single-

56 <https://papersmart.unon.org/resolution/index>  
The United Nations Environment Assembly,  
[...] Acknowledging the challenges of addressing marine plastic pollution in the face of increasing production and consumption of plastic in products and packaging, and urging all countries and other stakeholders to make responsible use of plastic while endeavoring to reduce unnecessary plastic use, and to promote research and application of environmentally-sound alternatives.  
[...] Encourages also all Member States to, based on best available knowledge on sources and levels of marine litter and microplastics in the environment, prioritize policies and measures at appropriate scale, to avoid marine litter and microplastics entering the marine environment.

57 IRIN, 2011.

**Figure 3.4.** Types of national policies on plastic bags, by continent

Source: Data independently collected by authors

use plastic, but thanks to a very effective waste management system and a high degree of social consciousness, the country accounts for relatively limited leakages of single-use plastics in the environment.

In **Europe**, in response to EU Directive 2015/720,<sup>58</sup> to achieve a sustained reduction in the number of lightweight plastic bags used per person by 2025, countries choose measures ranging from bans, such as in Italy and France, to agreements with the private sector, as Austria did. Currently the European Commission is finalizing a “European Strategy for Plastics in a Circular Economy” (2018-2030), to reduce the unnecessary generation of single-use plastic waste and eliminate overpackaging.<sup>59</sup>

With regards to **Oceania**, most of the states in Australia have banned lightweight

plastic bags and in Papua New Guinea, non-biodegradable plastic bags are banned.<sup>60</sup>

In **Central and South America**, regulations to curb the consumption of plastic bags are in place at both the national and subnational levels, and countries such as Haiti and Costa Rica also regulate the use of foamed plastic products. Costa Rica in particular aims to become the first country in the world to eliminate single-use plastics by 2021.<sup>61</sup>

In **North America**, regulations have been introduced mostly at the state or city level. Lightweight plastic bags are banned, for example in Montreal (Canada) and California and Hawaii (USA). Action against single-use Styrofoam products has been taken in New York City,<sup>62</sup> which re-instated in 2017 its ban on single-use Styrofoam containers after a first attempt in 2015 (see case study in section 4.4.1).

<sup>58</sup> More information on the EU Directive 2015/720 under section 3.5.1 of this paper.

<sup>59</sup> European Commission, Plastic Strategy COM (2018) 28 Final. <http://ec.europa.eu/environment/circular-economy/pdf/plastics-strategy.pdf>

<sup>60</sup> PNG prepares for ban, 2015; Queensland, Australia, Department of Environment and Heritage Protection, 2016.

<sup>61</sup> UNDP, 2017.

<sup>62</sup> Babin, 2017.

Figure 3.5. National-level plastic bag bans and Styrofoam regulations

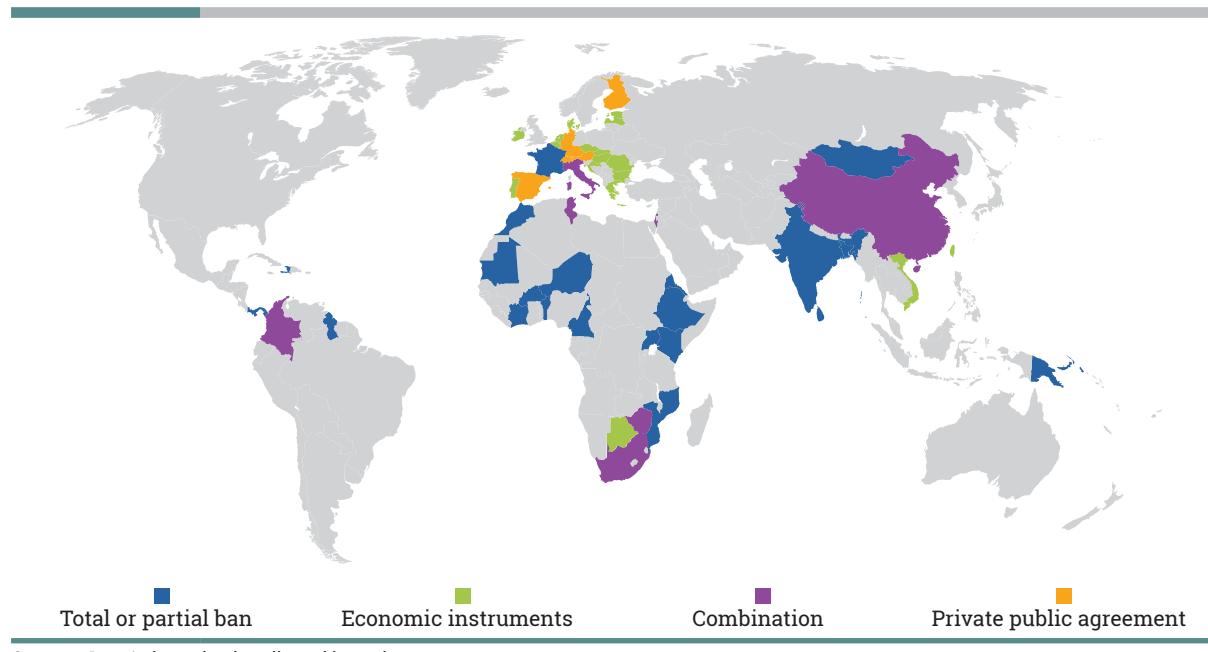
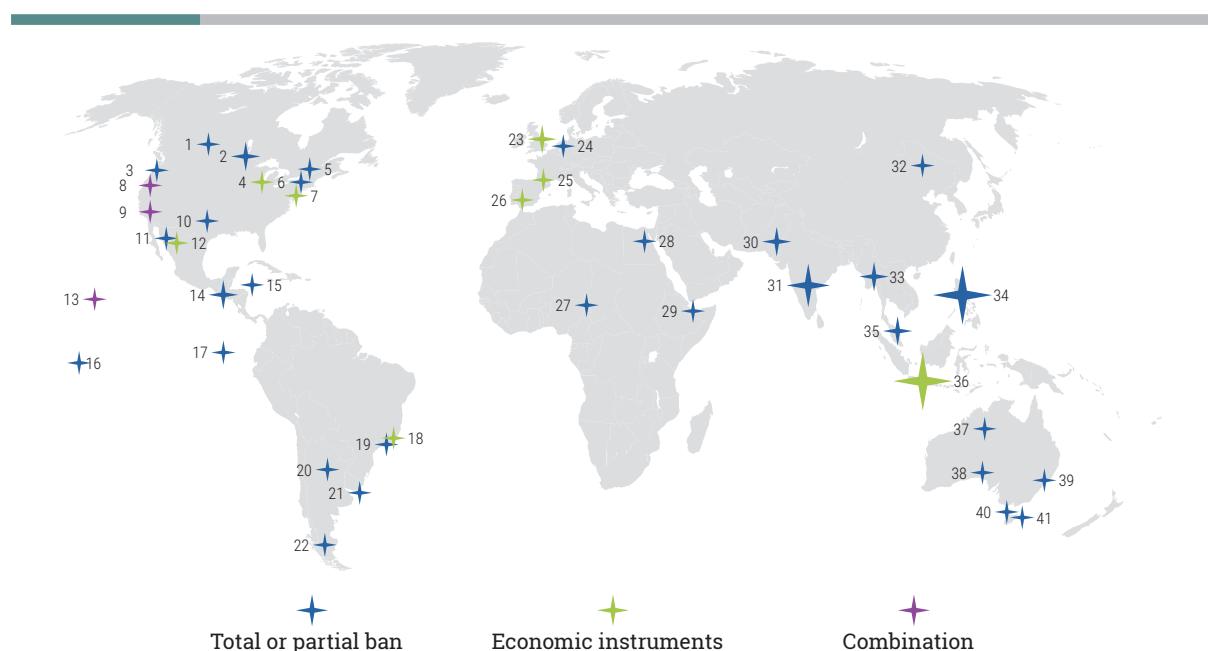


Figure 3.6. Sub-national level plastic bag bans and Styrofoam regulations



- |                       |                                |                                |                                      |
|-----------------------|--------------------------------|--------------------------------|--------------------------------------|
| 1. Wood Buffalo       | 13. Hawaii                     | 23. 4 regions, UK              | 34. 27 cities/provinces, Philippines |
| 2. 2 cities, Manitoba | 14. 4 cities, Guatemala        | 24. 2 regions, Belgium         | 35. Federal Territories, Malaysia    |
| 3. Seattle            | 15. Bay Islands, Honduras      | 25. Catalonia, Spain           | 36. >20 cities, Indonesia            |
| 4. Chicago            | 16. America Samoa              | 26. Andalusia, Spain           | 37. Northern Territory               |
| 5. Montreal           | 17. Galapagos Islands, Ecuador | 27. NDjamena, Chad             | 38. South Australia                  |
| 6. New York City      | 18. Rio de Janeiro, Brazil     | 28. Hurghada, Egypt            | 39. Australian Capital Territory     |
| 7. Washington, D.C.   | 19. Sao Paolo, Brazil          | 29. Somaliland, Somalia        | 40. Tasmania                         |
| 8. San Francisco      | 20. Cordoba, Argentina         | 30. 4 regions, Pakistan        | 41. Coles Bay                        |
| 9. California         | 21. Buenos Aires, Argentina    | 31. >9 cities/provinces, India |                                      |
| 10. Austin            | 22. Pinta Arena, Chile         | 32. Jilin Province, China      |                                      |
| 11. Querétaro, Mexico |                                | 33. 3 cities, Myanmar          |                                      |
| 12. Mexico City       |                                |                                |                                      |

### 3.5.3 Countries with policies on plastic bags and Styrofoam

In reflection of the ever-growing number of countries and cities regulating single-use

plastics, the tables below provide a summary of the countries that, at the time of finalizing this report,<sup>63</sup> have either already introduced legislation on plastic bags and Styrofoam products or announced imminent action.

#### How to read the Summary Table?

The tables are organized by continent and country. The "Year" column indicates when the policy action was undertaken, and the jurisdictional "Level" indicates whether the policy was introduced at the national or local level to regulate the importation, production or use of plastic bags and Styrofoam. The policy tools analysed include bans, levies, and a combination of the two. "Ban/levy approved" denotes that a policy has been approved but has not yet entered into effect, whereas "entered into force" means that the law has been enacted and has entered into effect. The column "Features" provides more details on the type of policy measure introduced as well as its impact, if information is available.

#### Summary of countries that have introduced regulations on plastic bags and Styrofoam products

Area	Country	Year	Level	Policy	Features
Africa	Benin	2018	National	Ban – entered into force	<b>Type:</b> Ban on import, production, sale and use of non-biodegradable plastic bags (LégiBénin, 2018). <b>Impact:</b> Information not available
	Botswana	2007	National	Levy – entered into force	<b>Type:</b> Levy on retailer. No enforcement upon retailers to charge for plastic bags. Retailers decide if and how much to charge. <b>Impact:</b> Tax resulted in voluntary levy on plastic bags. Decline in the consumption of plastic bags: 50% drop within 18 months, partial success probably due to consistently high prices of bags (Dikgang and Visser, 2010). However control over pollution resulting from plastic carrier bags failed, leading to discussions about banning them (Xinhua, 2018).
	Burkina Faso	2015	National	Ban – entered into force	<b>Type:</b> Ban on production, import, marketing and distribution of non-biodegradable plastic bags (UNDP-UNEP, 2015). <b>Impact:</b> Information not available
	Cameroon	2014	National	Ban – entered into force	<b>Type:</b> Ban on non-biodegradable plastic bags. <b>Impact:</b> Due to a lack of inexpensive alternatives, plastic bags appear to be smuggled from neighbouring countries. <sup>64</sup> (Nforngwa, 2014) The government has tried to encourage the cleanup of plastic litter by paying citizens for each kilogram of plastic waste collected. Through the programme, an estimated 100,000 kg of plastic waste was collected in 2015 alone (Colbert, 2016).

63 February 2018.

64 The law banning plastic bags passed in 1996 but was not enforced. (Nforngwa, 2014)

Area	Country	Year	Level	Policy	Features
Africa	Cape Verde	2017	National	Ban – entered into force	<b>Type:</b> Ban on the sale and use of plastic bags (EnviroNews Nigeria, 2017). <b>Impact:</b> Information not available
	Chad	2010	Local – N'Djamena	Ban – entered into force	<b>Type:</b> Ban on the importation, sale, and use of plastic bags in the capital city, N'Djamena. <sup>65</sup> <b>Impact:</b> Less observable plastic pollution in the city. (IRIN, 2010).
	Côte d'Ivoire	2014	National	Ban – entered into force	<b>Type:</b> Ban on the importation, production, use and sale of non-biodegradable plastic bags <50µ (Boisvert, 2014). <b>Impact:</b> Information not available
	East Africa	2017	Regional	Ban – entered into force	The East African Legislative Assembly (EALA) introduced a ban on the manufacturing, sale, importation and use of polythene bags under the East African Community Polythene Materials Control Bill 2017 (Karuhanga, 2017).
	Egypt	2009	Local – Hurghada	Ban – entered into force	<b>Type:</b> Ban on the use of plastic bags in Hurghada. Distribution of 50,000 cloth bags for free by the Hurghada Environmental Protection and Conservation Association, together with letters explaining the health and environmental reasons behind the campaign (Zohny, 2009). <b>Impact:</b> Information not available
	Eritrea	2005	National	Ban – entered into force	<b>Type:</b> Ban on the importation, production, sale, and distribution of plastic bags. <sup>66</sup> <b>Impact:</b> Problems associated with plastic bags, such as the blockage of drains and water pipes, dramatically decreased (Fikrejesus, 2017).
	Ethiopia	2007	National	Ban – entered into force	<b>Type:</b> Ban on production and importation of non-biodegradable plastic bags <30µ (Ethiopian News Agency, 2016). <b>Impact:</b> Enforcement unclear (Sisay, 2016; Alicia, 2011).
	Gambia	2015	National	Ban – entered into force	<b>Type:</b> Ban on the sale, importation and use of plastic bags. <b>Impact:</b> Success was seen in the first phase after implementation, but there has been a reappearance after a political impasse (Coker, 2017).
	Guinea-Bissau	2016	National	Ban – entered into force	<b>Type:</b> Ban on the use of plastic bags. <b>Impact:</b> Law not strictly enforced. Strong resistance from both consumers and retailers, claiming a lack of consultation (TrendType, 2017).
	Kenya	2017	National	Ban – entered into force	<b>Type:</b> Ban on the importation, production, sale, and use of plastic bags (The Guardian, 2017). <b>Impact:</b> Information not available

65 The law banning plastic bags passed in 1992 but was not enforced. (IRIN, 2010)

66 A ban on plastic bags was introduced earlier in Asmara (2002) and other regions. (IRIN, 2002)

Area	Country	Year	Level	Policy	Features
Africa	Malawi	2015	National	Ban – entered into force	<p><b>Type:</b> Ban on the use, sale, production, exportation and importation of plastic bags &lt;60µ (UNDP, 2015b).</p> <p><b>Impact:</b> Information not available</p>
	Mali	2012	National	Ban – approved	<p><b>Type:</b> Ban on the production, importation, possession, sale and use of non-biodegradable plastic bags.</p> <p><b>Impact:</b> The ban was adopted in 2012, but has not yet entered into force (Braun and Traore, 2015).</p>
	Mauritania	2013	National	Ban – entered into force	<p><b>Type:</b> Ban on the manufacture, use and importation of plastic bags. It was estimated that 70 percent of cattle and sheep deaths were due to plastic bag ingestion (Mauritania bans, 2013).</p> <p><b>Impact:</b> Information not available</p>
	Mauritius	2016	National	Ban – entered into force	<p><b>Type:</b> Ban on the importation, manufacture, sale or supply of plastic bags, with 11 Types of plastic bags for essential uses and hygienic and sanitary purposes exempt (for example roll-on bag for meat products, waste disposal bags, bags as integral part of packaging, bags manufactured for export) (Government of Mauritius, 2016).</p> <p><b>Impact:</b> Information not available</p>
	Morocco	2009	National	Ban – entered into force	<p><b>Type:</b> Ban on the production, importation, sale and distribution of black plastic bags.</p> <p><b>Impact:</b> Although only considered partially successful, the law is considered an important step forward. (Ellis, 2016).</p>
		2016	National	Ban – entered into force	<p><b>Type:</b> Ban on the production, importation, sale and distribution of plastic bags.</p> <p><b>Impact:</b> 421 tons of plastic bags were seized in one year. Citizens have switched to fabric bags. The Moroccan government declared that plastic bags are virtually no longer used in the country (Morocco seizes bags, 2017).</p>
	Mozambique	2016	National	Ban – entered into force	<p><b>Type:</b> Ban on the production, importation, possession and use of plastic bags &lt;30µ. People were advised to use baskets made by either grass or coconut trees (Mozambique News Agency, 2015; Mozambique plastic ban, 2016).</p> <p><b>Impact:</b> Information not available.</p>
	Niger	2015	National	Ban – entered into force	<p><b>Type:</b> Ban on production, importation, usage and stocking of plastic bags (Niger government bans production, 2014).</p> <p><b>Impact:</b> Limited because of poor enforcement. New efforts were made in 2017 (Niamey, 2017), but no information is yet available on the outcome.</p>
	Rwanda	2008	National	Ban – entered into force	<p><b>Type:</b> Ban on the production, use, importation and sale of all polyethylene bags.</p> <p><b>Impact:</b> In the first phase the ban resulted in a black market for plastic bags. Over time, plastic bags were replaced by paper bags (Clavel, 2014; Pilgrim, 2016).</p>

Area	Country	Year	Level	Policy	Features
Africa	Senegal	2016	National	Ban – entered into force	<b>Type:</b> Ban on the production, importation, possession and use of plastic bags <30µ (Kicking the plastic, 2015). <b>Impact:</b> Information not available
	Somalia	2015	Local – Somaliland	Ban – entered into force	<b>Type:</b> Ban on disposable plastic bags in Somaliland <sup>67</sup> (Masai, 2015) <b>Impact:</b> Despite the law, plastic bags are still widely used (Hasan, 2017).
	South Africa	2003	National	Ban – entered into force	<b>Type:</b> Ban on plastic bags <30µ and levy on retailer for thicker ones. <b>Impact:</b> In the first phase the consumption of plastic bags fell, but then increased again due to lack of enforcement. (Dikgang, Leiman, Visser, 2012a)
	Tanzania	2006	National	Ban – approved	<b>Type:</b> Ban on plastic bags and bottles. <b>Impact:</b> Ban has not been implemented. Since then, the government made constant efforts to phase out plastic bags. The latest ban was issued in 2016, but implementation has been pushed back (The EastAfrican, 2017).
		2006	Local – Zanzibar	Ban – entered into force	<b>Type:</b> Ban on the importation, distribution and sale of plastic bags <30µ. (IRIN, 2006) <b>Impact:</b> Information not available
	Tunisia	2017	National	Ban and levy – entered into force	<b>Type:</b> Ban on the production, importation and distribution of single-use plastic bags in major supermarkets and levy on consumers on thicker ones (>50µ) <sup>68</sup> (Quillen, 2017; Martinko, 2017). <b>Impact:</b> Information not available
	Uganda	2009	National	Ban – entered into force	<b>Type:</b> Ban on lightweight plastic bags <30µ. <b>Impact:</b> Enforcement was weakened by manufacturers' lobby. Implementation attempts by the National Environmental Management Agency (NEMA) in April 2015 had no sustained impacts. Plastic bags can still be found in some parts of the country, although local entrepreneurs started to produce woven, reusable bags (Wakabi, 2015; Namara, 2016).
	Zimbabwe	2010	National	Ban and levy – entered into force	<b>Type:</b> Ban on plastic bags <30µ and levy on consumer for thicker ones. <b>Impact:</b> Implementation has been difficult because of resistance from the informal sector. Flimsy plastic bags have been smuggled in from Mozambique. The levy has proved not to be a deterrent over the long term (Chitotombe, 2014).

67 The law banning plastic bags passed in 2005 but was not enforced. (Medeshi, 2010)

68 Before implementation of the law, an agreement was signed with major supermarket chains on a strategy for how to eliminate single-use plastic bags without harming businesses and consumers. (Martinko, 2017)

Area	Country	Year	Level	Policy	Features
Africa		2017	National	Ban – entered into force	<b>Type:</b> Ban on Styrofoam products <b>Impact:</b> Ban temporary lifted shortly after its introduction to allow businesses more time to replace Styrofoam containers with recyclable or biodegradable ones <sup>69</sup> (Mhofu, 2017).
Asia	Bangladesh	2002	National	Ban – entered into force	<b>Type:</b> Ban on polyethylene plastic bags. <b>Impact:</b> Initial positive response from the public. Use of plastic bags increased after some years due to lack of enforcement and absence of cost-effective alternatives (IRIN, 2011).
	Bhutan	2009	National	Ban – entered into force	<b>Type:</b> Ban on plastic bags <b>Impact:</b> Bags are still commonly used. Compliance has been difficult to monitor. <sup>70</sup> (CleanBhutan, 2014)
	China	2008	National	Ban and levy – entered into force	<b>Type:</b> Ban on non-biodegradable plastic bags <25 µ and levy on consumer for thicker ones. <b>Impact:</b> In Chinese supermarkets, plastic bag use decreased between 60 and 80%. Ban has been ineffectively enforced in food markets and among small retailers. <sup>71</sup> (Xanthos, 2017).
		2009	Local - Hong Kong	Levy – entered into force	<b>Type:</b> Levy on consumer. <b>Impact:</b> Implementation in different phases. Initially limited Impact due to implementation only in selected chains and outlets. In 2015, the levy was extended to over 100,000 retailers. 25% fewer bags were disposed in landfills within one year (in 2016 vs. 2015) (Hong Kong Environmental Protection Department; Kao, 2016).
		2015	Local – Jilin province	Ban – entered into force	<b>Type:</b> Ban on production and sale of non-biodegradable plastic bags and tableware in Jilin province (Sun, 2015). <b>Impact:</b> Limited because of poor enforcement (Zixiong, 2017).
India	Besides the national law, several states and cities have introduced bans on plastic carrier bags and other plastic materials. A selection of them can be found in the table below. <sup>72</sup>				
	2016	National	Ban – entered into force	<b>Type:</b> Ban on non-compostable plastic bags <50µ <sup>73</sup> (Notification on Plastic Waste Management Rules, 2016). <b>Impact:</b> Information not available	

<sup>69</sup> The law banning Styrofoam products was enacted in 2012 but was not enforced. (Mhofu, 2017)

<sup>70</sup> The law banning plastic bags was enacted in 1999 and reintroduced in 2005 but was not enforced. (CleanBhutan, 2014)

<sup>71</sup> In 1999 a ban on the production and use of Styrofoam tableware was introduced in China. The ban was not enforced and officially lifted in 2013. (Kao, 2013)

<sup>72</sup> Further states and cities include: Madhya Pradesh, Uttar Pradesh, Jammu & Kashmir, Uttarakhand, Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Gujarat, Odisha, Tamil Nadu and more. (PTI, 2017; Business Standard Web Team, 2017)

<sup>73</sup> The regulatory framework is provided by the Plastic Waste (Management and Handling) Rules of 2011, which replaced the earlier Recycled Plastics Manufacture and Usage Rules of 1999 (amended in 2003 to bring them into effect, but implementation was poor). (Notification on Plastic Waste Management Rules, 2016)

Area	Country	Year	Level	Policy	Features
Asia		2004	Local – Himachal Pradesh	Ban - entered into force	<p><b>Type:</b> Ban on the production, storage, use, sale and distribution of non-biodegradable plastic bags &lt;70µ in the Indian state of Himachal Pradesh. (The Himachal Pradesh Non-Biodegradable Garbage (Control) Act, 1995). In 2011 a ban on disposable plastic products, such as plastic cups, drinking glasses and plates was introduced (Duboise, 2012).</p> <p><b>Impact:</b> Significant decrease in plastic pollution (IANS, 2009).</p>
		2016	Local – Karnataka	Ban - entered into force	<p><b>Type:</b> Ban on manufacturing and sale of plastic bags in the Indian state of Karnataka (DHNS, 2017).</p> <p><b>Impact:</b> Plastic bags continue to be both available and commonly used (Deepika, 2017).</p>
		2016	Local – Punjab	Ban - entered into force	<p><b>Type:</b> Ban on the manufacture, stocking, distribution, sale or use of single-use plastic carry bags and containers in the state of Punjab<sup>74</sup> (The Punjab Plastic Carry Bags (Manufacture, Usage and Disposal) Control (Amendment) Act, 2016).</p> <p><b>Impact:</b> Information not available</p>
		2010	Local – Haryana	Ban - entered into force	<p><b>Type:</b> Ban on manufacture, stocking, distribution, sale or use of plastic carry bags in the state of Haryana (NDTV, 2010).</p> <p><b>Impact:</b> Limited because of poor enforcement. (PTI, 2016b).</p>
		2016	Local – Kerala	Ban - entered into force	<p><b>Type:</b> Ban on plastic bags &lt;50µ in the Indian state of Kerala (Deccan Chronicle, 2016).</p> <p><b>Impact:</b> Information not available</p>
		2001	Local – West Bengal	Ban - entered into force	<p><b>Type:</b> Several regulations from 2001 onwards. Ban on plastic bags &lt;40µ and blanket ban in certain areas in West Bengal (Mahesh et al., 2015; West Bengal Pollution Control Board).</p> <p><b>Impact:</b> Plastic bags are still commonly used. Implementation is limited (Mahesh et al., 2015).</p>
		1998	Local – Sikkim	Ban - entered into force	<p><b>Type:</b> Ban on delivery or purchasing of goods and materials in plastic wrappers or plastic bags in the state of Sikkim.</p> <p><b>Impact:</b> Although plastic bags are still common (used by 34% of shops) the majority switched to paper bags or newspaper (66%) (Bari, 2018).</p>
		2016	Local – Sikkim	Ban - entered into force	<p><b>Type:</b> Ban on sale and use of disposable Styrofoam in Sikkim<sup>75</sup> (Styrofoam ban, 2016).</p> <p><b>Impact:</b> Information not available</p>

74 Amendment of the "The Punjab Plastic Carry Bags (Manufacture, Usages & Disposal) Control Act (2005)" which banned non-biodegradable plastic bags <30µ, but was poorly enforced (PTI, 2016b)

75 Also the use of plastic water bottles during government meetings was prohibited. (The Telegraph, 2016)

Area	Country	Year	Level	Policy	Features
Asia	India	2017	Local – New Delhi	Ban - entered into force	<b>Type:</b> Ban on all kinds of disposable plastics in New Delhi <sup>76</sup> (Naik, 2017a). <b>Impact:</b> Limited because of poor enforcement. (Bari, 2018)
		2018	Local – Maharashtra	Ban - entered into force	<b>Type:</b> Ban on plastic bags <50µ in the state of Maharashtra <sup>77</sup> (Naik, 2017b). <b>Impact:</b> Information not available
	Indonesia	2016	Local – 23 cities	Levy - entered into force	<b>Type:</b> Levy on plastic bags imposed on customers (equivalent to \$0.015 per bag) at selected retailers in 23 cities. <b>Impact:</b> 40% reduction, on average, in the number of plastic bags used in the selected cities, but resistance has been seen from consumers and the plastic industry. The government is considering the imposition of a nationwide tax on plastic bags starting from 2018. (Black, 2016).
	Indonesia	2016	Local – Banjarmasin	Ban - entered into force	<b>Type:</b> Ban on plastic bags in the city of Banjarmasin. <b>Impact:</b> Reduced bag consumption by 80% (The Jakarta Post, 2017).
		2016	Local – Bandung	Ban - entered into force	<b>Type:</b> Ban on the use of Styrofoam in the city of Bandung (Hong, 2016). <b>Impact:</b> Information not available
	Israel	2017	National	Ban and levy - entered into force	<b>Type:</b> Ban on bags <20µ and levy on thicker ones in supermarkets (around \$0.03) (Udasin, 2016). <b>Impact:</b> A survey revealed that, four months after the law came into effect, 42% of shoppers had not bought any plastic bags from supermarkets (Raz-Chaimovich, 2017).
	Malaysia	2011	Local – Penang State	Levy – entered into force	<b>Type:</b> MYR 0.20 charge on plastic bags, in line with the campaign: "No free plastic bags". <b>Impact:</b> Information not available
		2012	Local – Penang State	Ban – entered into force	<b>Type:</b> Ban on polystyrene (PS) <b>Impact:</b> Information not available
		2017	Local – Federal Territories	Ban - entered into force	<b>Type:</b> Ban on non-biodegradable plastic bags and food containers in Malaysia's Federal Territories (Kuala Lumpur, Putrajaya, and Labuan) <sup>78</sup> (The Straits Times, 2017). <b>Impact:</b> Information not available
	Mongolia	2009	National	Ban - entered into force	<b>Type:</b> Ban on the importation and use of non-biodegradable plastic bags <25µ. <b>Impact:</b> After a few years the ban was incorporated into a new "Waste Law", negatively affecting the enforcement of the ban and the administrative supervision (Zoljargal, 2013).
	Myanmar	2009	Local – Mandalay and Nay Pyi Taw	Ban - entered into force	<b>Type:</b> Ban on the use of small and thin plastic bags in Mandalay and Nay Pyi Taw (Myanmar works for conservation, 2009). <b>Impact:</b> Information not available

76 A ban of the use, sale and distribution of plastic bags passed in 2009, but was not enforced. (Lalchandani, 2016)

77 This law banning plastic bags in the state of Maharashtra passed in 2005, but it was never enforced. (Naik, 2017b)

78 Since 2011, there has been a "no plastic bags on Saturday" campaign, in which selected big retailers charge for plastic bags on Saturdays. (Zen et al., 2013)

Area	Country	Year	Level	Policy	Features
Asia		2011	Local – Yangon	Ban - entered into force	<b>Type:</b> Ban on the production, storage, and sale of polyethylene bags in Yangon (Myanmar's main city, 2011). <b>Impact:</b> Information not available
	Pakistan	2013	Local – Punjab	Ban - entered into force	<b>Type:</b> Ban on the manufacturing, sale and usage of non-degradable plastic products in Punjab. <b>Impact:</b> Limited because of insufficient implementation <sup>79</sup> (Masud, 2017).
		2018	Local – Sindh	Ban - entered into force	<b>Type:</b> Ban on certain non-degradable plastic products, including carrier bags, in Sindh. (The Sindh Prohibition of Non-degradable Plastic Products (Manufacturing, Sale and Usage) Rules, 2014). Notification to implement the ban in 2018 <sup>80</sup> (The Express Tribune, 2018). <b>Impact:</b> Information not available
		2013	Local – Islamabad Capital Territory	Ban - entered into force	<b>Type:</b> Ban on the sale, purchase, and use of polyethylene bags in the Islamabad Capital Territory, and introduction of oxo-biodegradable plastic bags (Naeem, 2013). <b>Impact:</b> Information not available
		2017	Local – Khyber Pakhtunkhwa	Ban - entered into force	<b>Type:</b> Ban on the manufacture, importation, sale, and use of non-biodegradable plastic bags and regulation of oxo-biodegradable plastic products in Khyber Pakhtunkhwa (Khattak, 2017). <b>Impact:</b> Information not available
	Philippines	2011	Local – Muntinlupa	Ban - entered into force	<b>Type:</b> Ban on the use of plastic bags on dry goods, regulations on their use for wet goods in the city of Muntinlupa. Ban on the use of Styrofoam and styropor <sup>81</sup> (Earthjustice, 2015). <b>Impact:</b> Information not available.
	Sri Lanka	2017	National	Ban - entered into force	<b>Type:</b> Ban on the import, sale, and use of polyethylene bags <20µ and Styrofoam containers (Sri Lanka bans plastic, 2017b; Jayasekara, 2012). <b>Impact:</b> Information not available
	Taiwan	2003	National	Levy - entered into force	<b>Type:</b> Levy on disposable plastic bags and tableware (Environmental Protection Administration, n.d.). <b>Impact:</b> A study revealed that the levy reduced the total amount of waste generated (Yang and Innes, 2006).
	Viet Nam	2012	National	Levy - entered into force	<b>Type:</b> Non-biodegradable plastic bags are taxed by weight at VND 40,000 (\$1.76) per kilogram (levy on retailer). <b>Impact:</b> Plastic bags are still widely used across Viet Nam. The government is considering an amendment to increase the tax fivefold (Viet Nam considers fivefold gallop, 2017).

79 In 2002 an ordinance on the prohibition on manufacture, sale, use and import of polythene bags (black or any other polythene bag below <15µ) was issued, but not enforced. (Masud, 2017)

80 A ban on the sale and use of plastic bags <30µ was issued in Karachi in 2006. (APP, 2007)

81 Since the implementation of the ban in Muntinlupa, more than 27 cities and several provinces have introduced similar bans or levies on plastic bags, including the City of Quezon, Las Pinas, City of San Fernando, Makati City, Bacolod and Manila City. Styrofoam is banned in some municipalities. (Dezalyx, 2016; Earthjustice, 2015)

Area	Country	Year	Level	Policy	Features
Central and South America	Antigua and Barbuda	2016	National	Ban - entered into force	<p><b>Type:</b> Ban on the use and importation of plastic bags (Observer Media, 2017).</p> <p><b>Impact:</b> Plastic bags can still be found in small supermarkets (Observer Media, 2017).</p>
		2017	National	Ban - entered into force	<p><b>Type:</b> Ban on Styrofoam with an implementation plan of three stages. Ban on food service containers since 2017, from 2018 onwards ban on plastic utensils (e.g. spoons, straws, food trays, etc.) and ban on importation and use of Styrofoam coolers (Nice, Ltd, 2017).</p> <p><b>Impact:</b> Information not available</p>
	Argentina	2017	Local – Buenos Aires	Ban - entered into force	<p><b>Type:</b> Ban on non-biodegradable plastic shopping bags &lt;50µ in Buenos Aires<sup>82</sup> (Martin, 2017).</p> <p><b>Impact:</b> Shortly after the ban was introduced, sales of changuitos (individual shopping carts) rose sharply (Tavella, 2017; Oceguera, 2017).</p>
		2009	Local – Córdoba	Ban - entered into force	<p><b>Type:</b> Ban on the use of polyethylene bags in Córdoba (Legislatura de la provincia de Córdoba, 9696, 2009).</p> <p><b>Impact:</b> No information available</p>
	Belize	2018	National	Ban - approved	<p><b>Type:</b> Ban on single-use plastic shopping bags, Styrofoam, and plastic food utensils (Government of Belize Press Office, 2018).</p> <p><b>Impact:</b> Information not available</p>
	Brazil	2009	Local – Rio de Janeiro	Levy - entered into force	<p><b>Type:</b> Requirement to substitute polyethylene and polypropylene bags with alternatives, or, if not done, to take back any quantity of plastic bags from any source and dispose of them properly and compensate the public by giving them a discount if they bring their own bag, or to pay them with food products for every 50 plastic bags they bring (Beverage &amp; Diamond, 2009).</p> <p><b>Impact:</b> Reduction of 24% of plastic bags used each year (Siqueira, 2011).</p>
		2015	Local – Sao Paulo	Ban - entered into force	<p><b>Type:</b> Ban on non-biodegradable plastic bags in Sao Paulo (Petrone, 2015).</p> <p><b>Impact:</b> Information not available</p>
	Chile	2014	Local – Punta Arenas	Ban - entered into force	<p><b>Type:</b> Ban on polyethylene bags except for perishable food products (fresh food such as meat, seafood, etc.) in Punta Arenas (Southern Cities, 2014).</p> <p><b>Impact:</b> Information not available</p>
		2017	National	Bill - approved	<p><b>Type:</b> Ban on the sale of plastic bags in 102 coastal villages and towns (Chow, 2017a).</p> <p><b>Impact:</b> Information not available</p>

82 The law on banning non-biodegradable plastic shopping bags < 50µ was passed in 2009 in province of Buenos Aires, but was not enforced. (Martin, 2009)

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Area	Country	Year	Level	Policy	Features
Central and South America	Colombia	2017	National	Ban and levy - entered into force	<p><b>Type:</b> Ban on disposable plastic bags smaller than 30x30 cm and levy on consumer on single-use plastic bags (20 Colombian pesos, around \$1).</p> <p><b>Impact:</b> 27% reduction in the use of plastic bags (UNEP Stories, 2017).</p>
	Ecuador	2015	Local – Galápagos Islands	Ban - entered into force	<p><b>Type:</b> Ban on plastic bags in the Galápagos Islands (Haskell, 2014).</p> <p><b>Impact:</b> Information not available</p>
	Guatemala	2017	Local – San Pedro La Laguna and other cities	Ban - entered into force	<p><b>Type:</b> Ban on plastic bags and Styrofoam containers in San Pedro La Laguna. Cantel, Quetzaltenango and San Juan Sacatepéquez have introduced similar laws (Chiyal, 2017).</p> <p><b>Impact:</b> Information not available</p>
	Guyana	2016	National	Ban - entered into force	<p><b>Type:</b> Ban on the importation and use of Styrofoam items (Environmental Protection Agency of Guyana, 2015)</p> <p><b>Impact:</b> Information not available</p>
	Haiti	2013	National	Ban - entered into force	<p><b>Type:</b> Ban on the importation and production of plastic bags and Styrofoam containers (Lall, 2013).</p> <p><b>Impact:</b> Information not available</p>
	Honduras	2016	Local – Roatán, Utila, Guanaja	Ban - entered into force	<p><b>Type:</b> Ban on plastic bags instituted at the municipal level in Roatán, Utila, and Guanaja. Accompanied by an awareness raising campaign.</p> <p><b>Impact:</b> 100% elimination in Guanaja, 80% decline on Utila and 50% decline in Roatán (The Summit Foundation, 2017).</p>
	Mexico	2018	Local – Queretaro	Ban - entered into force	<p><b>Type:</b> Ban on disposable plastic bags in Queretaro City (Reyes, 2018).</p> <p><b>Impact:</b> Information not available</p>
		2010	Local – Mexico City	Ban and levy - entered into force	<p><b>Type:</b> Retailers in Mexico City must charge for plastic bags, which, according to the law, must also be biodegradable (Malkin, 2009; Mexico City bans, 2010).</p> <p><b>Impact:</b> Information not available</p>
	Panama	2018	National	Ban - entered into force	<p><b>Type:</b> Ban on the sale and use of non-biodegradable plastic bags (Central America Data, 2018).</p> <p><b>Impact:</b> Information not available</p>
	St. Vincent and the Grenadines	2017	National	Ban - entered into force	<p><b>Type:</b> Ban on the importation of Styrofoam products used for sale or storage of food; value added tax (VAT) removed from biodegradable alternatives to lower their cost (United Nations, 2017).</p> <p><b>Impact:</b> Information not available</p>

Area	Country	Year	Level	Policy	Features
Europe	European Union	2015		EU directive: Member states must ensure that by the end of 2019 no more than 90 lightweight (<50µ) bags are consumed per person per year. By the end of 2025 that number should be down to no more than 40 bags per person. Member states can choose whether to introduce bans, taxes, or other policy tools. (Directive (EU) 2015/720 of the European Parliament and the Council)	
	Belgium	2007	National	Levy - entered into force	<b>Type:</b> Levy on consumer to reduce distribution of free plastic carrier bags. <sup>83</sup> A bill on plastic bags has been drafted but not yet adopted as law (Surfrider Foundation Europe, 2017). <b>Impact:</b> Consumption of plastic bags decreased by 80% over ten years (Alpagro, 2016).
		2016	Local – Wallonia	Ban - entered into force	<b>Type:</b> Ban on the use of single-use plastic bags in Wallonia. Exception of thin compostable bags for foods that can be moist, until the end of 2018 (Surfrider Foundation Europe, 2017). <b>Impact:</b> Information not available
		2017	Local – Brussels Capital Region	Ban - entered into force	<b>Type:</b> Ban on non-compostable plastic bags <50µ in the Brussels Capital Region (Alpagro, 2016). <b>Impact:</b> Information not available
	Bulgaria	2011	National	Levy - entered into force	<b>Type:</b> Levy on supplier on PE bags <15µ (around \$0.10), increased every year until 2015 (Surfrider Foundation Europe, 2017). <b>Impact:</b> The Ministry of Environment reported drastic reduction in the use of plastic bags (Bulgaria's Environment Ministry Reports, 2015).
	Croatia	2014	National	Levy - entered into force	<b>Type:</b> Levy on supplier, with levies to go to the Environmental Protection and Energy Efficiency Fund (Surfrider Foundation Europe, 2017, Environmental Protection and Energy Efficiency Fund, n.d.). <b>Impact:</b> Information not available
	Cyprus	2018	National	Levy - approved	<b>Type:</b> Levy on consumer (€ 0.05, around \$0.06) for plastic bags in supermarkets (CNA News Service, 2018). <b>Impact:</b> Information not available
	Czech Republic	2018	National	Levy - entered into force	<b>Type:</b> Levy on consumer for plastic bags >15µ. Retailers determine the price, but charge must at a minimum cover the production cost of the plastic bag (Plastic Portal, 2018; Expats.cz, 2017). <b>Impact:</b> Information not available
	Denmark	1994	National	Levy - entered into force	<b>Type:</b> Levy on supplier for plastic bags. Fee passed on to retailers, who in turn pass it on to consumers (currently a bag costs around \$0.56 per bag) (Larsen & Venkova, 2014). <b>Impact:</b> Decrease from around 800 million bags to 400 million bags (The Danish Ecological Council, 2015).

<sup>83</sup> Before: voluntary agreement with supermarkets for 15 years (European Commission, 2013)

Area	Country	Year	Level	Policy	Features
Europe	Estonia	2017	National	Levy - entered into force	<p><b>Type:</b> Levy on consumer on plastic bags &lt;50µ (exemption of very light weight bags used to ensure hygiene and prevent food waste). Avoidance of sale or free of charge oxo-degradable plastic carrier bags<sup>84</sup> (Packaging Act, 2004).</p> <p><b>Impact:</b> Information not available</p>
	France	2016	National	Ban - entered into force	<p><b>Type:</b> Ban on lightweight single-use plastic carrier bags (&lt;50µ and &lt;10litres), expanded in 2017 on all other plastic bags except compostable bags. (EuroNews, 2016; Swiss supermarkets, 2016) Prohibition of the production, distribution, sale, provision or use of oxo-degradable plastic bags.<sup>85</sup> (LOI n° 2015-992, Article 75).</p> <p><b>Impact:</b> Information not available</p>
		2015	National	Ban - approved	<p><b>Type:</b> By 2020, a ban on all disposable tableware not made from 50% biologically-sourced materials that can be composted at home (Eastaugh, 2016; CNN, 2016).</p> <p><b>Impact:</b> Information not available</p>
	Greece	2018	National	Levy - entered into force	<p><b>Type:</b> Levy on consumer (€ 0.034, around \$0.04) for non-biodegradable plastic bags &lt;50µ. The levy will be raised to € 0.07 (\$0.086) in 2019. Businesses will be allowed to charge customers for thicker bags (up to 70µ) (Manifava, 2017).</p> <p><b>Impact:</b> After the first month of implementation lightweight plastic bag consumption decreased by 75-80% and sales of reusable shopping bags increased sharply (Smith, 2018).</p>
	Hungary	2012	National	Levy - entered into force	<p><b>Type:</b> Levy on supplier. Re-regulation of the environmental protection fee obliged producers and distributors to pay the fee in any case, which they incorporated into the products' price. Retailers voluntarily put a fee on plastic bags (European Commission, 2013; Balázs &amp; Kovátsits Legal Partnership, 2011; Kis, 2015).</p> <p><b>Impact:</b> Information not available</p>
	Ireland	2002 with review in 2007	National	Levy - entered into force	<p><b>Type:</b> Levy on consumer for plastic bags (initially set at €0.15 and later augmented to €0.22, around \$0.26). Aims to limit use to a maximum of 21 bags per person per year. In 2011 legislation allowed the levy to be amended once a year, with a ceiling of €0.70 (\$0.86) per bag (O'Neil, 2016).</p> <p><b>Impact:</b> One year after the introduction of the fee, the consumption of plastic bags decreased by more than 90% (Convery et al., 2007); (Department of Communications, Climate Action &amp; Environment, n.d.).</p>

<sup>84</sup> The producer is responsible for collection, recovery and recycling. A levy is imposed on the producer when recovery/recycling targets are not met. (Larsen & Venkova, 2014)

<sup>85</sup> Since 1996, some supermarkets have voluntarily replaced free thin plastic bags with biodegradable, reusable and cotton bags. Others have put a fee on plastic bags. A law banning the sale of non-biodegradable plastic bags was adopted in 2005, but was never applied, as it conflicted with other provisions. (European Commission, 2013)

Area	Country	Year	Level	Policy	Features
Europe	Italy	2011	National	Ban - entered into force	<p><b>Type:</b> Ban on non-biodegradable plastic bags &lt;100µ, with exemption of reusable plastic bags. (Messia, 2010) Promotion of reusable bags. The ban only became fully effective in 2014.<sup>86</sup></p> <p><b>Impact:</b> Reduction of plastic bag consumption by more than 55% since 2011 (Surfrider Foundation Europe, 2017).</p>
		2018	National	Levy - entered into force	<p><b>Type:</b> Levy on consumer for lightweight plastic bags in supermarkets and grocery stores (around \$0.025 – \$0.12). (ESM, 2017; The Florentine, 2018). Only biodegradable and compostable lightweight plastic bags are allowed to be provided or sold (Stemaplast, 2018).</p> <p><b>Impact:</b> Information not available</p>
	Latvia	2009	National	Levy - entered into force	<p><b>Type:</b> Levy on retailer for plastic carrier bags (with two different rates for single and multiple use bags and depending on weight). Since then, most supermarkets charge for plastic carrier bags and offer reusable carrier bags.</p> <p><b>Impact:</b> Plastic bag consumption dropped rapidly after implementation while use of reusable bags increased, but stabilized after the first year (Brizga, n.d.).</p>
	Lithuania	2016	National	Levy - approved	<p><b>Type:</b> Levy on consumer. Prohibition of free lightweight plastic bags with a thickness between 15 and 50µ. Supposed to enter into effect by 31 December 2018 (Ministry of the Environment of Lithuania, 2016; Surfrider Foundation Europe, 2017).</p> <p><b>Impact:</b> Information not available</p>
	Malta	2009	National	Levy - entered into force	<p><b>Type:</b> Levy on consumer on all sorts of plastic bags (€0.15, around \$0.18).<sup>87</sup> (Xuereb, 2009; Times of Malta, 2009)</p> <p><b>Impact:</b> Information not available</p>
	Netherlands	2016	National	Levy - entered into force	<p><b>Type:</b> Levy on consumer. Very lightweight bags for primary packaging are exempt. While businesses have the freedom to decide how much they will charge, the official guideline is €0.25 per bag (around \$0.30). (Pieters, 2015)<sup>88</sup></p> <p><b>Impact:</b> The number of plastic bags ending up as litter decreased by 40% in one year (Pieters, 2017).</p>

86 In 1988 a manufacturing tax (around \$0.06 per bag) was introduced but did not cause a reduction in plastic bag consumption and was abolished after 5 years. A law in 2006 provided the legal framework for a pilot program that was launched in 2007 to gradually implement measures to achieve the ban on non-biodegradable carrier bags on the market and on bags that don't comply with the criteria adopted at the EU level. (European Commission, 2013)

87 In 2005 an eco-contribution was introduced but was not effective. (Xuereb, 2009)

88 Since the mid-1990s, voluntary agreements obliged consumers to pay a fee for most plastic carrier bags. Bag bins are installed in some supermarkets, where used bags can be deposited and used again by other consumers. (European Commission, 2013)

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Area	Country	Year	Level	Policy	Features
Europe	Portugal	2015	National	Levy - entered into force	<p><b>Type:</b> Levy on supplier. The charge of € 0.10 (around \$0.12) per bag between 15-50µ was mostly passed on to the consumer (The Portugal News Online, 2016).</p> <p><b>Impact:</b> After the tax was introduced, the consumption of lightweight plastic bags decreased by 74%, while that of reusable plastic bags, exempted from the levy, increased by 61% (Martinho et al., 2017).</p>
	Romania	2009	National	Levy - entered into force	<p><b>Type:</b> Levy of € 0.05 (around \$0.06) on consumer on non-biodegradable plastic bags (European Commission, n.d.).</p> <p><b>Impact:</b> Information not available.</p>
		2018	National	Draft law -approved	<p><b>Type:</b> Ban on plastic bags &lt;50µ in supermarkets and &lt;15µ on national markets. To enter into effect on 1st of July 2018 (Marica, 2018; Romania to ban bags, 2018).</p> <p><b>Impact:</b> Information not available</p>
	Slovakia	2018	National	Levy -entered into force	<p><b>Type:</b> Levy on consumer for plastic bags between 15 and 50µ (Plastic Portal, 2018).</p> <p><b>Impact:</b> Information not available</p>
	Spain	2011	Local – Andalusia	Levy - entered into force	<p><b>Type:</b> Levy on consumer for plastic bags in Andalusia (€0.05, around \$0.06). From 2012, increases to €0.10 (around \$0.12) (ENDS Europe, 2010).</p> <p><b>Impact:</b> Information not available</p>
		2017	Local – Catalonia	Ban - entered into force	<p><b>Type:</b> Ban on free disposable plastic bags, including biodegradable and oxo-degradable ones in Catalonia (Surfrider Foundation Europe, 2017; Municipal Consumer Information Office, n.d.).</p> <p><b>Impact:</b> Information not available</p>
	Sweden	2017	National	Law - entered into force	<p><b>Type:</b> Law that requires supermarkets to educate customers on the environmental effects of plastic bags (Harford, 2017).</p> <p><b>Impact:</b> Information not available</p>
		2011	Local – Wales	Levy - entered into force	<p><b>Type:</b> Levy on consumer for plastic bags (£0.05) in Wales.</p> <p><b>Impact:</b> The consumption of single-use plastic bags has declined by more than 70% since the tax was introduced (Morris, 2015).</p>
United Kingdom	United Kingdom	2013	Local – Northern Ireland	Levy - entered into force	<p><b>Type:</b> Levy on consumer for plastic bags (£0.05, around \$0.07) in Northern Ireland.</p> <p><b>Impact:</b> Within one year, a 71% drop in the consumption of plastic bags, followed by another 42.6% decrease the following year (Plastic bag use continues to fall, 2015).</p>
		2014	Local – Scotland	Levy - entered into force	<p><b>Type:</b> Levy on consumer for plastic bags in Scotland (£0.05, around \$0.07)</p> <p><b>Impact:</b> Plastic bag usage declined by 80% in the year after the tax was introduced (Plastic bag charge in Scotland, 2015).</p>

Area	Country	Year	Level	Policy	Features
Europe		2015	Local – England	Levy - entered into force	<p><b>Type:</b> Levy on consumer (£0.05, around \$0.07) for plastic bags to be charged by companies with 250+ employees and on a voluntary basis for smaller retailers in England.</p> <p><b>Impact:</b> The number of single-use plastic bags used dropped by more than 85% in the six months following the introduction of the tax (Smithers, 2016).</p>
North America	Canada	2007	Local – Leaf Rapids	Ban - entered into effect	<p><b>Type:</b> Ban on plastic bags in Leaf Rapids (Manitoba) (Duboise, 2012a).</p> <p><b>Impact:</b> Information not available</p>
		2010	Local – Wood Buffalo	Ban - entered into effect	<p><b>Type:</b> Ban on single-use plastic bags (&lt;571µ) in in Municipality of Wood Buffalo with exceptions (Regional Municipality of Wood Buffalo, 2010; Single-use Shopping Bag Bylaw, No. 12/007).</p> <p><b>Impact:</b> Information not available</p>
		2010	Local – Thompson	Ban - entered into effect	<p><b>Type:</b> Ban on the sale or give-away for free of plastic shopping bags in Thompson (Manitoba) (Duboise, 2010).</p> <p><b>Impact:</b> Information not available</p>
		2018	Local – Montreal	Ban - entered into effect	<p><b>Type:</b> Ban on plastic bags &lt;50µ in Montreal (Quebec) (Fundira, 2016).</p> <p><b>Impact:</b> Information not available</p>
United States of America		In the table are included policies enacted at the state level as well as a limited number of municipal-level regulations whose development has been documented. <sup>89, 90</sup>			
		2010	Local – Washington, DC	Levy - entered into force	<p><b>Type:</b> Levy on consumer for plastic bags (\$0.05) in Washington, DC (Department of Energy &amp; Environment, 2010).</p> <p><b>Impact:</b> A survey in 2014 revealed that the consumption of plastic bags decreased on average from 10 to 4 plastic bags a week (Department of Energy &amp; Environment, 2014).</p>
		2011	Local – American Samoa	Ban - entered into force	<p><b>Type:</b> Ban on the sale and use of petroleum-based plastic bags (some exceptions possible for fresh and frozen products and others) (American Samoa Environmental Protection Agency, 2011).</p> <p><b>Impact:</b> Information not available</p>
		2011	Local – Hawaii	Ban - entered into force	<p><b>Type:</b> Ban on single-use plastic bags in Hawaii. 2013: Big Island Hawaii, 2018: Honolulu (ban and fee), 2011: Kauai, 2008: Maui and Pala (S. Walter Packaging, n.d.).</p> <p><b>Impact:</b> Information not available</p>

<sup>89</sup> In addition to the policies listed, single-use plastic bags are banned in Cambridge, Massachusetts (Annear, 2016), and Portland, Oregon (City of Portland, 2017), among others. Plastic bag levies are in place in Boulder, Colorado (\$0.10, City of Boulder, n.d.) and Montgomery County, Maryland (\$0.05, Turque, 2016). As of 2014, more than 150 municipalities in the United States have implemented plastic bag bans or levies. (Larsen, 2014)

<sup>90</sup> A law in Michigan prohibits local governments from banning or imposing fees on plastic bags. Idaho, Arizona and Missouri all have enacted similar laws. (Harvey, 2017)

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Area	Country	Year	Level	Policy	Features
North America		2012	Local – San Francisco, California	Ban and levy - entered into force	<p><b>Type:</b> Ban on single-use checkout plastic bags and levy on consumer on compostable bags, recycled paper bags or reusable (&gt;125 uses) bag of \$0.10 in the county and city of San Francisco (sfenvironment, n.a.).</p> <p><b>Impact:</b> Information not available</p>
		2013	Local – Austin, Texas	Ban - entered into force	<p><b>Type:</b> Ban on single-use plastic bags (&lt; 101µ) in Austin, Texas. (abagatatime, n.d.)</p> <p><b>Impact:</b> While the consumption of single-use plastic bags decreased, that of reusable, thicker plastic bags increased (Richards, 2015).</p>
		2015	Local – New York City, New York	Ban - entered into force	<p><b>Type:</b> Ban on single-use Styrofoam containers instituted in New York City. The ban was challenged by a coalition of recycling firms and plastics manufacturers who claimed the material is recyclable. The ban was lifted in 2015 and reintroduced in 2017 (Alexander, 2017).</p> <p><b>Impact:</b> Information not available</p>
		2016	Local – California	Ban - entered into force	<p><b>Type:</b> Ban on single-use plastic bags and levy on thicker reusable ones (US\$ 0.10) in California.</p> <p><b>Impact:</b> Plastic bags accounted for about 3% of the litter collected during the 2017 Coastal Cleanup Day, compared to 7.4% in 2010 (Los Angeles Times Editorial Board, 2017).</p>
		2017	Local – Chicago, Illinois	Levy - entered into force	<p><b>Type:</b> Levy on consumer plastic bags in Chicago (\$0.07).</p> <p><b>Impact:</b> The number of plastic bags (and paper bags, as these are also taxed) declined by 42% one month after the introduction of the tax (Cherone and Wetli, 2017).</p>
		2017	Local – Seattle	Ban - entered into force	<p><b>Type:</b> Ban on single-use plastic bags, including bags labelled with biodegradable, degradable, decomposable or similar, and voluntary levy on thicker (&gt; 57µ) plastic bags in Seattle (Seattle Government, 2017).</p> <p><b>Impact:</b> Information not available</p>

Area	Country	Year	Level	Policy	Features
Oceania	Australia	2003	Local – Coles Bay	Ban - entered into force	<b>Type:</b> Ban on non-biodegradable plastic checkout bags in Coles Bay (Fickling, 2003). <b>Impact:</b> It has been estimated that in ten years, the ban has avoided the use of two million plastic bags. (Twomey, 2013).
		2009	Local – South Australia	Ban - entered into force	<b>Type:</b> Ban on lightweight plastic bags in South Australia (SA EPA, 2009). <b>Impact:</b> Consumption of reusable, thicker plastic bags increased (Watson, 2013).
		2011	Local – Australian Capital Territory	Ban - entered into force	<b>Type:</b> Ban on lightweight plastic bags in the Australian Capital Territory (ACT Government, 2011). <b>Impact:</b> Two years after the implementation of the ban, 36% reduction in the amount of plastic bag waste in landfills (Hayne, 2017).
		2011	Local – Northern Territory	Ban - entered into force	<b>Type:</b> Ban on plastic bags <35µ in the Northern Territory. (NT Government, 2017) <b>Impact:</b> A survey revealed that, five years after the ban was introduced, plastic bag litter increased (Rigby, 2017).
		2013	Local – Tasmania	Ban - entered into force	<b>Type:</b> Ban on plastic bags <35µ in Tasmania. (EPA Tasmania) <b>Impact:</b> Increased consumption of thicker bags (Richards, 2017)
		2018	Local – Queensland	Ban - approved	<b>Type:</b> Ban on plastic bags <35µ in Queensland. (Queensland Government). Ban on lightweight plastic bags in Victoria (Cooper, 2017) and in Western Australia (Cooper, 2017b). <b>Impact:</b> Information not available
	Fiji	2017	National	Levy - entered into force	<b>Type:</b> Levy on consumer, FJD 0.10 (\$0.05) per plastic bags (Vanuatu joins PIC, 2017). <b>Impact:</b> Information not available
	Papua New Guinea	2016	National	Ban - entered into force	<b>Type:</b> Ban on non-biodegradable plastic shopping bags <sup>91</sup> (Plastic bags banned, 2015). <b>Impact:</b> Information not available
	Vanuatu	2018	National	Ban - entered into force	<b>Type:</b> Ban on manufacture, use and import of single-use plastic bags, straws and polystyrene takeaway food containers. Bags to wrap and carry fish or meat are exempt (SPREP, 2018; Vanuatu bans plastic, 2018). <b>Impact:</b> Information not available
Marshall Islands	Marshall Islands	2017	National	Ban - entered into force	<b>Type:</b> Ban on importation, manufacture and use of single-use plastic carrier bags. Ban on Styrofoam and plastic cups, plates and packages (SPREP, 2018; Styrofoam and Plastic Products Prohibition Act, 2016). <b>Impact:</b> Information not available
	Palau	2017	National	Ban - entered into force	<b>Type:</b> Ban on the importation and distribution of plastic shopping bags (Carreon, 2017; SPREP, 2018). <b>Impact:</b> Information not available

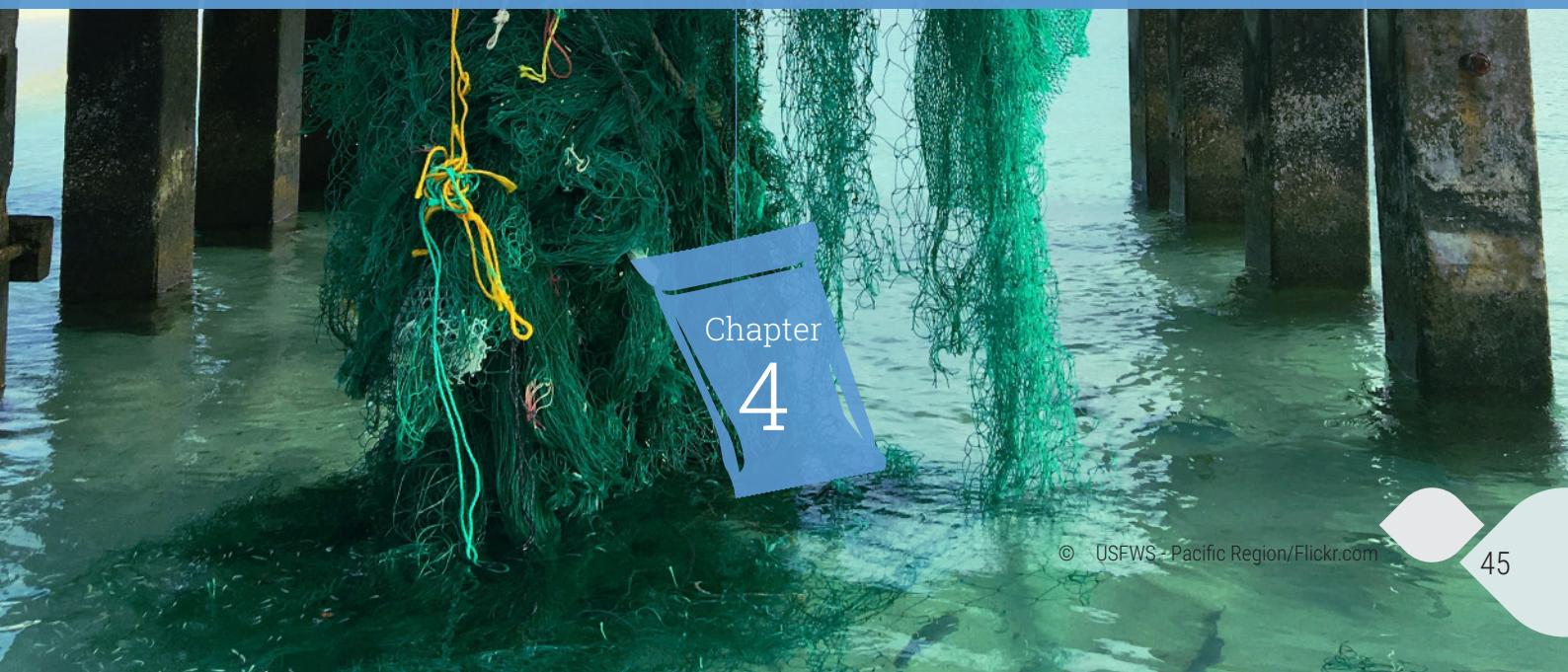
<sup>91</sup> Ban on plastic bags was introduced in 2005 but failed due to missing practical and social preparation. (Wayang, 2017)

**Summary of countries that have announced imminent action  
on plastic bags and Styrofoam products**

Area	Country	Year	Level	Policy announced	Features
Africa	Botswana	2017	National	Ban	Government is considering the introduction of a ban on plastic bags <24µ (Marumoloa, 2017, Botswana, 2018).
	Nigeria	2013	National	Ban	Ban on production, importation, usage and stocking of low density smooth plastic and packaging bags (Obateru, 2016).
	Republic of the Congo	2011	National	Ban	The government announced a ban on the production, importation, sale, and use of plastic bags, but did not announce when it would take effect (Congo bans bags, 2011).
Central and South America	Costa Rica	2021	National	Ban	The government announced the phasing out of all kinds of disposable plastics by 2021 (UNDP, 2017).
	Jamaica	2018	National	Ban	The government is considering the introduction of a ban on non-biodegradable plastic bags below 50-gallon capacity and on Styrofoam containers (Serju, 2017).
	Uruguay	2017	National	Levy	Levy on consumer on single-use plastic bags (UNEP, 2017C; Hui, 2016). Impact: Information not available
Europe	Croatia	2017	National	Levy	Levy on consumer for lightweight carrier bags, to become effective after 31 December 2018 (Pavlic, 2017).
	Poland	2017	National	Levy	The government is planning the introduction of a PLN 1 (around \$0.28) levy on plastic bags (Adamowski, 2016) Implementing measures were notified to the European Commission in November 2017. The first fees are supposed to be collected in 2019 (Surfrider Foundation Europe, 2017).
	Slovenia	2017	National	Ban	Ban on free lightweight plastic bags. The Ministry of Environment issued a legislative blueprint (Surfrider Foundation Europe, 2017).
	Spain	2017	National	Levy	Levy on consumer for disposable plastic bags with a thickness between 15 µ and 50µ. The levy was intended to be introduced in March 2018, but was postponed. A total ban of lightweight and very lightweight non-compostable plastic carrier bags is supposed to come into effect in 2020 (All Shops, 2017; Gerrard, 2018).
Oceania	New Zealand	2017	Local	Levy	Levy on plastic bags. Almost half of the nation's mayors have signed an open letter to the Ministry of the Environment to impose a mandatory charge on plastic bags (Cann, 2017). A supermarket chain launched a campaign, letting shoppers decide how much to pay (or not) for plastic bags (Huffadine, 2017). Another supermarket chain announced that it will phase out all plastic bags by 2018 (Clayton, 2017).
	Vanuatu	2018	National	Ban	Ban on the use, manufacture and importation of single- use plastic bags (SPREP, 2018)



## Selected case studies



**B**y analysing case studies from countries around the world, this chapter has the objective of identifying lessons learned and common trends that have

led to positive long-term impacts. These lessons will be summarized in the form of recommendations to policymakers in the concluding section of this report (chapter 5).

## 4.1

## Europe



Photo Credit: European Parliament/Flickr.com

### 4.1.1 Ireland: Levy on consumers

#### The Irish “PlasTax”

##### Context

In the 1990s, plastic bags were a significant problem in Ireland, littering towns, the countryside and the coastline, and accounted for 5% of the total waste stream. In 1998, the Irish Department of the Environment, Heritage and Local Government commissioned a study to assess how to reduce the use of plastic bags and to estimate consumers' maximum willingness to pay (WTP) for a plastic bag. The assessment revealed that retailers gave out 1.26 billion plastic bags every year, with an average consumption of 328 bags per person per year. The average consumers' WTP for a plastic bag was found to be around €0.024.

##### Introduction of the tax

In 2002 the Irish government introduced a tax on plastic bags at points of sale, known as the “PlasTax”. The levy was set six times higher than the estimated willingness to pay, at €0.15, with the aim to trigger behaviour change in consumers and promote the use of reusable shopping bags. The tax did not apply to small so-called knot bags used to separate certain fresh produce, such as raw meat, fruits and vegetables, for hygiene purposes.<sup>92</sup>

##### What worked well

The policy design and implementation phases were accompanied by **extensive consultations** with key stakeholders, including industry representatives, retailers and citizens. To reduce public resistance, a

<sup>92</sup> This was decided after concerns raised particularly by butchers.

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"When the plastic bag tax was introduced, there was a bit of grumbling but now it feels completely normal. Ireland is definitely cleaner now and people are more protective of the environment."

- Mark Nyhan, Ireland (2017)

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strong **awareness campaign** on the reasons for the introduction of the levy was launched, linking price and good environmental benefits. The result was wider public recognition and smooth enforcement of the levy, with consumers in favour of increased environmental protection. In addition, the **revenues of the levy** were paid into an Environment Fund, created ad hoc and controlled by the Minister for the Environment, Heritage and Local Government. To support smooth implementation, the **governance functions were clearly defined** and separated between the local authorities responsible for enforcing the application of the levy at point of sale and the newly appointed revenue commissioners tasked to collect the levy receipts due from retailers. The latter also had the power to "carry out a full tax audit of retailers suspected of not charging the levy."<sup>93</sup>

### Impact

Within one year from the introduction of the tax, the use of plastic bags in Ireland dropped by more than 90%<sup>94</sup> and the consumption per person fell from 328 plastic bags per year to 21 bags.<sup>95</sup> Likewise, while prior to the 2002 levy, plastic bags accounted for 5% of the national waste, in 2004 this number fell to 0.22%, with a strong perception among surveyed households of the positive effects of the levy on the environment.<sup>96</sup>

### Monitoring and review of the tax

After four years from the introduction of the "PlasTax", a regulatory impact assessment revealed that plastic bag usage had risen to 31 bags per person, so in July 2007 the levy was raised to €0.22. Again, bag consumption decreased. With the aim of keeping the use of plastic bags to a maximum of 21 bags per person per year, the 2011 legislation passed to allow the levy to be amended once a year, with a ceiling at €0.70 per bag.

### Lessons learned

The success of the Irish levy on plastic bags demonstrates that the adoption of a sufficiently high levy can influence consumer behaviour. Furthermore, it proves that stakeholder buy-in and wider public acceptance are

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93 O'Neill, 2016

94 Convery, McDonnell, and Ferreira, 2007.

95 Plastic bag consumption per person per year calculated comparing data from before the tax introduction, until 2005.

96 The Litter Monitoring Body, 2004.

essential for the successful implementation of such a policy tool. Extensive consultation and awareness campaigns on the environmental impacts of plastic bag litter were of utmost importance. Clear division of roles and responsibilities among local authorities were key for good governance and, regular monitoring and review of the tax ensured its continued effectiveness.



Photo Credit: Mo Riza/Flickr.com

#### 4.1.2 Austria: Voluntary agreements

##### The power of public-private agreements

###### Context

According to the EU Plastic Bags Directive,<sup>97</sup> member states of the European Union should adopt measures to cut the consumption of plastic bags with a thickness below 50 microns, ensuring that by the end of 2019 no more than 90 bags are used per person per year.

###### Signing the agreement

In 2016 the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) of Austria signed an agreement with large retailers and environmental protection organizations to reduce the usage of carrier bags. The agreement sets a target more ambitious than the one in the EU Directive, aiming to reduce the consumption of plastic bags to a maximum of 25 bags per person per year, including also any single-use carrier bags made from other materials such as paper. As of January 2017, most of Austria's large supermarket chains have voluntarily stopped providing customers with free carrier bags (made from any kind of material).<sup>98</sup> Some supermarkets have gone a step further and if customers don't bring their own shopping bags, they can only purchase reusable ones at the checkout counters.

###### The plan going forward

The government will support the promotion of **awareness raising campaigns** and environmental projects. A first campaign targeting customers via radio, print and social media was implemented from February to April 2017.<sup>99</sup>

<sup>97</sup> EU Directive 2015/720.

<sup>98</sup> United Nations, 2017b.

<sup>99</sup> Ibid

To **monitor and communicate the progress** of the policy, a report will be published annually with an analysis of data provided by the signing retailers.

## 4.2

## Africa



Photo Credit: Ministry of Environment - Rwanda/  
Flickr.com

"After the ban plastic bags could be easily found in local markets and shops, but with time people started to comply and now everybody enjoys a cleaner environment."

- Thibault Mutabazi, Rwanda (2017)

### 4.2.1 Rwanda: Total ban

#### Total plastic bag ban: Cleaner cities and rural areas

##### Context

In 2004, the Rwandan Ministry of Environment, concerned by the improper disposal of plastic bags, as they were often burned or clogged drainage systems, commissioned a baseline study which revealed that plastic bag litter was threatening agricultural production, contaminating water sources, killing fish and creating visual pollution.

##### Introduction of the ban

In 2008 the Rwandan government banned the manufacturing, use, sale and importation of all plastic bags. Paper bags replaced plastic ones<sup>100</sup> and citizens also started using reusable bags made of cotton.<sup>101</sup> Along with the new ban, tax incentives were provided to companies willing to invest in plastic recycling equipment or in the manufacturing of environmentally friendly bags.

##### What didn't work so well

Critics claim that stakeholders were insufficiently consulted during the policy design and that the poorest fractions of the population were not considered.<sup>102</sup> Despite the good intentions, after the entry into force of the ban, investments in recycling technologies were lacking, as were good and cheap alternatives. As a result, people started smuggling plastic bags from neighbouring countries and a lucrative black market emerged.

<sup>100</sup> It remains controversial whether paper bags can be considered a suitable environmentally sound alternative to plastic bags.

<sup>101</sup> Fullerton, 2017.

<sup>102</sup> Pilgrim, 2015.

### What worked well

With time, **enforcement** of the law became stricter, and if caught, offenders would face high fines and even jail.<sup>103</sup> In the long run, citizens became used to the new regulation and, Kigali, the capital of Rwanda, was nominated by UN Habitat in 2008 as the cleanest city in Africa.



Photo Credit: warrenski/Flickr.com

### 4.2.2 South Africa: Combined ban and levy on retailers

#### Behaviour change needs prompting

#### Context

By the late 1990s, plastic bag litter had become so widespread in South Africa that plastic bags were referred to as the “new national flower”.

#### The ban and levy introduction

In 2003, the Government of South Africa introduced a **ban** on single-use plastic bags less than 30 microns thick.<sup>104</sup> The new regulation was combined with a nominal **levy on retailers** of ZAR 0.04 (roughly \$0.04) on 24 litre bags.<sup>105</sup> After only three months the levy was reduced to ZAR 0.03, partly because of the pressures from plastic-bag producers. A non-profit company was established from a percentage of the revenues from the levy, “**Buyisa-e-Bag**”, with the mandate to promote waste minimization and recycling, create sustainable job opportunities in the plastic recycling industry and awareness initiatives.

#### What didn't work so well

The levy on plastic bags affected the food sector but excluded other industries, such as clothing retailers, which still gave out free plastic bags. The levy on plastic bags seemed to be particularly problematic for poorer segments of the population, which use plastic bags as cheap means to carry goods over long distances.

103 Ibid

104 The government allowed for an initial 20% margin of flexibility on the thickness of the banned bags for a five-year period, after which the ban would extend to all plastic bags thinner than 24 microns.

105 Dikgang, Leiman, and Visser, 2012a.

Despite the initial success, with little to no **consultation with stakeholders** and **no awareness** raising on why the levy was being implemented, consumers started to budget the small charge for plastic bags into their shopping, and the number of bags consumed slowly returned to pre-levy levels. Currently the nominal levy on retailers is set at ZAR 0.08 per bag (with a thickness of 24 microns or more)<sup>106</sup>, but retailers charge consumers between ZAR 0.35 and 0.75 per bag.<sup>107</sup>

In 2009 (six years after the introduction of the levy), only 13% of the revenues collected reached "Buyisa-e-Bag".<sup>108</sup> The non-profit company was closed but no other dedicated purpose was identified for the levy's revenues.<sup>109</sup> Questions have been raised in Parliament on how this levy is being utilized and the benefits (if any) to the local waste and recycling sector.

### Lessons learned

The mix of policy tools implemented in South Africa, albeit initially successful in reducing the demand for plastic bags, had **diminishing effects** over the longer term due to **limited consultations with and awareness** of the stakeholders. The (too) small nominal levy on retailers did not prompt the desired change in consumers' behaviour, suggesting that people have become habituated to paying for plastic bags. It remains unclear if any part of the revenues collected from the levy are utilized for the benefit of the local waste and recycling sector.

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106 <https://www.iol.co.za/business-report/economy/sas-plastic-bag-tax-diverted-2045284>

107 <https://www.iol.co.za/news/south-africa/were-throwing-money-away-on-plastic-bags-2093938>

108 Nahmann, 2010.

109 Estimates suggest that in 11 years (between 2003 up to the end of August 2014) more than ZAR 1 billion (roughly \$90 million) has been collected in public revenues, and about ZAR 5 billion (roughly \$400 million) was charged by retailers to consumers.



Reusable carrier bags being sold at Wakulima Market in Nakuru County on 27 August 2017, the day before the ban on plastic bags entered into force.

Photo Credit: Ayub Muiyuro; Nation Media Group

"We cut fresh cabbages into small pieces and before the ban, we used to pack them in transparent plastic bags. Now we cannot cut them because there is nowhere to put the vegetables. If we do they will go bad or get dirty, unless the customers bring their own containers."

"I also sell boiled beans and other githeri, but I might have to quit that business as well [as there are no cheap packaging alternatives]."

Emma Wangari, a 36-year-old vegetable seller in Kangemi market.

### 4.2.3 Kenya: Punitive total ban

#### Severe plastic bag ban

##### Context

Prior to 2017, about 100 million plastic bags were used in Kenya every year in supermarkets alone, impacting the environment, human health and wildlife especially in areas where waste management systems are inadequate.<sup>110</sup> In Western Kenya, veterinarians claimed that in their lifetime cows ingest an average of 2.5 plastic bags, among other plastics.<sup>111</sup>

##### The ban

In February 2017, the Government of Kenya announced a ban on the production, sale, importation and use of plastic carrier bags, which came into full effect after six months (in August 2017). Under the new law, representing the third attempt in the past decade, offenders can face fines of up to \$38,000 or four-year jail terms, making Kenya's plastic bag ban the most severe in the world.<sup>112</sup> Before the law entered into force, UN Environment supported the organization of a stakeholder dialogue where national and local-level officials could engage with private sector representatives to exchange views on how best to implement the regulation.<sup>113 114</sup>

##### Impact

Large supermarket chains are selling reusable cloth bags,<sup>115</sup> as the government<sup>116</sup> encourages retailers to offer consumers alternatives to plastic bags.<sup>117</sup> Kenyans are slowly adjusting to life without plastic bags but there is not yet a clear account of the impact of the ban. The government is now starting an analysis to measure the overall act of the ban.<sup>118</sup> On one hand local 'green' businesses see this as an opportunity for new innovative solutions to succeed and prosper, on the

<sup>110</sup> UNEP Newscentre, 2017a.

<sup>111</sup> UNEP Stories, 2017b.

<sup>112</sup> BBC, 2017.

<sup>113</sup> UNEP Stories, 2017b.

<sup>114</sup> <http://www.theeastfrican.co.ke/business/Kenya-effects-ban-on-plastic-bags-/2560-4086512-10oy0x4/index.html>

<sup>115</sup> Kenya brings toughest bag ban, 2017.

<sup>116</sup> In particular the agency responsible for the enforcement of the ban, Kenya's National Environmental Management Authority (NEMA).

<sup>117</sup> Kuo, 2017.

<sup>118</sup> <https://amp.theguardian.com.cdn.ampproject.org/c/s/amp.theguardian.com/world/2018/apr/25/nairobi-clean-up-highs-lows-kenyas-plastic-bag-ban>

other hand, during this transition period - where there is lack of affordable eco-friendly alternatives - hygiene and food loss concerns are being raised by small-scale vendors (selling for instance pre-cooked foods, fruits and vegetables in markets).<sup>119</sup>

## 4.3

## Asia

### 4.3.1 China: National and provincial policies

#### Regulations at the national and local level

##### National plastic tableware ban

In 1999 the Chinese government banned the production and use of all single-use plastic tableware, but the ban was never effectively enforced and it was officially lifted in 2013.<sup>120</sup>

##### Plastic bags context

Plastic litter in China has become known as "white pollution". Prior to 2008 about 3 billion plastic bags were used in China every day, creating more than 3 million tons of garbage each year.<sup>121</sup>

##### The national ban and levy

To curb the production and consumption of plastic bags, in 2008 the Government of China introduced a ban on bags thinner than 25 microns and a levy on thicker ones, promoting the use of durable cloth bags and shopping baskets. Exemptions were allowed for bags used in the handling of fresh food such as raw meat and noodles for hygiene reasons.<sup>122</sup>

##### Impact

One year after the introduction of the legislation, the distribution of plastic bags in supermarkets fell on

<sup>119</sup> [https://www.the-star.co.ke/news/2018/03/14/plastic-bag-makers-mama-mboga-and-harassed-kenyans-rue-ban\\_c1728261](https://www.the-star.co.ke/news/2018/03/14/plastic-bag-makers-mama-mboga-and-harassed-kenyans-rue-ban_c1728261)

<sup>120</sup> China File, 2013.

<sup>121</sup> Block, 2013.

<sup>122</sup> Xanthos and Walker, 2017.



Photo Credit: Pete Jelliffe/Flickr.com

average by 70%,<sup>123</sup> avoiding the use of 40 billion bags.<sup>124,125</sup> Within seven years, the number of plastic bags used by supermarkets and shopping malls shrank by two-thirds, with 1.4 million tons of bags avoided.<sup>126</sup> However, plastic bags do remain common, especially in rural areas and farmers' markets, due to weak enforcement.<sup>127</sup>

China has recently (January 2018) introduced a ban on the import of plastic scraps (see Box 1). The impact of the ban on the global plastic recycling industry has not yet been estimated.

#### **Provincial level ban boosting bio-alternatives**

In addition to the national policies, initiatives in China have been taken also at the provincial level. Jilin Province in Northeast China is the nation's largest producer of corn and corn derivatives (also generating large amounts of bio-waste). To transform the bio-waste into a resource and boost the bioplastic sector, Jilin Province introduced in 2015 a ban on single-use non-biodegradable plastic bags and tableware, promoting the production and use of a corn-based biodegradable plastic.<sup>128,129</sup>

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<sup>123</sup> Government sources reported a drop in the consumption of plastic bags in the first year of the ban of between 60 and 80%. Other sources suggest that there was a big variation on the impact depending on the area. For instance, the consumption of plastic bags in supermarkets dropped by 90% in Beijing and almost 50% in Guangzhou City in less than a year.

<sup>124</sup> Block, 2013.

<sup>125</sup> Liu, 2008.

<sup>126</sup> You, 2013. Also, data released in 2016 by the National Development and Reform Commission, China's economic planning agency.

<sup>127</sup> Zhu, 2011.

<sup>128</sup> Sun, 2015.

<sup>129</sup> Polylactic acid resin.



Photo Credit: UK Department for International Development/Flickr.com

### 4.3.2 Bangladesh: Social pressure and disaster management

#### Environmental impacts of plastic bag litter

##### Context

In the early 1990s, environmental NGOs and the Ministry of the Environment of Bangladesh started supporting campaigns against single-use plastic bags. Initially limited to Dhaka, the capital city, the initiatives rapidly spread throughout the country due to the large positive response received from the public. Environmental groups estimated that in 2002, more than nine million plastic bags were wasted daily in the capital city of Dhaka. Of this, about 10% reached landfills and dumpsites, while the remaining was improperly discarded in the environment.<sup>130</sup>

##### The ban

In 2002, after plastic bags were found responsible for exacerbating the deadly flooding of 1989 and blocking drainage systems in 1998, the government introduced a ban on all shopping bags made of polyethylene (PE).

After the implementation of the ban, the government promoted a campaign informing citizens that offenders could face fines of up to \$71 and six months in jail.

##### What didn't work so well

Despite public support, the ban was not strictly enforced and plastic bags are still widely used in Bangladesh, especially in food markets. Activists found that the lack of cheap alternatives largely contributed to the failure of the policy.<sup>131</sup>

130 IRIN, 2011.

131 Ibid.



Photographs: Afroz Shah

### 4.3.3 India: Public engagement

#### Public action as driver of change

##### Context

High plastic consumption rates and improper waste handling has increased the amount of environmental pollution in India, with plastic litter becoming an eyesore in many places.

Versova is a flat sandy Mumbai beach with thick mangroves. It used to be an ignored strip of ocean near slums, used mostly as dumping ground. In October 2015 Afroz Shah, a young Indian lawyer and environmentalist from Mumbai, frustrated with the rotting waste on Versova beach, decided to act. Afroz Shah and his then 84-year-old neighbour started cleaning up the beach themselves.

##### Impact of mobilizing the public

Since October 2015, Afroz Shah has inspired thousands of volunteers to join what he calls weekend "dates with the ocean". Shah started mobilizing residents by knocking on doors and explaining the damages caused by marine litter.

Over two years, using their hands, tractors and diggers, the volunteers have removed 13,000 tons of waste, mostly plastics. This year, for the first time in over two decades, the nesting and hatching of Olive Ridley turtles, a vulnerable turtle species, has taken place on Versova beach.

##### Main issues

However great the success of the weekly beach clean-ups, there is still much more to do before the plastic pollution problem on Versova beach can be considered resolved. A study found that the largest source of pollution comes from the garbage that residents dump into nine creeks in Mumbai's northwest suburbs, which washes ashore and flows into the sea. This is aggravated by storm water drains that are open along the coastline and carry even larger amounts of garbage during the monsoon season.

## Lessons learned

Beach clean-ups can be a powerful tool to achieve positive environmental impacts and community engagement. To sustain the good results achieved through the clean-ups, it is key to identify the main sources of pollution and take action to resolve the issue at source. In most cases this links back to establishing improved waste management systems and to education and awareness raising among local communities.<sup>132</sup>

	4.4	<b>America</b>
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Photo Credit: jsnsndr/Flickr.com

### 4.4.1 New York City: Styrofoam ban

#### Perseverance in the fight against Styrofoam products

##### The ban

In 2015, single-use Styrofoam containers (EPS foam) were banned in New York City. Shortly after the ban was instituted, the city was sued by a coalition of recycling firms and plastic manufacturers, who claimed that Styrofoam is recyclable and proposed a recycling plan for the foamed plastic items.<sup>133</sup> The ban was overturned, that same year, by a ruling of the New York Supreme Court. The ban was reinstated in 2017, following a report by the New York City Department of Sanitation which found that it is not possible to recycle Styrofoam in a manner that is economically feasible or environmentally effective.<sup>134</sup> The ban applies to all stores that sell or offer polystyrene packaging, and was re-instated with a six-month time window for retailers and customers to adapt to the new legislation.

<sup>132</sup> In addition to citizens' actions, the Indian government in 2016 banned non-compostable plastic bags below 50 microns under its Plastic Waste Management Rules. Several states and cities have also passed local regulations, ranging from stricter regulations to total bans.

<sup>133</sup> Babin, 2017.

<sup>134</sup> New York City, Department of Sanitation, 2017.



Photo Credit: gracelinks/Flickr.com

#### 4.4.2 Costa Rica: Total single-use plastic ban

##### First to pledge phasing out all single-use plastics

###### Context

Costa Rica has emerged as an environmental leader in many ways. It was successful in doubling its forest cover from 26% in 1984 to more than 52% in 2017 and plans to be carbon neutral by 2021.<sup>135</sup> **Government officials pointed out that despite the various successes, “one fifth of the solid waste produced daily is not collected and ends up in the Costa Rican landscape, polluting rivers and beaches.”**<sup>136</sup> Costa Rica now aims to become the first country in the world to ban all single-use plastics by 2021.

###### The ban

On 5 June 2017, World Environment Day, the government announced a National Strategy to phase out all forms of single-use plastics by 2021 and replace them with alternatives that biodegrade within six months. The ban aims at eliminating not only plastic bags and bottles, but also other items such as plastic cutlery, straws, Styrofoam containers and coffee stirrers. The Strategy promotes the substitution of single-use plastic through five actions: (i) municipal incentives, (ii) policies and institutional guidelines for suppliers, (iii) replacement of single-use plastic products, (iv) research and development, and (v) investment in strategic initiatives. In implementing this project, the government is supported by the United Nations Development Programme (UNDP), local governments, civil society and private sector groups.<sup>137</sup>

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135 UNDP, 2017.

136 Chow, 2017a.

137 UNDP, 2017.



Photo Credit: Garrett Coakley/Flickr.com

#### 4.4.3 The Caribbean region

##### Regulation in the Caribbean SIDS and countries with islands

###### Caribbean context

Due to their limited size and increasing consumption of resources, the Caribbean Small Island Developing States (SIDS) face serious challenges in managing solid waste and plastic litter. Policies have been introduced in many Caribbean SIDS to encourage more sustainable consumption patterns, and an effort to develop a regional approach to waste management is currently ongoing and supported by UN Environment and the Dutch Government.

###### Antigua and Barbuda

In January 2016, Antigua and Barbuda prohibited the importation, manufacturing and trading of plastic shopping bags. In July of the same year, the distribution of such bags at points of sale was banned, leaving enough time for retailers to finish their stocks. Since plastic bags sold in large retailers accounted for 90% of the plastic litter in the environment, the ban was first implemented in major supermarkets, and later extended to smaller shops.

###### What worked well

Key elements for the success of the policy include four rounds of **stakeholder consultations** to ensure engagement and acceptance of the policy. Stakeholders engaged include major retailers, the National Solid Waste Management Authority, the Ministry of Trade and the Department of Environment. After approval by the Cabinet, it was decided that the ban would be **incorporated in the existing legislation**, as this was more expedient than instituting a new law.<sup>138</sup>

An **awareness-raising campaign** titled "I'm making a difference one bag at a time" included frequent television short clips by the Minister of Health and the Environment providing information on the progress of the ban and feedback from stakeholders. A **jingle** was produced to promote the use of durable bags

<sup>138</sup> Presentation at Waste Management: High Level Forum 19-20 October 2017, Georgetown, Guyana.

for a cleaner and healthier environment. Moreover, shoppers were provided with **reusable bags** outside supermarkets, and seamstresses and tailors were taught how to manufacture such bags so as to meet increasing demand. Major supermarkets were also required to offer paper bags from recycled material, in addition to reusable ones.<sup>139</sup> To encourage the manufacturing and use of alternatives to plastic bags, the legislation includes a list of materials that will remain **tax free**, such as sugar cane, bamboo, paper, and potato starch.<sup>140</sup>

### Impact

In the first year, the ban contributed to a 15.1% decrease in the amount of plastic discarded in landfills in Antigua and Barbuda, and paved the way for additional policies targeting the reduction of plastics. For instance, the importation of plastic food service containers and cups was prohibited in July 2017. As of January 2018, single-use plastic utensils were banned, as well as food trays and egg cartons. At a later stage, Styrofoam coolers are also expected to be outlawed.

### Aruba

A ban on single-use plastic bags was proposed in **Aruba** in 2005. The legislation was not considered by Parliament until 2016, and the ban entered into force on 1 January 2017. Retailers were initially reluctant as switching to alternatives meant higher costs for their businesses, especially for clothing stores and take-out restaurants. To overcome this resistance, meetings were held with the Aruba Trade & Industry Association, with the Aruba Hotel and Tourism Association, and with the Aruba Tourism Authority. Furthermore, workshops were organized at local schools on the importance of protecting Aruba's environment, as the island economy depends primarily on tourism. Thanks to the stakeholder consultations and education programme, the new ban gained wide acceptance and endorsement by the community. Since the introduction of the ban, citizens have even started to report grocery stores that might be providing the outlawed plastic bags by posting pictures on social media.<sup>141</sup>

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<sup>139</sup> Presentation at Waste Management: High Level Forum 19-20 October 2017, Georgetown, Guyana.

<sup>140</sup> Ibid.

<sup>141</sup> Michael J.R. Raymond, personal communication, December 2017.

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"Trees and mangroves are now free from plastic bags. Moreover, grocery stores get rid of empty boxes easily, because customers reuse them to carry out their groceries."

- Michael Raymond, Aruba (2017)

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### Bay Islands - Honduras

In 2016, a ban on plastic bags was instituted at the municipal level on the three main islands of Roatán, Utila and Guanaja, resulting in substantial declines in the amount of plastic litter in the environment. The ban was announced one year before its implementation and accompanied by well-designed outreach and notification activities.<sup>142</sup> Through a door-to-door awareness raising campaign, each household was provided with two reusable bags made of canvas and leaflets explaining the reasons for the ban. Events to sensitize the community to the problem of plastic litter were organized in the local schools. As a result, the initiative gained strong support from retailers and citizens.<sup>143</sup> Bans on other problematic single-use plastic items, such as Styrofoam, are being discussed.

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<sup>142</sup> The Summit Foundation, 2017.

<sup>143</sup> Spurgeon Miller Molina, Mayor of Guanaja, personal communication, July 2017.





## Conclusions



**L**arge amounts of single-use plastics are improperly discarded in dumpsites, in the environment, or burned out of necessity as cooking fuel, especially in countries with inadequate waste management systems and limited public awareness. Only a small percentage is disposed of properly in sanitary landfills, and an even smaller portion is recycled.

From the case studies it is evident that the presence and impacts of mismanaged single-use plastics are not solely characteristic of developing countries. To date for instance, the so called "knot plastic bags" used for fresh food handling (such as raw meat, fruits and vegetables, and fresh produce) are still the most practical and hygienic option available cross-borders, and there is no expectation of their imminent phase-out.

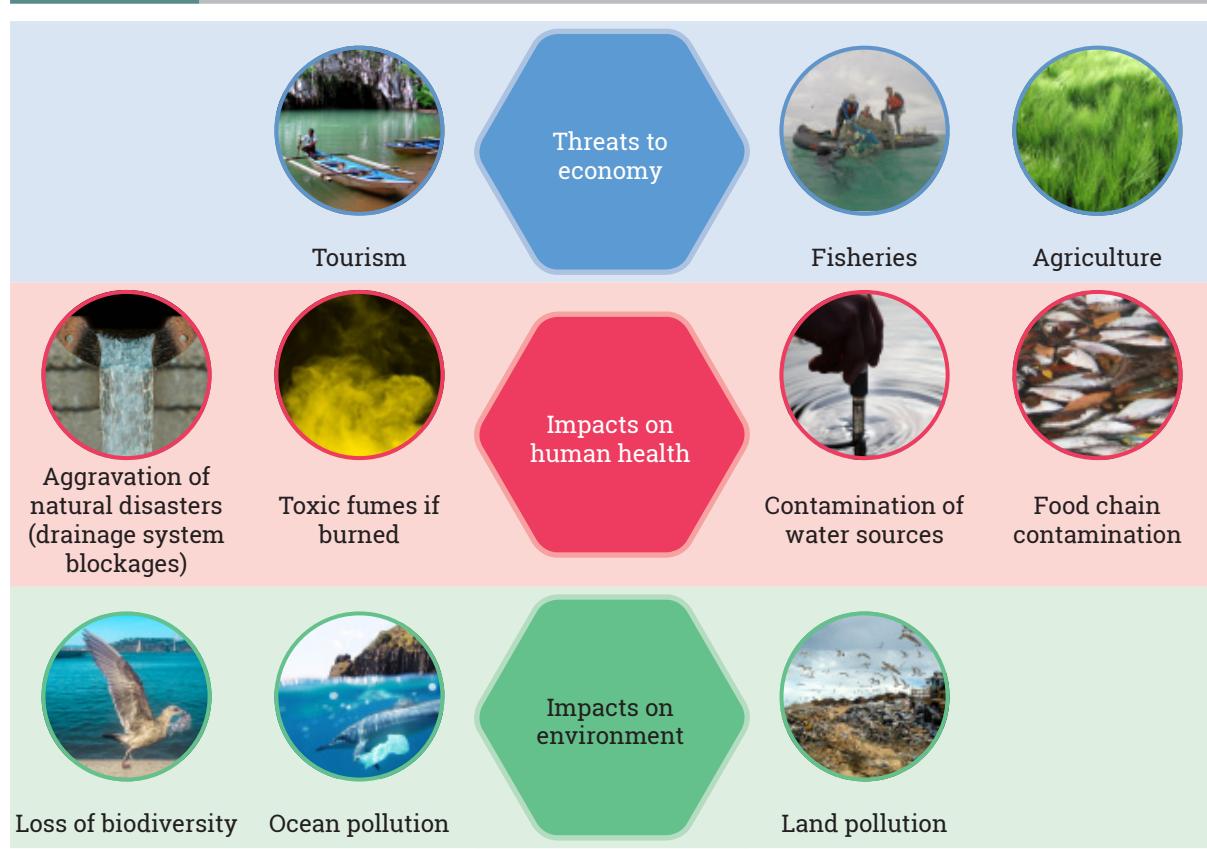
#### Box 7. Food for thought

##### **Reusable bags will not abolish the need for conventional plastic bags for household waste and unexpected purchases**

Conventional plastic bags, although designed to be single-use, can be multi-purpose and used as carry bags but also for instance, to manage household waste or pet waste. In Canada for instance, like in several countries around the world, many people reuse the conventional plastic bags beyond the one time that they serve to transport groceries home from the supermarket.

*The Grocery Bag Controversy, Silverhill Institute for Environmental Research and Conservation, July 2011.*

**Figure 5.1. Examples of impacts of mismanaged single-use plastics**



**Transitioning to more eco-friendly alternatives can be a lengthy process. In the meantime, strengthening circular thinking and waste management systems can successfully help in reducing plastics pollution.**

## 5.1 Bans and levies

To date, regulations on plastic bags and Styrofoam products have been introduced at the national level in more than 60 countries, and more will follow.

Of the bans and levies analysed in this paper which have entered into force (over 140 regulations at the national and local levels), there is not yet sufficient information to draw robust conclusions on the environmental impacts achieved by levies and bans on plastic bags. In 50% of cases, there is no information on impact: partially this is due to lack of monitoring and reporting systems, and partially, it is due to the fact that many of the measures analysed have been implemented only recently, and therefore they are too recent to have robust data on achieved impacts.

**Figure 5.2. Impact of national bans and levies on plastic bag usage (based on more than 60 countries experience)**



*Source: Data independently collected by authors*

Roughly 30% of cases have registered dramatic drops in plastic pollution and the consumption of plastic bags within one year from the entry into force of the national ban or levy, while the remaining 20% have reported no to little impact.

Of the countries that have introduced national bans on plastic bags and have reported no to little impact, the main issues seem to be (i) lack of enforcement and (ii) lack of affordable alternatives. The latter has led to cases of smuggling (development of black markets for plastic bags) or to shifts towards the use of thicker plastic bags (which is not regulated), a transition that has in some instances worsened environmental concerns.

Strategies to minimize the use of and phase-out single-use plastics, other than bags and Styrofoam, have recently started to be considered in several countries.

**Bans** on single-use plastics can be a step towards more comprehensive policies aiming at reducing the generation of plastic waste and at replacing single-use plastics with more sustainable, environmentally-friendly alternatives. For instance, the plastic bag ban in Antigua and Barbuda has led to the introduction of further measures to forbid the import of food plastic containers and the use of plastic utensils. Bans on single-use plastics are considered by small and medium 'green' businesses as opportunities to prosper by marketing innovative, environmentally sound alternatives.

## 5.2 Other possible actions

Instead of, or in addition to the above-mentioned policy instruments, other actions that could be pursued to reduce the amount of single-use plastic waste include technological, social and waste management system responses.

**Public-private partnerships** and **voluntary agreements** can for instance be valid alternatives to bans and can achieve reductions in the consumption of single-use plastics, like in the case of Austria. The progressive introduction of **voluntary reduction strategies** can be a great way to successfully allow enough time for the population to begin changing consumption patterns and for affordable and eco-friendly alternatives to become available in the market. **Social pressure** can trigger changes among both policymakers and manufacturers and eventually help to reduce plastic pollution.

**Public awareness** is a common denominator for the success of any of the above-mentioned initiatives aiming at having a broader social impact (whether dictated by law or engaged in voluntary). Similarly, awareness raising, monitoring and continued communication of progress to the public will help to build confidence and strengthen commitment to the cause.

### 5.3 Roadmap for policymakers

This section presents a **10-step roadmap** to guide governments that decide to opt for a policy approach (the introduction of a ban or levy). The roadmap draws upon the experiences, both positive and negative, of over 60 countries that have already implemented bans and levies on single-use plastics (primarily plastic bags and Styrofoam) and for which details are overviewed in chapters 3 and 4 of this report.

#### 1. Assess baseline conditions

An assessment of the baseline conditions can help to gain a clear understanding of the issue to be corrected. Policymakers may wish to assess:

- ▶ what are the **most problematic single-use plastics** that require government action. A baseline study could for instance provide evidence that the single-use plastic most prevalent in the environment in a certain country is PET bottles (rather than plastic bags, cigarette butts, etc.).
- ▶ what is the **extent** of the problem;
- ▶ what are the **impacts** that the mismanaged single-use plastics are imparting on human health and wildlife, the environment, and the economy; and
- ▶ what is currently **causing the problem** (what is the source of pollution – citizen negligence, poor collection systems, improper disposal sites, etc.).

Estimating the **consumers' willingness to pay** for a certain good or service, can provide a powerful tool as part of the baseline assessment process to ensure that the instrument chosen will eventually be dissuasive and influence consumer behaviour. In the case of a levy, for instance, it would be important to set a tax that is high enough to discourage consumers from asking for plastic bags. For example, one of the success measures the Irish government adopted before the imposition of the plastic bag tax was to commission a survey to estimate the amount that citizens were willing to pay for a plastic bag. They then set the levy at a value more than six times higher,<sup>144</sup> effectively influencing consumers' behaviour.

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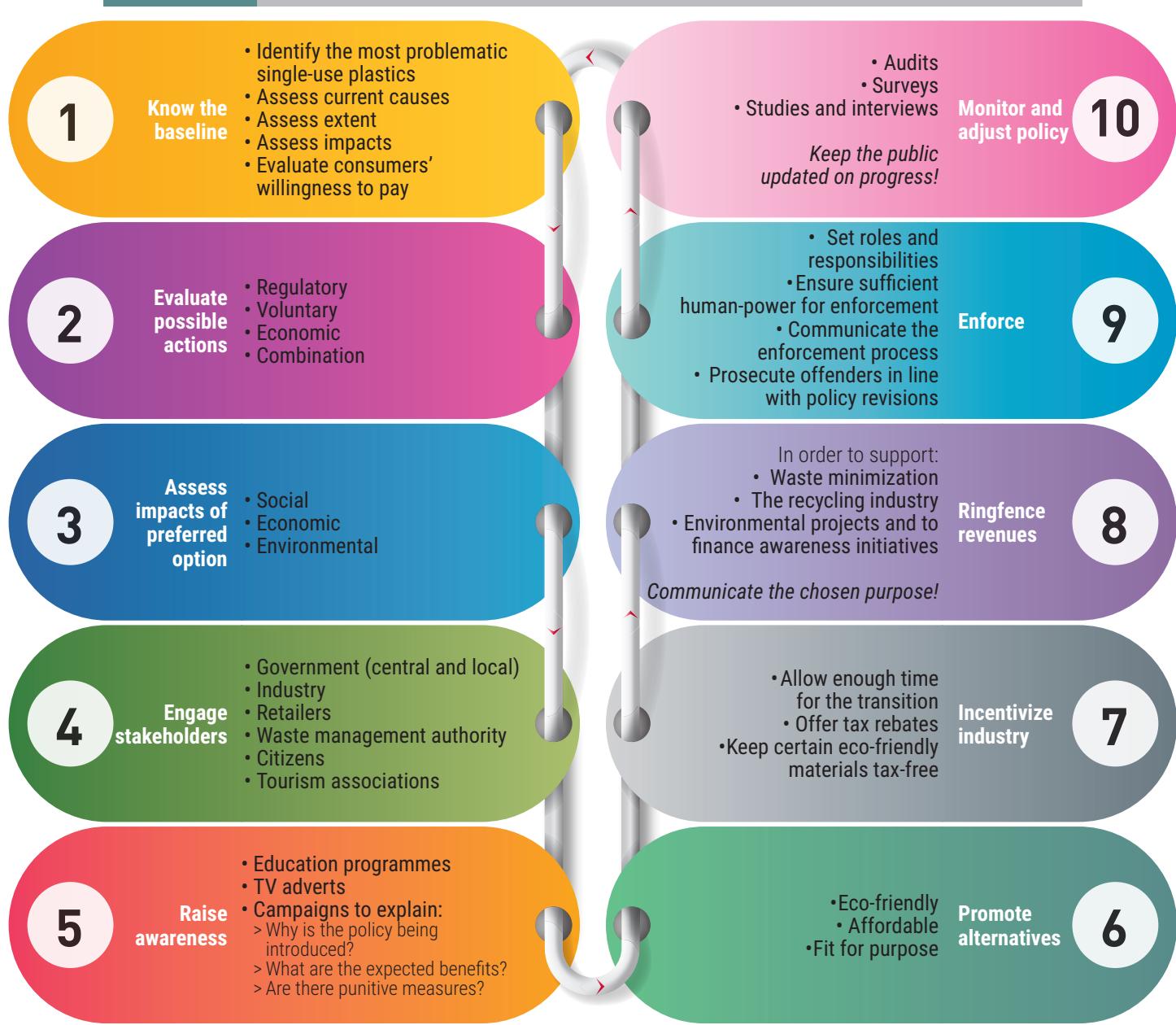
#### 2. Evaluate the appropriateness of possible actions

Based on the findings of the baseline study, it will be important to evaluate what are the most appropriate instruments that will be beneficial in addressing the specific problem or need that has been identified.

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<sup>144</sup> Convery, McDonnell, and Ferreira, 2007.

**Figure 5.3.** Roadmap for policymakers: 10 steps to consider when introducing bans or levies on single-use plastics



Among the elements to be analysed, of upmost importance are the **institutional capacity** and the existing **economic conditions** to ensure that the instrument(s) being considered are realistic and have high chances of being successfully implemented.

Institutional capacity: as demonstrated by the success of the Irish levy, institutional capacity and political influence of the

entity (ministry) championing the policy is essential to ensure broad support and enforcement.

Economic conditions: Instruments such as levies require the existence of effective legal and fiscal systems. If for instance these are not in place, governments may wish to consider other types of action, rather than the introduction of levies.

Table 2. Example of instruments to minimize single-use plastic waste

Type of instruments to reduce single-use plastic waste	Overview of Method	Example of applications	Positive impacts
Voluntary reduction strategies	Public -private partnerships	It builds on the understanding that for change to be long-lasting, it needs to be voluntary and based on choice	Promotion of reusable alternatives to single-use plastics (e.g. promotion of reusable bags, reusable bottles, etc.)  Allows time for population to change consumption patterns, which can trigger changes among manufacturers Allows time for affordable and eco-friendly alternatives to enter the market
		The agreement sets the overarching goal, but leaves the choice to the private sector on how to achieve the results	Voluntary agreements between government and retailers (e.g. to encourage retail to voluntarily ban or phase out single-use plastic bags)  Agreements with producers (e.g. to voluntarily establish Extended Producer Responsibility, including deposit return schemes)  Valid alternative to bans Achieves reductions in single-use plastic consumptions Stimulates businesses
Public education		It requires a gradual and transformational process, key to change consumers' behaviour	Introduction of environmental conservation principles in school curriculums  Social campaigns  Common denominator for the success of any initiative
		Bans the use, sale, etc. of certain single-use plastic items	Ban (total or partial)  Relatively simple to introduce Can reduce amount of single-use plastic consumed Can be a step towards more comprehensive policies
Policy instruments	Regulatory	Laws and acts mandating that packaging manufacturers bear some responsibility in recovering packaging waste	Extended Producer Responsibility  Reduces amount of packaging lingering in the environment Fosters business responsibility Stimulates recycling sector
		Levies or taxes on certain items	Levy on suppliers  Levy on retailers  Levy on consumers  Dissuasive effect, leading to behavioural change Generates (short-term) income
	Economic	Combination of regulatory and economic	Ban and levy  Extended Producer Responsibility  A combination of the above

At this stage, government has the opportunity to assess the best **process** to follow **for the introduction** of the preferred instrument(s), and estimate the time and resources needed. For instance, if one of the instruments considered were regulatory, perhaps the inclusion of provisions in an existing law or act might be sufficient and more time and resource efficient than opting for the enactment of a new law.

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### 3. Assess sustainable development impacts of preferred options

Once appropriateness of possible actions has been assessed, governments may be left with a short list of possible suitable instruments. Before selecting the most appropriate option that would address the issues and needs identified in the baseline assessment, a key step is to **study the sustainable development impacts** of the short-listed choices, taking into consideration all sectors (including food, clothing, etc.) and all segments of the population. For instance, it might be the case that in a certain country, although the foreseen environmental benefits of introducing a ban might be highly positive, the social impacts on a large part of the population might be unsustainable, making bans not the most desirable option. Assessing the social, economic and environmental impacts of a policy will also help **identify its boundaries and scope** (for instance providing guidance on the need to exclude from the ban knot bags for fresh meat and vegetables).

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### 4. Foster stakeholder engagement

Acceptance from the broadest range of stakeholders is of utmost importance, and can be ensured through calls for early inputs, policy discussion meetings, and wide-reaching awareness campaigns.

Special attention should be paid to **mapping the main stakeholder groups** that will be affected by the new policy and their relative power. Opposition from industry can be expected, especially in the case of regulatory instruments. Being able to present evidence-based options (informed by a thorough baseline study) can help support the policy chosen and ensure successful results. In the case of the ban on Styrofoam products in New York City, for instance, the ban was lifted shortly after its introduction as a result of protests from the plastic industry, but it was eventually restored after two years, when the government could prove that the claims of the industry were unfounded (see case study 4.4.1.).

The most common stakeholder groups that might be engaged from the onset include:

- ▶ National and local government entities
- ▶ National waste management authorities
- ▶ Local waste management officers
- ▶ Trade and industry associations
- ▶ Single-use plastic producers
- ▶ Retailers
- ▶ Individual citizens and organized civil society groups
- ▶ Environmental NGOs

Depending on the specificity of the country, local conditions and priorities, it might be possible to identify additional groups of stakeholders. For instance, gaining the support of tourism associations in SIDS could play an essential role in reducing single-use plastic waste. A good example of citizens' engagement is provided by the Government of Queensland (Australia), which invited the

public to complete an online survey and submit written feedback on how the plastic bag ban should be implemented.<sup>145</sup>

## 5. Raise awareness

Evidence shows that resistance is likely to decrease if consumers are aware of the social, environmental and economic impacts of mismanaged single-use plastics. These can be communicated through a variety of methods, ranging from:

- ▶ Educational programmes
- ▶ Workshops in schools
- ▶ Extensive multi-media awareness-raising campaigns (TV, radio, newspapers, social media).
- ▶ Door-to-door campaigns (this type of awareness raising has proven particularly successful in small towns, communities and islands).
- ▶ Development and distribution of information material.
- ▶ Showcasing and/or distributing alternative options to single-use plastics (reusable bags, reusable bottles, etc.).

Each campaign should have a **clear and simple message**, relevant for a **wide range of stakeholders**. The messaging should clarify why a certain instrument has been chosen and what will be the benefits for the population. For instance, if a levy is to be introduced, it would be important for the public to fully understand the link between the fee that will have to be paid and the environmental benefits that will derive. The public should also be made aware of eventual punitive measures included in the law.

**Finally, consumers should be aware that the easiest way to minimize the environmental impact of carrier bags is to reuse them as many times as possible<sup>146</sup> and, at the end of life, dispose of them soundly.**

Nationwide campaigns seem to be less effective than **locally targeted campaigns**. In the case of bans or levies, awareness-raising activities, adapted to the local context, should **be launched before the imposition of the instrument** and persist after the introduction, to facilitate acceptance of the policy over the long term. At the time the ban was imposed in Antigua and Barbuda, a wide-reaching awareness-raising campaign was organized. A jingle promoting the usage of reusable bags was produced and used in different media, creating buy-in from the public.<sup>147</sup>

## 6. Support uptake of eco-friendly alternatives

Before banning plastic bags (or any single-use plastic), governments may wish to verify the presence of valid alternatives. Especially in developing countries, if cheap and resistant alternatives to plastic bags are lacking, the ban may end up negatively impacting the poorest segments of the population.

Eco-friendly and fit-for purpose alternatives should provide the same or better properties of the items that are to be regulated. For instance, the materials used for fresh food packaging are often scientifically tested and chosen to provide high quality barrier protection to keep the food fresh. If the available replacement doesn't provide the same benefits, a policy to reduce overpackaging of fresh food could lead to unintended impacts such as greater food losses and waste.

145 Australia, Department of Environment and Heritage Protection, 2016.

146 United Kingdom, Environment Agency, 2011.

147 Presentation at Waste Management: High Level Forum 19-20 October 2017, Georgetown, Guyana.

The uptake of affordable, eco-friendly and fit-for-purpose alternatives and recycling technologies can be facilitated through the introduction of **economic incentives** (including tax rebates, research and development funds, technology incubation support and public-private partnerships). For instance, Antigua and Barbuda have legislated, as part of the plastic bag ban, that certain materials used to manufacture alternatives are to be kept tax-free, including sugar cane, bamboo, paper, and potato starch. In addition to this, reusable bags were distributed for free at the entrance of major supermarkets. Support to projects that **upscale** or **recycle** single-use items can be a way to transform potential wastes into a resource. To stimulate the creation of micro-enterprises, **trainings** could be organized to teach new skill-sets related to the promotion of alternatives (for instance training could be organized for seamstress and tailors on how to produce durable reusable bags using eco-friendly or used materials).

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### It is not waste until it is wasted

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When promoting the use of alternatives, governments may wish to consider their environmental and life cycle impacts, which in most cases are determined primarily in the production stage (see for instance "Box 2.3: Biodegradable plastic: The unintended consequences" and "Box 3.1: The controversy over reusable bags").

A common alternative, generally proposed to swiftly replace single-use plastic bags, is paper bags. Note should be taken that it is still controversial if paper bags should be considered an affordable and eco-friendly alternative to plastic. Although paper bags

degrade much quicker in the environment, they require more energy to be produced, are more expensive and once discarded take more space in collection trucks and landfills.

**Communication materials** can be distributed to inform citizens about available alternatives. On the island of Guanaja (Honduras), each household was provided with information through a door-to-door campaign and in addition, each household was given two canvas reusable bags.

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## 7. Provide incentives to industry

When wanting to regulate the production and consumption of single-use plastics, governments are likely to face resistance from the plastic industry as well as from packaging importers and distributors. To limit resistance and gain as much support as possible, governments may wish to consider providing incentives to industry. It may be beneficial to introduce the incentives long before the new legislation is put into effect in order to guarantee enough time for plastic manufacturers, distributors and retailers to adapt to the new stipulations. Such measures might include:

- ▶ Provisions to allow **time** to adapt to the transition (for instance provide enough time for retailers to deplete existing plastic bags stocks, begin alerting consumers of the upcoming change and purchase new alternatives).
- ▶ Tax rebates and **financial incentives** to stimulate production of cost-effective alternatives to plastic bags (for instance make provisions to keep tax free the importation of certain materials/products that are to be used to manufacture eco-friendly and fit-for-purpose alternatives, as noted in the Antigua and Barbuda case study).

## 8. Ringfence revenues

When introducing a levy on single-use plastic products, consideration should be given to how revenues from that economic instrument will be used. To maximize public benefits, the revenues from the levy could be ringfenced and reinvested to:

- ▶ Support specific **environmental projects**
- ▶ Boost the local **recycling industry** (end-use markets)
- ▶ Create **job opportunities** in the plastic recycling industry (through seed funding)
- ▶ Finance **awareness** initiatives which promote for instance waste minimization

Given that the main objective of the levy is to be dissuasive, it is important that the levy's revenues are ringfenced for activities that are time-bound. For instance, if the levy is successful, people will be dissuaded from continuing to use single-use plastic bags, and revenues should be expected to gradually decrease and eventually stop.

To ensure a transparent process and maximize public support, it is important to widely communicate the chosen purpose for which the revenues will be utilized. It has been reported that in South Africa, consumers' acceptance of the plastic bag levy decreased partly due to the unclear administration of the revenues and poor results in terms of recycling and green jobs creation.<sup>148</sup>

## 9. Enforce the policy

To guarantee good governance, enforcement and monitoring of the policy it is important to clearly distribute and define **roles and responsibilities** between local, national and sub-national authorities and organizations. The Ireland case study serves as a good reference example. As part of the policy development, it would be advisable to consider measures that ensure that the necessary **skills and human resources** (and therefore budget) will be in place before the policy enters into force.

It is key to ensure that the **process for enforcement** is made clear to the users that will be impacted by the policy. For instance, in the case of a levy on retailers, it should be made clear to the retailers how and when the levy should be collected or deposited. In the case of a levy on consumers, the public should be made aware of the amount they are expected to pay.

When the law includes punitive measures, **prosecution of offenders** will help ensure compliance to the policy (carrot and stick approach).

<sup>148</sup> Nahmann, 2010.

## 10. Carry out monitoring and adjustment

As conditions change over time, it is important to monitor the **progress** and **effectiveness** of the policy introduced and adjust the policy accordingly. It is important for governments to keep the public updated on the progress and benefits achieved, to continue building consensus and demonstrate accountability. Progress could be monitored in several ways, including through audits, surveys, impact assessments and focus-group interviews. It would be advisable to review the policy instruments on a regular basis (for instance with a yearly frequency for the first three to five years, and afterwards every five years or as deemed necessary).

In Ireland, thanks to a regulatory impact assessment the government learned that the consumption of plastic bags increased a few years after the levy was introduced as people became used to it. As a result, the levy was revised upward.<sup>149</sup> In the Northern Territory of Australia, five years after a ban

on thin plastic bags (below 35 microns) was introduced, a survey revealed that plastic litter increased, as people had begun paying for thicker bags but continued to treat them as single-use items.<sup>150</sup>

In the case of **total bans**, law enforcement and monitoring of compliance are critical to ensure that the prohibited items are not illegally produced or imported from neighbouring countries.

To gather data on **effectiveness**, governments may consider including in the legislation a reporting obligation (providing a standard template to allow for comparability across years) to estimate the reduction in consumption. Once progress and effectiveness have been estimated, these would inform and form part of the new baseline scenario. The steps presented in the road map for policymakers could then be reviewed and refreshed to ensure that the measures in place continue to be the most effective and appropriate for the country or local context.

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<sup>149</sup> O'Neill, 2016.

<sup>150</sup> Rigby, Steer, and O'Toole, 2017.

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