

Compilation of information, best practices and lessons learned on measures taken by key stakeholders to prevent and reduce single use plastic waste and packaging waste

JANUARY 2023



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This compilation has been approved by the working group of the Plastic Waste Partnership of the Basel Convention. It is intended to assist Parties to the Basel Convention, authorities, stakeholders, and the public in the environmentally sound management of plastic wastes. It does not necessarily represent the viewpoints of the working group members on all the details of its content. This compilation should not be understood as derogating from the text of the Basel Convention or any decision(s) adopted by the Conference of the Parties and is without prejudice to the views of individual Parties. The information presented therein is current at the time of writing. The working group reserves the right to revise this content at any given time.

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Launched in November 2019, the Basel Convention Plastic Waste Partnership was established with the goal to improve and promote the environmentally sound management of plastic waste at the global, regional and national levels and prevent and minimize their generation so as to, among other things, reduce significantly and in the long-term eliminate the discharge of plastic waste and microplastics into the environment, in particular the marine environment.

Organised into a working group and four project groups addressing different thematic issues, the Partnership supports the achievement of the Sustainable Development Goals and sharing of solutions to tackle the triple planetary crisis as a trusted source of information on best practices, successes, and challenges in the prevention, minimisation and environmentally sound management of plastic waste.

The Partnership seeks to create a collaborative environment to promote action and dialogue among governments, regional and local authorities, intergovernmental organizations, the private sector, non-governmental organizations and academia on initiatives that can be carried out at the local, regional and global levels to tackle plastic pollution.

1. EXECUTIVE SUMMARY

1. This compilation report provides a global overview of national and subnational policies designed to prevent and reduce single-use plastics, including primary microplastics, and plastic packaging. Plastic packaging other than single-use plastic packaging is not covered in this document.
2. This document compiles information, best practices and lessons learnt referenced in literature from research, intergovernmental organizations, government agencies, civil society organizations, and the private sector (grey literature). It also highlights gaps in the academic and grey literature, proposing avenues for future research.

Key trends

3. Preventing the generation of hazardous wastes and other wastes is a core principle of the Basel Convention, and the waste hierarchy defined within this framework prioritizes waste prevention above other forms of management¹. Policies to prevent and reduce single-use plastics are on the rise, especially since 2021. The majority of these policies are either bans, or market-based instruments, or hybrid policies mixing these approaches and other elements. These policies occur mainly at the national or subnational level, and more rarely at the regional level (notably in the European Union and its Member States). There are currently no comprehensive inventories of policies from which to extract detailed trends; however, by 2018, at least 127 countries had passed policies to prevent single-use plastics (UNEP & WRI 2018).

Literature global trends

4. Until recently, the academic literature on single-use plastics policies focused on recycling and other recovery methods. In the last couple of years, the literature on prevention policies has grown significantly, as well as the grey literature.
5. Although these policies to prevent single-use plastics are distributed across all regions, significant geographical gaps were identified in academic literature. A survey of publications till June 2022 reveals that they do not cover over two thirds of countries, mostly in Africa, Eastern Europe, Western Asia, Oceania and Latin America and the Caribbean and poorly reference 83% of countries globally. Overcoming geographical biases and strengthening research in those regions and countries could benefit policy design and enforcement (see section 3.1.).

Products coverage

6. Most policies to prevent single-use plastics focus on plastic bags and expanded polystyrene (EPS) food containers, and to a lesser extent on microplastics.² Academic literature on the issue has a disproportionate emphasis on plastic bags, while many single-use plastics products are barely mentioned at all, including single-use service ware (including cutlery), single-use sanitary products (including hygiene products, wipes, cotton buds), as well as primary microplastics (including glitter and confetti) (see section 3.2.).

Lack of data

7. Policy design suffers from the lack of information on single-use plastics and alternatives. Data is urgently needed to better acknowledge trends in plastic use, as well as the socio-economic, environmental and health impacts of plastics. Benefits of single-use plastics for food preservation and in the health sector also need to be better understood. Policy design would also benefit from the availability of information on quantity of plastics placed on the market by producers and brand owners.

¹ The waste hierarchy is part of the Basel Convention's Framework for the environmentally sound management of hazardous wastes and other wastes and requires that waste prevention is prioritized over other approaches. "Framework for the environmentally sound management of hazardous wastes and other wastes" UNEP/CHW.11/3/Add.1/Rev.1.

² It should be noted that the concept of microbeads as further evolved and it is now considered as part of the broader definition of primary microplastics (<https://echa.europa.eu/hot-topics/microplastics>).

8. More research on policies preventing single-use plastics other than plastic bags would be useful. It would also help determine priority single-use plastics to be targeted urgently. Research and development on viable reusable alternatives would be beneficial as well (see section 4.1).

Legislation and governance

9. Governance is a major issue: fragmented plastics governance at the international, national and local level are challenging effectiveness. Currently, there are mainly the Basel Convention provisions on transboundary movements and environmentally sound management of plastic wastes. On March 2022, resolution UNEA-5/14, entitled “End plastic pollution: Towards an international legally binding instrument” established and mandated an international negotiating committee to develop a new instrument.
10. At the national level, there are often obstacles in the coordination of the work on plastic issues in governments, while areas such as industrial development, trade and science are essential in the transition to a circular economy. Also, the promotion of expanded plastics production and trade can contradict policies to reduce plastic pollution. Inclusion of all stakeholders in policy design is therefore instrumental (see section 4.3).

Enforcement

11. Proper enforcement is still a significant issue in some countries (see section 4.4.1).

EPR

12. Many single-use plastics, especially non-packaging, are still not covered by Extended Producer Responsibility (EPR). The main focus is downstream, from collection to disposal. Only some EPR schemes contribute partly to the cost of littering clean-up, prevention and eco-design. Modulated fees may be more effective than average fees to respond to that issue (see section 4.4.2).

Bans

13. Both bans and market-based measures have shown significant and consistent reductions in plastic bag consumption, and there are many best practices and challenges to consider for optimal effectiveness and enforcement. Bans, market-based instruments, and consumer awareness approaches are best considered as complementary tools within a broader policy package, as hybrid policies appear to be the most successful.
14. Bans may be the policies most likely to trigger negative reactions but are also the preferred approach for single-use plastics that are hardest to recycle and that have the greatest pollution impacts. If properly designed and implemented, including through the provision of alternative products or services, they may increase material efficiency towards a circular economy and decrease waste-management costs (see section 4.4.3.). Political support is needed to prioritize enforcement given the risk of smuggling and other illicit activities.

Levies and taxes

15. Levies and taxes are examples of market-based instruments, which can be imposed at various stages (e.g. production, import, sale, use). Market-based instruments may be generally better accepted and often effective; however, they may suffer from a rebound effect in the long term and ensuring the right fee level is key. Most levies currently in force focus on reducing consumption of single-use plastics and are regressive in nature (they disproportionately affect lower-income consumers). A tax or suite of taxes can also be implemented to internalize costs associated with pollution across the lifecycle of plastics (see sections 4.4.4 and 4.4.5).

Exemptions

16. Policy exemptions need to ensure that environmental impacts from linear production and consumption of single-use plastics are not merely transferred to other single-use products, such as paper bags or compostable plastic bags. Consideration needs to be given to the properties of alternatives such as biodegradable and compostable

plastics and their potential impacts. Hybrid ban-levy policies for plastic bags can help shift consumer behaviour towards bringing their own bags (see section 4.4.6).

Stakeholder engagement and building pro-environmental behaviour

17. Engaging all stakeholders is key to successful implementation, regardless of the policy approach (ban, levy/tax, or hybrid). These include plastic producers, businesses that use single-use plastics and consumers. Stakeholder engagement is also an opportunity to disseminate environmental education and encourage pro-environmental behaviour, with positive spillover effects in other areas (see Section 4.4.7).

Levels of jurisdiction

18. Local governments have often innovated and provided leadership in policies to prevent single-use plastics. At the same time, the collaboration of local authorities is considered key to successfully implement policies passed at the regional or national level. Sometimes, policies to prevent single-use plastics can be the focus of conflict between authorities at different levels of jurisdiction (see section 4.4.8).

Monitoring of implementation

19. Monitoring is important to assess compliance with policies to prevent single-use plastics as well as overall effectiveness, and different monitoring techniques are required for different single-use plastics, and primary microplastics (see section 4.4.9). However, most policies appear to lack adequate monitoring, while existing assessments referenced in the literature are punctual and do not account for how policy effectiveness may evolve in the longer term.
20. The literature suggests a gap in monitoring of compliance with policies to prevent single-use plastics and their impacts, or at least a deficit in making such information publicly available. Monitoring over longer time frames that can reveal evolutions in compliance and rebound effects is also lacking.

Assessing effectiveness

21. Few studies have studied effectiveness, especially in the long term (at least 2 years after policy adoption). The choice between ban and levy does not seem decisive for effectiveness, which is rather impacted by the fee amount, the availability of cheap reusable alternatives, public awareness, and enforcement mechanisms. To ensure effectiveness, data on amounts of single-use production are essential, as well as the design of comprehensive policies. A global evidence-based strategy to inform policy design is still lacking.
22. Full implementation of current commitments would only decrease plastic leakage to the environment of 7% from 2020 figures by 2040.
23. More research to assess long-term effectiveness would be useful. This includes the comparative effectiveness of immediate and gradual approaches, the comparative effectiveness of policies to prevent single-use plastics at different levels of jurisdiction, the comparative effectiveness of policies in countries that are isolated in their efforts to prevent single-use plastics, and in countries that benefit from active cross-border cooperation on the issue, the interplay between virgin plastic prices and the effectiveness of policies to prevent single-use plastics.
24. Existing research could be strengthened on how effectiveness of policies to prevent single-use plastics is impacted by the behaviour of key constituencies for single-use plastic policies and on consumer behaviour to minimise consumption of single-use plastics (see section 4.4.10).

COVID-19

25. The COVID-19 pandemic had a major impact on single-use plastic use and policies. There was a sharp increase in the use of many single-use plastics, including personal protective equipment, packaging and hygiene products, that could aggravate the existing plastic pollution.
26. Some prevention policies were put on hold, or postponed, while in some places single-use plastics were reintroduced, and bans were enacted on reusable bags (see section 4.5).

2. CONTEXT AND OBJECTIVES

The Plastic Waste Partnership

27. The Plastic Waste Partnership (PWP) was established in 2019 under the Basel Convention to mobilize stakeholders to minimize the generation of plastic waste and improve its environmentally sound management (ESM) at the global, regional, and national levels.
28. This publication was prepared under project group 1 “Plastic waste prevention and minimization” of the PWP and under Output 1 of Activity 1 of its workplan: “Compilation of information, best practices and lessons learned on measures taken by key stakeholders (including governments and private sector), to prevent and reduce single use plastic waste and packaging waste”.

General context

29. Global plastic production has increased dramatically from 2 million metric tons (Mt) in 1950 to 381 Mt in 2015 (Geyer *et al.* 2017) and is expected to further increase significantly in coming decades (Borrelle *et al.*, 2020). Global use of plastics in 2060 could nearly triple from 2019 levels (OECD 2022). Borrelle *et al.* (2020) notes that urgent transformative changes are needed to fight plastic pollution, including the reduction or elimination of the use of unnecessary plastics.
30. The massive global production and consumption of single-use plastics including plastic packaging is a rising threat to the environment. Beyond known impacts to aquatic ecosystems, plastic pollution also poses threats to human health and the environment on land. Plastic obstruction of water drainage systems can aggravate floods and increase the prevalence of mosquito-borne disease. Plastic pollution threatens land and marine fauna alike through entrapment, asphyxiation, and ingestion. Plastics have impacts on climate change and human health across their lifecycle (CIEL 2019). Microplastic particles have contaminated tap and bottled water in 83% of samples sourced from EU countries as well as Uganda, India, Indonesia, Lebanon, United States, Cuba, and Ecuador (Kosuth *et al.* 2017). According to UNEP and the Stockholm Environment Institute (2019), during production, plastics affect workers who handle hazardous materials and are exposed to endocrine disruptors, with health consequences like infertility, spontaneous abortions, adverse birth outcomes and increased risk of breast cancer. The linear production, consumption and recovery of single-use plastics also represent a loss of monetary value: 95% of the monetary value of single-use plastic packaging is lost after initial use, amounting to an annual loss of value estimated at USD 80-120 billion globally (World Economic Forum 2019).
31. Borrelle *et al.* (2020) estimated that approximately 19 to 23 Mt (million tonnes) of plastic entered aquatic ecosystems in 2016, and that under business as usual, plastic emissions into aquatic ecosystems could reach 90 Mt per year by 2030. Even limiting 2030 plastic emissions into aquatic ecosystems to 2010 levels of 8 Mt per year - problematic in themselves and not an environmental threshold - would require immense efforts, that “far exceeds” the existing commitments from governments, industries, and other stakeholders combined, including plastic reduction, waste management and environmental recovery strategies (Borrelle *et al.* 2020). Latest report from the OECD projects plastic leakage into the environment at 44 Mt in 2060, while accumulated plastic in rivers and oceans is projected to more than triple, from 2019 to 493 Mt. Emissions of greenhouse gas emissions from the plastics lifecycle could more than double, to 4.3 Gt CO₂e (OECD 2022).
32. Policies including single-use plastic bans, taxes and incentives have been identified as a key ingredient to enable the transition from the current reliance on linear design in plastic packaging towards a circular economy (World Economic Forum 2019). Over the last decade in particular, the number of policies to reduce plastic pollution has increased significantly at the global, regional, national and subnational levels (Karasik *et al.* 2019), and more than 120 countries globally have implemented such bans or taxes (OECD 2022). Among them, policies on single-use plastics including plastic packaging (representing 26% of the global plastics market according to World Economic Forum

2019) and microplastics have emerged to regulate their production, trade, distribution, consumption, and recovery. Since Swedish supermarkets first established plastic bag levies in the 1970s, legislation to prevent and reduce single-use plastics has been adopted across the globe, in developed and developing economies, as plastic pollution became increasingly visible.

33. Policies to prevent single-use plastics fall under the top of the waste hierarchy (i.e. prevention); however, they intersect with other policies relating to plastics across their lifecycle, including policies on toxic-free circular design, policies on recycling, other recovery and disposal, as well as policies on monitoring and remediating plastic pollution in the open environment.

Scope and objectives

34. This publication aims to identify global trends in policies to prevent and minimize single-use plastics including plastic packaging and microplastics as described in existing literature, as well as to highlight key insights, as well as thematic and geographical gaps from the literature on the subject. Issues considered include policy type (binding, voluntary or hybrid, market-based or not or hybrid), effectiveness and enforcement, which plastic lifecycle stages received the most policy emphasis, the interaction of different levels of jurisdiction, and other economic and geographic variables/trends. The publication tries to identify to what extent these plastic prevention policies affect different lifecycle stages of single-use plastics (manufacturing/importing-exporting/placing products on the market/retail, etc.). It tries to identify the level of jurisdiction where most policies appear to be present, and whether those jurisdiction layers support each other or conflict (local vs. state/region vs. national vs. sub-continent etc.).
35. Non-binding policy elements such as consumer awareness-raising were analysed when they formed part of broader policy packages to prevent single-use plastics, but purely voluntary policy approaches were not analysed on their own due to time constraints.
36. This publication does not focus on policies that deal with aspects of plastic waste management further downstream from production and consumption, such as Pay-as-you-throw (PAYT) and landfill or incinerator gate fees, although such policies may indeed contribute indirectly to reducing single-use plastic consumption.
37. For the purpose of this publication, single-use plastics are understood as plastic products not designed for reuse. Single-use plastic packaging is considered as a subset of single-use plastics.³

Methodology

38. This publication relies on four approaches:
 - (a) A meta-analysis of academic literature, performed using Elsevier's Scopus database, the largest abstract and citation database of peer-reviewed academic literature. It includes scientific journals, books, and conference proceedings, and focuses mainly on anglophone literature (around 80% of all the journals indexed in Scopus are published in English);
 - (b) Two inventories of policies to prevent and reduce single-use plastics, one included in the publication "Single-use plastics, A Roadmap for Sustainability" (UNEP, 2018), and the 'Plastic Policy Inventory' from Duke University, regularly updated online;
 - (c) Insights from academic and grey literature publications, including those recommended by members of the Plastic Waste Partnership;
 - (d) Country case-studies selected where sufficient literature was available to consider effectiveness and impacts.
39. The first stage was a Scopus database search for academic article titles and abstracts linked to single-use plastic prevention policies. This provided a comprehensive overview of the distribution of academic research on policies to reduce and prevent single-use plastics up to 15 June 2022, and to highlight gaps in geographical or

³ Forms of plastic packaging identified as most problematic for the environment in studies of ocean plastic pollution are single-use, not reusable. Although reusable plastic packaging exists, it is not the focus of this document.

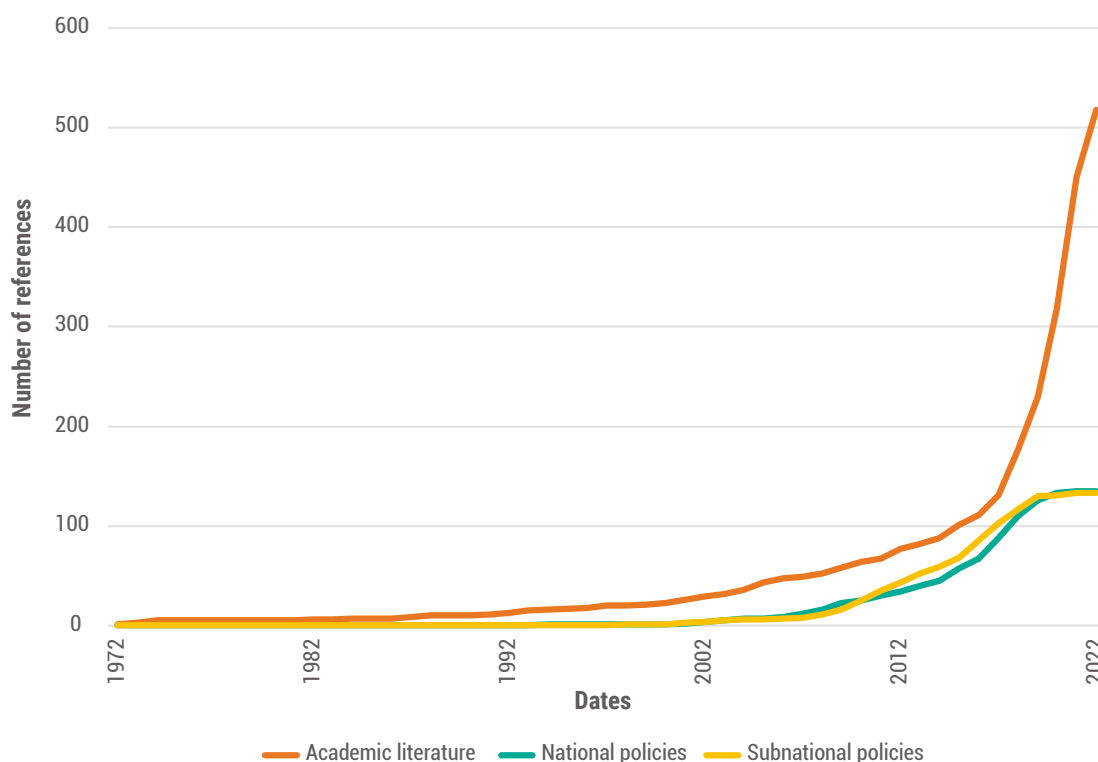
thematic coverage. The focus on mainly anglophone content is a limitation that may have induced a bias against non-anglophone countries. Policies that are too recent to be the subject of academic publications are also not captured in this exercise.

40. Two keyword lists were created: a comprehensive list of single-use plastics including plastic packaging (“products list”), and a comprehensive list of policy-related terms (“policies list”) (see Annex 3). The search was run for titles and abstracts containing at least one keyword from each list, and over 52000 articles were found. The articles or abstracts that were out of scope were removed, resulting in a sample of 514 articles, conference papers and books from 1972 to 2022.
41. The abstracts of these 514 academic publications were also analysed for mentions of different countries and single-use plastic products (the complete list of product keywords searched is available in Annex 3). Due to the number of references found, and lack of time to individually review the content of each article, the final list of articles may contain a few articles slightly outside the scope of this publication.
42. Additionally, two policy inventories by UNEP (2018) and Duke University (Karasik *et al.* 2022a) were used to propose an updated but non-exhaustive inventory of single-use plastic prevention policies adopted in different jurisdictions up to February 2022 (see Annex 1). The UNEP inventory (from 2018) focuses on policies to prevent or reduce plastic bags and polystyrene packaging, while the Duke University inventory, regularly updated (latest update in February 2022), identifies policies to reduce plastic pollution more generally. It covers an estimated 39 to 47% of national-level regulations and 21% of the local regulations to reduce plastic pollution.

3. META ANALYSIS OF THE ACADEMIC LITERATURE

43. Up to the years 2016/2017, despite policymakers' interest in passing regulations to prevent single-use plastics, the academic literature on the topic was limited. Academic research articles about plastic waste and plastic pollution mainly focused on recycling and other forms of recovery. The majority of articles failed to mention reduction of plastics at source as part of actions needed to tackle plastic pollution. While numerous articles in the corpus mention the terms "prevention" and "reduction", they most often omitted reduction and prevention strategies from their proposed policy interventions (still true for part of the literature in 2020, see for instance Jiang 2020), as these terms can also be used in the context of reducing impacts without reducing use or consumption.
44. Since 2020, the number of publications on the topic rose exponentially (graph 1). The corpus considered in this study includes 315 publications focusing on policies to prevent and reduce single-use plastics between 1972 and November 2020, and an additional 199 just between December 2020 and June 2022. The evolution of academic references observed on graph 1 seems in line with a growing enactment of national and local policies.

Graph 1: Evolution of policies to prevent and reduce single-use plastics and references in the literature



3.1. GEOGRAPHIC COVERAGE

Global trends – 1972-2020

45. Between 1972 and 2020, a review of country mentions in the abstracts of the sample of 315 academic publications reviewed revealed significant geographic gaps in academic research on policies to prevent single-use plastics. The number of publication abstracts mentioning each country is illustrated below in Table 1. Mention of countries in the text of publications but not in titles or abstracts is not represented in these findings.
46. While 61 countries were mentioned at least once in the abstracts of the academic publications reviewed, the remaining 134 countries were not mentioned at all while at least 48 of them had policies to prevent single-use plastics. In other words, English academic literature do not cover over two thirds of countries, mostly in Africa, Eastern Europe, Western Asia, Oceania and Latin America and the Caribbean, and focused disproportionately on a minority of countries. Only 10 countries accounted for 57% of abstracts occurrences (China, India, UK, USA, South Africa, Australia, Germany, Chile, Ireland, and Kenya) and 25 countries account for 80%. China accounted for 10% of the occurrences and India, the UK and USA for 7% each.
47. 90% of the countries had either no or very limited occurrences in the sample of academic publications (1 or 2).
48. Research seemed to be particularly lacking for African countries. While 38 countries on the continent had adopted policies preventing or reducing single-use plastics (UNEP 2018; Karasik *et al.* 2022b), only 13 of these countries were represented in the corpus.
49. Sub-Saharan Africa was particularly affected by this issue. While two thirds of countries in Northern Africa were referenced in the literature under review, it was the case for less than 20% of sub-Saharan countries (see Graph 1). Research was also largely lacking in Western Asia with no occurrence for Armenia, Azerbaijan, Bahrain, Cyprus, Georgia, Iraq, Kuwait, Lebanon, Oman, State of Palestine, Qatar, Saudi Arabia, Syria, Türkiye, United Arab Emirates and Yemen.
50. A discrepancy between policies adopted and existing academic publications was also noticeable in Latin America and the Caribbean. As many as 12 countries that adopted legislation were not referenced in the sample. Finally, Oceania was also inadequately covered by the literature. While references were observed for Australia and New Zealand, none were found for Melanesia and Polynesia.

Recent developments – 2021-2022

51. While the literature has boomed between 2020 and 2022, the proportions of occurrences per region in the literature remains globally stable, except in Western Asia where references have almost quadrupled (but they were very limited in 2020 with only two references). Global identified trends for the period 1972-2020 remain accurate.
52. The number of countries not mentioned at all fell in the corpus from 134 to 114, while the predominance of a minority of countries remains, with 22 countries in the world still representing 70% of occurrences. 81 countries were cited at least once, while more than 120 countries globally have implemented bans or taxes (OECD 2022).
53. In the meantime, 83% of countries still have either no or very limited occurrence in the literature (1 or 2 occurrences). Research still seems to be lacking in African countries, with 36 countries not mentioned at all, and in Latin America and the Caribbean with 24 countries not mentioned either, even though numerous policies were recently adopted (Clayton *et al.* 2021). The number of publication abstracts mentioning each country is illustrated below in Map 1 as well as in Tables 1 and 2.
54. Map 1 shows the discrepancy between adopted policies and academic literature.
55. More research is needed to investigate the adoption of policies to reduce and prevent single-use plastics, and specifically in regions where gaps have been identified.

Map 1. Geographic coverage of academic literature on policies to prevent single-use plastics, compared to actual presence of policies

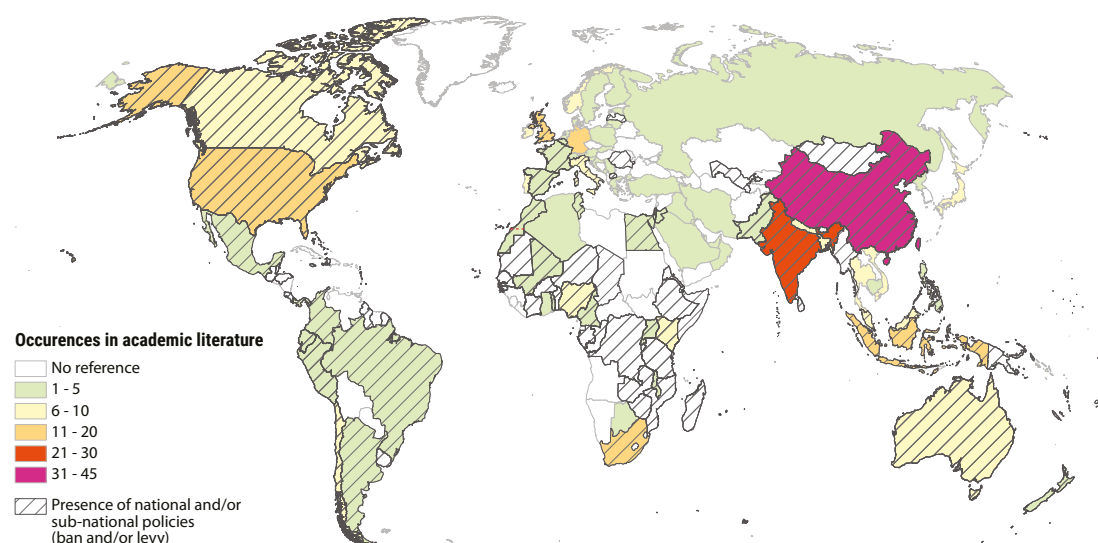


Table 1. Number of publications per country in the academic literature

World region/country		Frequency Nov. 2020	Frequency June 2022
Africa	Northern Africa	4	9
	Algeria	1	2
	Egypt	1	2
	Morocco	1	3
	Tunisia	1	2
	Sub-Saharan Africa	26	41
	Botswana	3	3
	Cameroon	0	1
	Ghana	1	1
	Kenya	5	8
	Malawi	1	1
	Mali	1	1
	Mauritius	0	2
	Nigeria	2	5
	Rwanda	1	2
	South Africa	11	15
	Togo	1	1

America	Northern America	16	27
	Bermuda	0	1
	Canada	2	7
	United States	13	19
	Latin America and the Caribbean	15	26
	Antigua and Barbuda	0	1
	Argentina	2	3
	Bahamas	1	2
	Brazil	2	3
	Chile	6	7
	Colombia	1	2
	Ecuador	1	1
	Mexico	1	3
	Panama	0	2
	Peru	0	1
	Trinidad and Tobago	1	1
Asia	Eastern Asia	23	47
	China	19	40
	Japan	3	6
	South Korea	1	1
	South-eastern Asia	12	31
	Cambodia	1	1
	Indonesia	4	11
	Malaysia	4	6
	Philippines	0	2
	Thailand	3	5
	Vietnam	0	7
	Southern Asia	20	39
	Bangladesh	1	5
	India	14	21
	Iran	2	3
	Maldives	0	2
	Nepal	3	5
	Pakistan	0	3
	Western Asia	2	14
	Bahrain	0	1
	Iraq	0	1
	Israel	1	1
	Jordan	1	1
	Kuwait	0	1
	Oman	0	1
	Qatar	0	2
	Saudi Arabia	0	2
	Türkiye	0	3
	United Arab Emirates	0	1

Europe	Eastern Europe	3	3
	Poland	1	1
	Russian Federation	1	1
	Slovakia	1	1
	Northern Europe	26	35
	Denmark	1	2
	Estonia	0	1
	Finland	2	2
	Ireland	6	8
	Lithuania	1	1
	Norway	2	5
	Sweden	1	2
	United Kingdom	13	14
	Southern Europe	11	25
	Croatia	1	1
	Greece	0	2
	Italy	3	5
	Montenegro	1	1
	Portugal	3	5
	Serbia	1	1
	Slovenia	1	3
	Spain	1	7
	Western Europe	13	22
	Austria	1	2
	Belgium	1	1
	France	1	4
	Germany	8	11
	Luxembourg	1	1
	Netherlands	0	1
	Switzerland	1	2
Oceania	Australia and New Zealand	10	11
	Australia	9	10
	New Zealand	1	1
	Melanesia	0	2
	Solomon Islands	0	1
	Vanuatu	0	1

Table 2. Countries not referenced in academic literature corpus

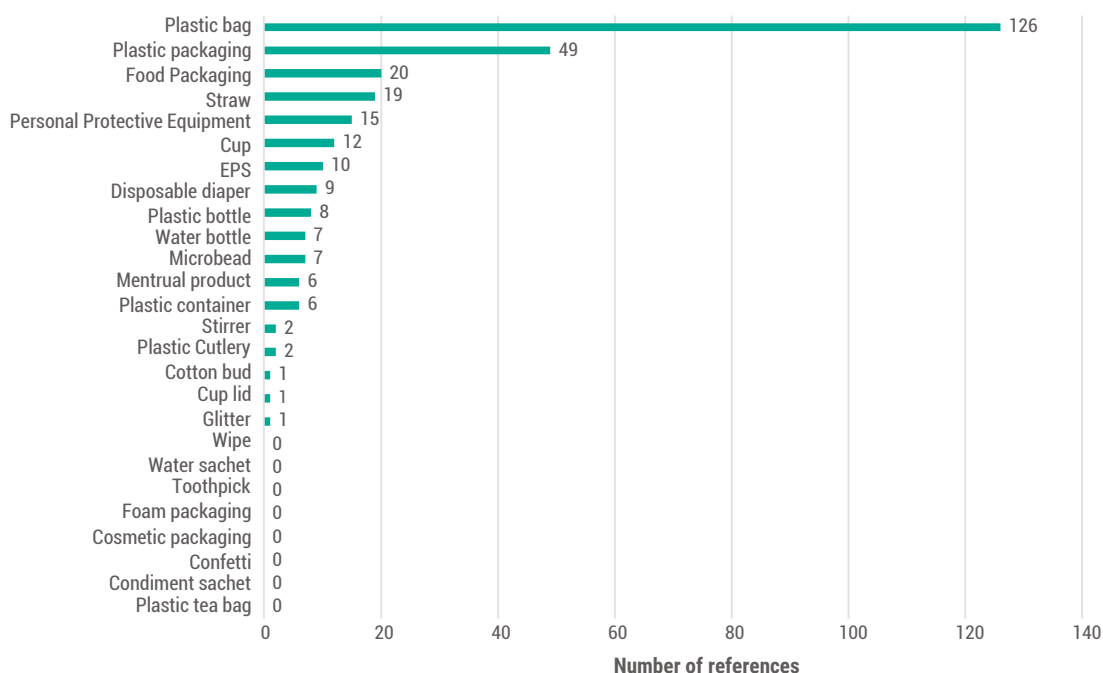
Africa	Northern Africa	Libya Angola, Benin, Burkina Faso, Burundi, Côte d'Ivoire, Cabo Verde, Central African Republic, Chad, Comoros, Congo, Congo DRC, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Guinea, Guinea-Bissau, Lesotho, Liberia, Madagascar, Mauritania, Mozambique, Namibia, Niger, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Sudan, Sudan, Tanzania, Zambia, Zimbabwe
	Sub-Saharan Africa	
Americas	Latin America and the Caribbean	Aruba, Barbados, Belize, Bolivia, Costa Rica, Cuba, Dominica, Dominican Republic, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Nicaragua, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Uruguay, Venezuela
Asia	Central Asia	Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
	Eastern Asia	Mongolia, Democratic People's Republic of Korea
	South-eastern Asia	Brunei Darussalam, Laos, Myanmar, Singapore, Timor-Leste
	Southern Asia	Afghanistan, Bhutan, Sri Lanka
	Western Asia	Armenia, Azerbaijan, Cyprus, Georgia, Lebanon, State of Palestine, Syria, Yemen
Europe	Eastern Europe	Belarus, Bulgaria, Czech Republic, Hungary, Moldova, Romania, Ukraine
	Northern Europe	Iceland, Latvia
	Southern Europe	Albania, Andorra, Bosnia and Herzegovina, Malta, North Macedonia, San Marino, Vatican City
	Western Europe	Liechtenstein, Monaco
Oceania	Melanesia	Fiji, Papua New Guinea, Vanuatu, Micronesia, Kiribati, Marshall Islands, Micronesia, Nauru, Palau
	Polynesia	Samoa, Tonga, Tuvalu

3.2. PRODUCTS COVERAGE

56. Mentions of single-use plastic products were searched through titles and abstracts of the inventory of policies (Annex 1). The complete list of product keywords searched is available in Annex 3.
57. Between 1972 and 2022, an assessment of the 514-publication sample shows that academic literature focuses primarily on plastic bags: they are mentioned in more than a hundred articles. Plastic packaging is the second product receiving the most attention, with mentions in almost 50 articles.
58. Finally, all other single-use plastics are barely or not mentioned in the literature reviewed. Stirrers, plastic cutlery, cotton buds, cup lids, glitter, wipes, water sachets, toothpicks, cosmetics packaging, confetti, condiment sachets and plastic tea bags have between 0 and 2 mentions. Yet, some of are covered in certain policies, such as the EU and French policy, like condiment sachets, confetti, cosmetics packaging, water sachets and wipes.
59. This trend seems to match trends in policies on single-use plastics. UNEP & WRI (2018) found that 66% of 192 they surveyed, or 127 countries, had enacted national legislation to regulate single-use plastic bags. By way of contrast, by November 2021, only 12 countries have passed national legislation on microplastics: Canada, China, Denmark, France, Ireland, Italy, Republic of Korea, New Zealand, Taiwan (province of China), Sweden, the UK, and the USA (Anagnosti *et al.* 2021). An EU-wide primary microplastics ban is also under consideration.

60. Some groups have emphasized the need for policies to focus on single-use plastics that are most likely to end up in the oceans, or that are currently not recycled at scale. These extend beyond plastic grocery bags and include plastic straws and stirrers, cups and lids, disposable plastic cutlery, EPS food containers, oxo-(bio)degradable plastics, PVC packaging and all primary microplastics (Ocean Conservancy & Trash-free Seas Alliance 2019). Multilayer and composite plastic packaging (notably sachets) are both widely found in the open environment and not currently recycled, and also require regulation (Liamzon 2020, BreakFreeFromPlastic 2020a).
61. The emphasis on plastic bags, both in policy preventing single-use plastics and in related academic literature, may seem disproportionate in light of the fact that they constitute a small share of overall plastic production. Nevertheless, plastic bags are among the most littered plastic items, possibly due to their lightness and ability to be carried over long distances (see also Chile case study). Plastic bags were the seventh most common retrieved during the Ocean Conservancy's 2019 International Coastal Cleanup, behind food wrappers, cigarette butts, plastic beverage bottles, plastic bottles, straws and stirrers, and cups and plates (Ocean Conservancy, 2020). Meanwhile, plastic bags were the most common form of plastic litter found during #BreakFreeFromPlastic's 2019 484 community clean ups in 51 countries, followed by sachets and plastic bottles (BreakFreeFromPlastic 2020a).
62. Furthermore, although it is clear that policies are needed to prevent other single-use plastics than plastic bags, the plastic bag policies adopted so far may have positive spillover effects that may increase consumers' readiness to comply with additional measures to prevent single-use plastic and with other pro-environmental policies (Thomas *et al.* 2019).
63. Research on policies preventing single-use plastics could include in particular single-use sachets, single-use food packaging, cutlery and other service ware, single-use water sachets, single-use sanitary products (including hygiene products, wipes, cotton buds, diapers), as well as glitter and confetti and other primary microplastics. It is also noted that components of fireworks, balloons as well as plastic shot wads are areas less researched, yet commonly contribute to plastic littering.
64. This trend was confirmed by Knoblauch *et al.* paper from 2021, in which they state that most national policies from the last 5 years still deal with single-use plastic bags, while they note the rise of policies targeting microplastics in cosmetics.

Graph 2. Academic publications coverage of different single-use plastics



Note: plastic bottles can be water or non-water bottles

4. INSIGHTS FROM THE LITERATURE

65. This section highlights key insights from the current academic and grey literature on best practices and lessons learned on measures taken to prevent and reduce single-use plastic waste (including packaging waste and microplastics), as well as impacts and challenges, including environmental, socio-economic and technical considerations.

4.1 DATA ON SINGLE-USE PLASTIC PRODUCTS AND THEIR ALTERNATIVES

66. Adequate policy design to prevent and minimize single-use plastics could be evidence-based and address the current situation for each country, including trends in single-use plastic use, and socio-economic, environmental and health consequences associated with the life-cycle of plastics (Van Fan 2022). In particular, a better understanding of the amounts of plastic waste entering rivers and oceans is needed, as well as sources, rates and pathways for microplastic pollution (Lau *et al.* 2020) and pollution by macroplastics (Van Ryan 2021), as well as information regarding soil and atmospheric contamination.
67. A better grasp of the benefits of single-use plastics is needed, for instance in the health sector and for food preservation. It is essential for ASEAN countries, but also true for most countries in the world, since numerous misconceptions about problems associated with plastics hampers policy design (Akenji *et al.* 2019). Latest research shows that the rapid rise in single-use plastic packaging in Europe has not reduced food waste, and that food and packaging waste have actually risen together. In developing countries, with still less plastic packaging, there are lower rates of household food waste (Schweitzer and al. 2018).
68. It is necessary to strengthen national capacities to assess patterns and trends in plastic use, and all major manufacturers and importers could release information on the quantity and types of plastics being placed on the market (Akenji *et al.* 2019). For the Ocean Conservancy and Trash-Free Seas Alliance (2019), producers and brand owners should be mandated to disclose this data.
69. More research on policies preventing single-use plastics other than plastic bags would be useful. These could include single-use sachets, personal protective equipment (PPE), single-use food packaging, serveware and cutlery, single-use water sachets, single-use sanitary products (including hygiene products, wipes, cotton buds, diapers), as well as glitter and confetti and other primary microplastics. Better baseline information about the trade, sectoral interactions, design, manufacture, and use patterns of single-use plastics would be useful.
70. This would notably allow to make assessments that are fundamental to determine priority single-use plastics for a targeted approach. Better baseline information about the trade, sectoral interactions, design, manufacture, and use patterns of single-use plastics would also be useful.
71. There is also a crucial need to promote research and development for finding new and viable alternatives to single-use plastics in order to reduce plastic consumption (UNEP and Stockholm Environment Institute 2019). Product lifecycle assessments show that all single-use items are damaging for the environment, whatever their composition (Knoblauch and Mederake 2021), hence the need to focus on reusable alternatives, rather than switching to non-plastic or compostable plastic single-use alternatives.

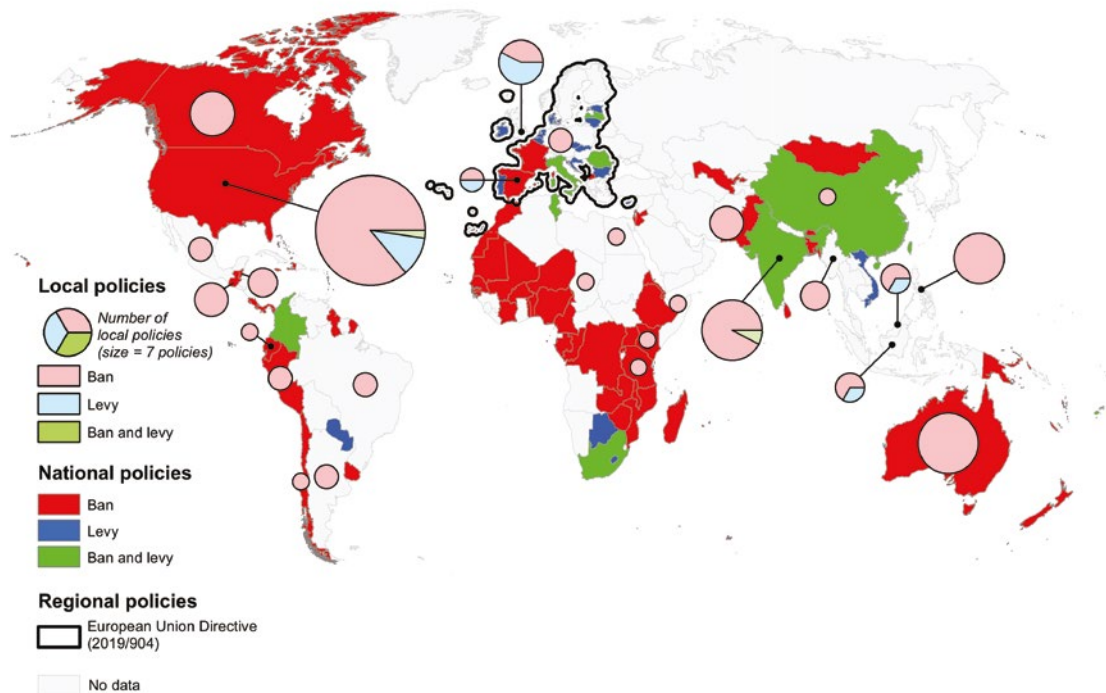
4.2 GEOGRAPHIC DISTRIBUTION OF POLICIES PREVENTING AND REDUCING SINGLE-USE PLASTICS

72. A growing number of policies to prevent single-use plastics, and particularly plastic bags and EPS food containers, have been adopted at the supranational, national, or subnational level over the last decade, and the number is on the rise (UNEP 2018, Karasik *et al.* 2019, Diana *et al.* 2022). Policy instruments to prevent and reduce single-

use plastics vary, from market or price-based instruments (levies or taxes) to more direct regulation (bans) to voluntary measures, and hybrid policies with a mix of these elements. The last couple of years saw a major growth in the use of policy instruments to prevent or reduce single-use plastics. By 2018, at least 127 countries had passed policies to prevent single-use plastics.

73. Map 2 below represents bans and market-based instruments referenced in UNEP 2018 and in the Duke University Plastics Policy Inventory as of February 2022 (<https://nicholasinstitute.duke.edu/plastics-policy-inventory>) and does not provide exhaustive coverage of all policies adopted.⁴ It reveals a clear trend of prevalence of bans over levies (or other market-based instruments) and hybrid policies. This trend is particularly strong at the local level, but can also be observed at the national level.

Map 2. Distribution of local and national policies to reduce and prevent single-use plastics



74. This trend has been noted by Karasik *et al.* (2019) in their analysis of a large sample of policies to fight plastic pollution, including but not limited to policies to prevent single-use plastics. Their sample inventory gives an indicative overview of national-level policies (an estimated 39 to 47% of all policies) and provides examples of subnational policies as well (an estimated 21%). In their sample, national governments used regulatory instruments 3.5 times more than economic instruments. Similarly, the subnational examples found used regulatory bans far more frequently than economic instruments, at a ratio of roughly 2 to 1 for instruments targeting plastic bag pollution, and 23 to 6 for instruments targeting single-use plastics more broadly. The most used instrument was a ban, used twice as frequently to address pollution from plastic bags than the second most common instrument: levies and taxes. Over half of the policies analysed with bag bans were enacted in sub-Saharan Africa (Karasik *et al.* 2019).
75. In addition to policies adopted by authorities, some policies to prevent or reduce single-use plastics take the form of public-private partnerships. For the most part, these partnerships tend to favour market-based instruments, like levies or taxes rather than bans.

⁴ For a broader view of both voluntary and binding measures addressing plastic pollution, please see the UNEP Interactive Dashboard of actions on marine plastic litter and microplastics (<https://digital.gpmarinelitter.org/>) listing measures reported to UNEP by governments and other stakeholders in 2019 and 2020 through the Ad Hoc Expert Group on Marine Litter and Microplastics. For a complete inventory of national policies introduced from 2016 to 2020, see Knoblauch 2021.

76. No academic publications appeared to study the role of per-capita GDP and availability of public sector funding in jurisdictions' choice to opt for bans, levies, hybrid policies, or in the incidence of public-private partnerships for the prevention of single-use plastics. This could be an avenue for further research.

4.3 LEGISLATION AND GOVERNANCE

77. Governance is a major issue in policies aiming at preventing and minimizing single-use plastics. The fragmented character of plastic governance at the international, federal, national or subnational levels constitutes a severe challenge for effective governance (Knoblauch and Mederake 2021) and addressing this gap in governance is seen as essential to finding solutions to plastics issues (Vince and Hardesty 2017, UNEP 2021). So far, international and regional governance on marine litter and microplastics have identified the urgent need for a global response to address the whole plastic life-cycle and have included calls for regional action planning. On March 2022, resolution UNEA-5/14, entitled "End plastic pollution: Towards an international legally binding instrument" established and mandated an international negotiating committee to develop a new instrument.
78. At the national level, there are often obstacles in the coordination of the work on plastic issues in governments. While industrial development, trade and science are essential in the transition to a circular economy, the ministries responsible for these sectors are more than often not associated to this work. It has been noted as a factor hampering the implementation of otherwise ambitious national strategies and actions in Indonesia, Malaysia and Thailand.
79. Also, the action of other ministries can contradict policies to prevent single-use plastics, and the promotion of expanded plastics production and trade is an important factor to consider. Hence, the importance of broadening the scope of action beyond the usual focus on waste, but rather looking at the whole lifecycle of plastic. Some countries may also suffer from an unclear distribution of responsibilities regarding waste between national and municipal authorities, due to unclear mandates (Akenji *et al.* 2019).
80. Some literature recommend that all stakeholders are associated in the drafting of regulations, including those in governments and government agencies, local governments, industry and environmental group. These discussions should also include waste pickers and their associations, as they are often instrumental in waste management, particularly in developing economies (UNEP & WRI 2020).

4.4 POLICY, ENFORCEMENT, MONITORING, EFFECTIVENESS

4.4.1. Enforcement

81. Proper enforcement of single-use plastics prevention policies is a significant issue in some countries, lessening impact (UNEP & WRI 2020). For instance, by 2017, plastic bags bans and levies had not been enforced adequately in Bangladesh, South Africa or India (Xanthos & Walker 2017), and neither had they been in Cambodia by 2020 (Keong 2020). In Africa, waste management legislation is poorly enforced in many countries, including measures to reduce single-use plastics (Embrandiri *et al.* 2021). It is the case for instance for Burkina Faso, Madagascar, DRC, Cote d'Ivoire, Ethiopia, Mali, Malawi, Niger, Morocco and Tanzania (Nyathi and Togo 2020).
82. Enforcement has been very challenging in China, especially in rural areas, where a vast majority of the stores (over 80%) continued to deliver plastic bags for free to their clients (Xanthos and Walker 2017). In a later evaluation by the Zero Waste Alliance in 2018, the figure was evaluated to 78% (China Development Brief 2018). Various factors that impact the proper enforcement of policies are explored below.

4.4.2. Extended Producer Responsibility

83. Over the past 25 years, extended producer responsibility (EPR) has been a corner principle of waste-management policy in many countries for several waste streams including plastic packaging waste, much of which is single-use (Zero Waste Europe 2015). Many single-use plastics, especially non-packaging single-use plastics, are still

not covered by EPR. The principle of EPR is producer responsibility covering the full environmental and social costs associated with their products (Lindqvist 2000).

84. To date, the concept of EPR has mainly been operationalized through EPR schemes involving Producer Responsibility Organizations who take operational or financial responsibility for waste management. These EPR schemes and policy tools have typically focused on downstream measures from collection to disposal, rather than on waste prevention, and can be either binding or voluntary. These include materials and packaging taxes as well as fee modulation within EPR schemes (Zero Waste Europe 2015).
85. In practice, EPR schemes cover the costs associated with separate collection and recovery, but do not cover the cost of waste that ends up in mixed waste or littered. Only some EPR schemes contribute partly to the costs of littering clean-up and prevention, which is a persistent challenge with single-use plastics (Monier *et al.* 2014).
86. While EPR schemes and policies to date have improved waste collection and recycling, they have not been effective at incentivizing upstream waste prevention or eco-design. Often, costs end up being passed on to consumers and eco-design requirements focus on recycling rather than prevention. Producers therefore lack an effective economic incentive to prevent waste through redesign. Several studies have also shown that collective EPR schemes (Producer Responsibility Organizations) with averaged fees, rather than modulated fees, lessens the individual responsibilities of producers and disincentivize their individual efforts for eco-design (Zero Waste Europe 2015). Other EPR tools such as advanced recycling or disposal fees may also have indirect impact on prevention, but fall outside the scope of this publication (they fall in the scope of Project Group 2 on “Plastic waste collection, recycling and other recovery, including financing and related markets”).
87. Changing Markets Foundation (2021) have shown how Producer Responsibility Organization Ecoembes set-up in the context of Spain’s EPR scheme has fought policies to ban or otherwise prevent single-use plastics in order to preserve their revenue, since producers pay fees based on the quantity of packaging they put on the market.
88. In recent years, there have been calls to revisit EPR to explicitly support waste prevention, reuse, repair and redesign, including for single-use plastics, and thus better serve the waste hierarchy and circular economy (Zero Waste Europe 2015, UPSTREAM 2021, Reusable Packaging Association 2021).

4.4.3. Bans

89. Bans should not be artificially pitted against market-based instruments, but rather considered as one ingredient in a multifaceted policy package, as they are most effective when considered in conjunction with market-based instruments (Surfrider Foundation 2019c). This section explores the specific benefits and challenges that bans on single-use plastics can bring within a policy package.
90. While they can be more challenging to enforce at first, bans are intrinsically effective in preventing single-use plastics because unlike market-based instruments, they completely prohibit regulated products. Regulation through bans is simpler for damaging situations such as production of non-recyclable single-use plastics that are either non-essential or for which alternatives are available. For Akenji *et al.* (2019), it is essential to reduce the production of avoidable or hard-to recycle plastic.
91. Policies including bans may be preferable to market-based instruments alone for single-use plastics that are unrecyclable or challenging to recycle. For this reason, the European Union’s single-use plastic directive chose to ban of most commonly littered single-use plastics,⁵ and to use other tools including market-based instruments for other aspects (Powell 2018). Bans have historically been the preference for local policies on EPS in the USA for the same reason (Wagner 2020). Bans on single-use plastics that are challenging to recycle can also be considered within broader bans on materials that are hard to manage, as part of a green chemistry and circular economy approach (Jambeck *et al.* 2020). Ocean Conservancy and Trash-Free Seas Alliance (2019), relying on their assessment of 43 measures to reduce plastics in oceans,

⁵ <http://data.europa.eu/eli/dir/2019/904/oj>

proposed a list of 8 categories of plastic single-use items to ban urgently, as they frequently end up in the ocean and or not recycled at scale, with collection rate often less than 5%: plastic grocery bags, straws and stirrers, cups and lids, cutlery, EPS food containers, oxo-biodegradable products, PVC packaging and primary microplastics (e.g. glitter and confetti).

92. In addition to avoiding pollution from targeted single-use plastics, bans have the added benefit of avoiding the need and cost of collecting these single-use plastics which are often low-value, thereby lowering overall collection costs (Ocean Conservancy and Trash-Free Seas Alliance 2019). This allows governments to make waste-management savings, and also implies savings for private operators in the waste collection sector including informal waste-pickers who can focus on collecting higher-value wastes without having to waste time, energy and resources sorting through low-value or negative-value materials. It should also be noted that bans can also excessively affect poorer people, whose business sometimes depend on the banned products. Revenue for pro-environmental spending can also be gathered from fines associated with bans.
93. Identification of single-use plastics to be banned is seen as a major step in policy design, and it is suggested that the participation of all stakeholders is essential at this stage (ICLEI 2020). Another essential aspect pointed out by numerous authors, is that bans do need to be accompanied by alternatives that are cheap and easily available. Complete bans, without alternatives yet in place, might otherwise lead to a rise on the use of other kinds of plastic bags, such as garbage bin liners. For instance, the plastic bag ban in California saw the decrease of plastic carrier bags offset by a rise on the use of thicker trash bags, offsetting decrease in plastic use by 30% (UNEP & WRI 2020). Schnurr *et al.* (2018) also observed that the bag ban in Northern Territory in Australia, in 2011, led to an increase of the use of thicker bags and littering.
94. While they may be effective when designed correctly, bans may be perceived as less acceptable and may be challenging to enforce at least at first due to consumer resistance. However, this resistance seems to shift after bans enter into force, possibly due to the visibility of environmental benefits (Sharp *et al.* 2010; Santos *et al.* 2013). There is a wider acceptance of bans on primary microplastics among various stakeholders (Ocean Conservancy and Trash-Free Seas Alliance 2019).
95. Resistance may come not only from consumers but also from industry players fearing loss of income (Changing Markets Foundation 2020a). This can lead industry players to make significant investments in campaigns to oppose bans on single-use plastics, such as the American Progressive Bag Alliance's (recently renamed the American Recyclable Plastic Bag Alliance) \$5.7 million campaign opposing plastic bag bans in California in 2007-2008, and over \$2 million campaign in 2010 (Changing Markets Foundation 2020a).
96. Industry pushback can also take the form of legal challenges against policies to prevent single-use plastics, such as Kenya Association of Manufacturers' ultimately unsuccessful challenge against the country's single-use plastic bag ban (Changing Markets Foundation 2020a). Resistance from industry and business players can also lead to illicit activities such as smuggling and illegal sales and use of regulated single-use plastic items, such as bags in Nigeria (UNEP 2018), Rwanda (see case study) or Kenya, where bags are smuggled from Uganda and Tanzania (UNEP & WRI 2020). This trend is particularly visible in developing countries where some people rely on plastic bags for their livelihood.
97. Judicial support is a key ingredient for successful enforcement of bans. For instance, the Madras High Court produced enforcement guidelines that avoided stay orders when local plastic manufacturers appealed in court against Tamil Nadu's single-use plastic bag ban (Ocean Conservancy and Trash-Free Seas Alliance 2019). Ban effectiveness also depends on the existence of dissuasive penalties, and perceived readiness by law enforcement and the judiciary to enforce these penalties (see Rwanda case study).
98. Bans and market-based instruments can be used together in hybrid policies (Surfrider Foundation 2019b) to avoid massive shifts from single-use plastics to single-use alternative products and encourage a transition to reuse and a circular economy. Taxes or levies on single-use alternatives to banned single-use plastics can help level the playing field (Powell 2018). Taxes and levies can also be used to pave the road for bans (Ocean Conservancy and Trash-Free Seas Alliance 2019). In particular, Nwafor & Walker (2020) have recommended a hybrid approach.

99. Few countries have ban effectiveness data available mainly because of their recent adoption. According to UNEP 2018, in countries that do have data, about 30% have reported dramatic reductions in single-use plastics bag use within the first year.

4.4.4. Market-based instruments

100. Market-based instruments in environmental policy have three main objectives: to change behaviour; to internalize costs; and to raise revenue. These aims can sometimes be in conflict, particularly when the desire for revenue generation exceeds the commitment to significantly reduce or phase out the problematic material or behaviour (Powell 2018).
101. At some levels of jurisdiction, authorities wishing to prevent single-use plastics through market-based instruments may not have the legal power to impose new taxes, but may still be entitled to collect a levy, fee or charge (e.g. localities and municipalities in the USA).
102. Evidence from consumer behaviour studies reveals that changes in price are more effective than all other behavioural interventions attempted so far, such as awareness-raising (Heidbreder *et al.* 2019). Ireland's 2002 single-use plastic bag levy of 15 Euro cents has been widely cited as a success, with a reduction of plastic bag use in retail outlets "in the order of 90%" (Convery *et al.* 2007). A few effectiveness studies in both high and low-income countries suggest significant levels of effectiveness, though less spectacular than the "90%" estimate for Ireland (Heidbreder *et al.* 2019).
103. For example, the introduction of a 5 pence (GBP 0.05) charge for "single-use carrier bags" in Wales in 2011 saw an 80% drop in the distribution of such bags by the following year, as well as a 20% increase in the number of people "always" bringing their own shopping bag (Poortinga *et al.* 2013).
104. However impressive these figures may be, they do not establish full causation: several academic studies have also noted that it is hard to isolate levies or taxes themselves as the sole driver of these impacts from the broader change in social norms that accompanies these policies (Heidbreder *et al.* 2019).
105. Studies also suggest that market-based instruments can enjoy high levels of acceptability by consumers and industry alike (Convery *et al.*, 2007) which facilitates compliance and enforcement, although acceptability of single-use plastic levies is not to be taken for granted, and engagement of stakeholders is required.
106. The effectiveness of market-based instruments can be more challenging to maintain over the long term. Several studies have shown a rebound effect for levies (e.g. Dikgang *et al.* 2012 on the plastic bag levy in South Africa); these can be explained when charges are lowered or not adjusted to match inflation, and further studies assessing the evolving effectiveness of market-based instruments for single-use plastics over a longer period are needed (Heidbreder *et al.* 2019). For Dikgang *et al.* (2012), in the case of a levy or a tax, effectiveness is intimately linked to the charge for each bag, and often too low.
107. A key question with market-based instruments is who pays the tax or levy formally (formal incidence) and who ends up bearing the cost in practice (effective incidence). For instance, in hybrid ban-levy models, if levies were not entirely borne by consumers but also by businesses (for instance 20% - 80%) there would be less of an incentive for businesses to continue distributing reusable bags as if they were single-use bags, and an increased incentive for businesses to encourage clients to remember to bring their reusable bags.
108. The issue of perceived fairness is very important in any new taxes. While the polluter pays principle would entail that manufacturers of single-use plastics should pay their share, policymakers may wish to pay attention to fairness among manufacturers. For instance, if a country decides to impose a tax on domestic plastic manufacturers, they should consider border tariffs for imported plastic products for sale on the domestic market, to ensure domestic manufacturers are not unfairly treated compared to foreign manufacturers (Powell 2018). Such border taxes are likely to affect different regulatory authorities and texts than taxes concerning domestic manufacturing. However, there seems to be a gap in academic research on import taxes or duties on single-use plastic products, and the ways in which these policies interact with market-based instruments targeting single-use plastics manufactured domestically.

109. The overall socio-economic impact of market-based instruments could also be taken into account. Given that taxes on consumption are usually regressive (people with low-income pay a higher share of their income in tax than people with higher income), other aspects of the national taxation system should be adjusted so that the overall impact of taxes is progressive (Powell 2018).

4.4.5. A plastics tax to internalise lifecycle impacts

110. While levies on single-use plastic products to reduce consumption are widespread, other stakeholders are considering a plastics tax to comprehensively address costs caused by plastics across their lifecycle. This follows the polluter pays principle, to redistribute the costs of environmental damage from society as a whole to those responsible for the pollution in the first place. These costs would include those implied by harms at all stages of their lifecycle from extraction of feedstocks to final disposal or pollution are not currently borne by producers or consumers, and include the cost of clean ups and remediation (also called “Pigouvian taxation”). Calculating total costs is challenging: not all negative impacts are easy to monetize because of ethical questions or because of data gaps. However, a market-based instrument that internalizes the true cost to human health and the environment could incentivize the responsible use of plastics, including preventing single-use plastics, and raise funds for expenditure to protect the environment (European Academies Science Advisory Council 2020; Powell 2018). It could increase recycling rates, and reduce the use of virgin plastic products (Ministry of Environment and Forestry 2020).
111. Powell (2018) has closely assessed the role that a plastics tax could play in shaping consumer behaviour, internalising the costs of environmental harm and funding for pro-environmental expenditure. The UK-based think tank studied five scenarios for how a plastics tax could be applied on different actors at different stages of the plastics lifecycle, and the impacts it might have in each instance. It concluded that a suite of taxes, rather than a single tax, would be needed to incentivize responses needed from consumers and producers in order to effectively prevent single-use plastics and increase recycling (Powell 2018).
112. The merits of a plastics tax in supporting recycling have already been acknowledged, with several EU Member States including Italy introducing a tax on virgin plastics as a means to ensure they reach EU recycling targets. Looking at how ASEAN countries can improve legislation to curb plastic pollution, Akenji *et al.* (2019) also suggest taxing the production and import of virgin plastics. In a recent report by the OECD, the latter recommend plastics taxes (as well as recycled content targets and EPR with fee modulation schemes) as innovative economic instruments, not generalized at the moment, that need to be extended to more products and countries (OECD 2022).
113. For Knoblauch *et al.* (2021), the focus of policy and research is on the consumption phase, while the production phase is under regulated, and also under researched. In their review of government measures to fight plastic pollution since 2016, they found no policies on production or product design. In order to best design a suite of taxes covering the lifecycle of plastics, further research is needed regarding the interplay between virgin plastic prices and the effectiveness of policies to prevent single-use plastics.

Table 3: Example applications of a plastic tax and potential impacts - Extracted from Powell 2018

	Purchase of monomers	Sale of non-recycled resins	Purchase of non-recycled resins	Purchase of final products (all plastic)	Purchase of final products (specific types)
Statutory incidence (where is the tax levied?)	Industry: Plastic manufacturers Levied by weight or value of monomers purchased.	Industry: Plastic manufacturers. Levied by weight or value of resins sold.	Industry: Converters Levied by weight or value of resins purchased.	Consumers Levied per product, or by the weight of the plastic in the product.	Consumers Levied by product.
Objective	Reduce consumption of plastic throughout the economy by raising the cost of its principal input. Tax could be differentiated between monomers produced from virgin and recycled feedstock.	Incentivise plastic production from recycled resins (supply 'push'), and thus increase demand for recycled plastic (relative to non-recycled).	Incentivise the manufacture of goods using plastic from recycled resins (demand 'pull' from converters), thus increasing final consumption of recycled plastic.	Discourage the purchase of (all) plastic items (demand 'pull' from consumers) in favour either of 'going without' or switching to non-plastic alternatives.	Discourage the purchase and manufacture of particular plastic items while creating demand for alternatives.
Advantages	Could have a significant impact on plastic demand if the costs are passed up the supply chain to manufacturers and consumers. Applied upstream: few economic actors. Easy to administer.	Increases demand from plastic manufacturers for recycled plastic, potentially minimizing waste to landfill and incineration. Applied relatively upstream with a larger (than monomers) but still relatively small tax base. Easy to administer. Reduces demand for oil-based virgin plastic downstream. Incentivises 'circular' production.	Increases demand from converters for recycled plastic, potentially minimizing waste to landfill and incineration. Sends clear signals upstream about the need for more circular business models. A larger tax base than manufacturers, but relatively easy to administer, as the tax base is well defined. Reduces demand for virgin feedstock derived monomers.	Shapes the decisions of consumers, changing perceptions about the need for plastic in the economy. Does not require tariffs and exemptions. Could be refined to exempt recycled products, or exempt particular types of plastic that may be too complex to be in scope at first. Highly visible and likely to be extensively debated in public. Highly visible and likely to be extensively debated in public, so potentially triggering behavioural changes in consumers by this alone.	Can be targeted at particular usages of plastic and have rapid results, as has been seen with the success of plastic bag charging schemes. Does not require tariffs or exemptions. Can act as a gateway - the first step towards increasing awareness of the breadth of plastic use in the economy. Relatively easy to administer. Relatively easy to administer. Availability or necessity of alternatives less likely to be a problem.

	Purchase of monomers	Sale of non-recycled resins	Purchase of non-recycled resins	Purchase of final products (all plastic)	Purchase of final products (specific types)
Disadvantages	Higher risk of the tax being absorbed by profits along the supply chain; potentially raising revenue, but not changing behaviour. 80% of monomer demand in the EU comes from just 9 Member States, so strong opposition could be expected. May require complementary trade arrangements to avoid simply swapping domestic production for imports. Monomers are not yet plastics; this is not technically a plastics tax, but is in practice essentially a fossil fuel tax.	Does not necessarily reduce overall demand for plastic in the economy. 80% of plastics production is in 9 EU Member States only: strong opposition. Assumes sufficient recycled plastic is available. Requires complimentary trade arrangements. High risk of tax being paid, rather than recycled plastic used, if not at a high enough rate. Risk of tax being absorbed throughout supply chains.	Does not necessarily reduce overall demand for plastic in the economy. Requires traceability or certification of provenance of resins. Requires complementary trade arrangements to ensure imported goods cannot undercut those produced domestically.	By itself, does nothing to increase demand for recycled resins upstream. Would need to be calibrated to reflect that most products contain, but are not necessarily 100%, plastic. Products that are entirely made of plastic, i.e. plastic packaging, would be easier to define than others. Very large number of agents involved: administratively complex. If exemptions were to be made for recycled plastic then this could require additional certification and complexity. Alternatives likely to be more readily available for some products than others.	Only tackles the most 'fashionable' or easy to target usages of plastic, but does nothing about less easily definable plastic use through the economy. By itself, does nothing to increase demand for recycled resins upstream. May be simpler and more effective simply to ban these items, as has been proposed for some items by the European Commission in May 2018 (see section 5).

4.4.6. Exemptions

114. It is important to consider the nature and scope of exemptions provided in a given regulation. Where exempted products are produced and consumed in a similar linear fashion as single-use plastics, whether they are thicker plastic bags, paper bags or bio-based compostable plastic bags, these exemptions may create a simple transfer of environmental impacts rather than preventing pollution, including the risk of a higher carbon footprint than plastic considering manufacture and transport (UNEP & WRI 2020). For Herberz *et al.* (2020), single-use items are detrimental for the environment, whether they contain plastic or not, and all of them should be targeted by regulations to curb pollution. In any case, life-cycle assessments are essential to assess potential impacts of legislation, notably, on ecosystems from litter, on climate change, on water availability, and on municipal waste streams.
115. UNEP and WRI (2018) found that 38 countries with policies to prevent single-use plastic bags had exemptions for single-use biodegradable or compostable plastic bags, or otherwise incentivised the production of these single-use biodegradable or compostable bags.
116. Plastics can be biodegradable or non-biodegradable. Biodegradable plastics are broadly understood to refer to plastics that can be degraded under certain conditions, such as temperature, humidity, oxygen content and pH, by microorganisms in nature,

such as bacteria, mould, and algae, and turn into water or and carbon dioxide and other small molecules. Compostable plastics are a subset of biodegradable plastics designed to biodegrade under controlled conditions (European Commission, 2022). However, biodegradable plastics and compostable plastics may be predominantly tested in artificial environments and lack transferability to real conditions in the (marine) environment.

117. There is evidence collected in the last decade, showing that bio-based plastic made from renewable raw materials might have similar impacts as those made with conventional plastic when becoming a component of marine litter (UNEP 2021). They may contain hazardous additives and contaminants, and they can also be non-biodegradable, so they can fragment into microplastics and persist in the environment under ambient conditions.
118. The EU's Directive on the reduction of the impact of certain plastic products on the environment, which includes bans on single-use plastics, is an example of best practice in this regard as it covers all single-use plastics without distinction, conventional, bio-based, biodegradable and compostable.
119. Another specific challenge arises from policies that regulate plastic bags of a specific thickness, and exempt other plastic bags from controls, presuming that thicker bags will necessarily be used as reusable bags. UNEP & WRI (2018) found that 38 countries had an upper thickness limit in their regulations to prevent single-use plastic bags, varying between 15 microns (Uzbekistan) and 250 microns (Saudi Arabia). The state of New York, USA, has set the threshold higher still, banning all plastic bags thinner than 254 microns (10 mils) (Romer 2020). In France, bags labelled as reusable, with a thickness of 50 microns or above, are still distributed for free in shops, while in practice they are rarely reused (Zero Waste France 2020a). Banning bags under a specific threshold might not be successful as it might not lead to a reduction in plastic bag use (UNEP & WRI 2020).
120. These policies imply a need for stakeholders including businesses, law-enforcement and consumers to be able to accurately identify the thickness of different plastic bags to comply with the regulations, which can be challenging in practice. For instance, Senegal adopted a hybrid regulation to ban plastic bags under 30 microns, and impose a levy on thicker bags, in 2015. According to the Ministry of Environment and Sustainable Development, law enforcement and customs lacked instruments to control the thickness of imported bags (Badji 2017). Both Senegal and Rwanda ended up removing thickness thresholds in later updates to their plastic bag legislation (see Rwanda case study).
121. In the USA, local and state-level plastic bag regulations have typically used a threshold of 63.5 microns (2.25 mils) to distinguish single-use plastic bags from reusable ones. However, in some instances such as in Honolulu County, bans on single-use plastic bags under 63.5 microns led to the distribution of free plastic bags thicker than that threshold. Newer policies have tended to increase the threshold to 101.6 microns (4 mils), and 254 microns (10 mils) in New York, while they have also banned the distribution of all free plastic bags, in order to reduce fraudulent attempts to escape compliance (Romer and Tamminen, 2014; Wagner 2017).
122. For this reason, some groups recommend a hybrid approach banning thin plastic bags and imposing levies on thicker reusable bags, to encourage consumers to bring their own reusable bags (Surfrider Foundation 2019c).

4.4.7. Engaging stakeholders, awareness-raising and building pro-environmental behaviour

123. Engagement with business and industry is an important factor to account for successful policies in preventing single-use plastics. According to Akenki *et al.* (2019), there are currently few efforts to engage the upstream business, for instance in ASEAN countries.
124. For Diana *et al.* (2022), there is a need to consider producers when drafting policies, and resources may be used to focus on the largest producers. Indeed, according to Charles *et al.* (2021), more than half of all single-used plastic waste generated in the world in 2019 came from 20 polymer producers only, and 90% came from 100 producers. For Ocean Conservancy and Trash-Free Seas Alliance (2019), a permanent

dialogue between public and private sector is essential, taking into account market dynamics and local specific, and key for effective implementation.

125. On another level, engagement of small and mid-sized enterprises is particularly important (Ocean Conservancy and Trash-Free Seas Alliance 2019), both in the formal and informal sector. Indeed, small retailers and street vendors may be least able to absorb the cost of shifting away from single-use plastics, compared to larger private sector actors, and may therefore require the most support (UNEP & WRI 2020).
126. Meanwhile, consumer behaviour is a key determinant of compliance with both voluntary and binding policies to prevent single-use plastics, whether these are bans or market-based instruments or hybrids. Outreach to groups representing the interests of women, persons with disabilities, minority groups, and young persons will allow better anticipation of policy impacts (UNEP & WRI 2020).
127. Stakeholder engagement is an opportunity to engage in environmental education and awareness-raising and build a pro-environmental identity with possible positive spillover effects in other areas (Jambeck *et al.* 2020). Environmental education and awareness-raising can take many forms, including providing curriculum materials on plastic pollution, as well as citizen-science, with a key role for the scientific and education community, NGOs and local communities (see Chile case study). Practice-based initiatives such as community clean-ups are also an important opportunity (see Rwanda case study). In the USA, mobilization within the scientific community, as well as scientific research were key in passing state-level microbeads bans (see USA case study).
128. Chitotombe and Gukurume (2014) noted that the lack of consultation of different stakeholders including businesses, consumers and informal economic sectors that use single-use plastics may have contributed to greater resistance to Zimbabwe's 2010 hybrid ban and levy policy on single-use plastic bags. Nwafor and Walker (2020) similarly observed that lack of awareness-raising with consumers and businesses contributed to low compliance with Nigeria's single-use plastic bag ban.
129. According to Sharp and al. (2010), education and outreach policies pursued alone, are not likely to result in change in consumer behaviour. In a review of 187 studies, Heidbreder *et al.* (2019) found that although awareness of plastic pollution is high, behaviour change does not follow automatically, mainly due to four obstacles: perceived convenience of single-use plastics, lack of knowledge or opportunities to use alternatives, strong habits, and shifting responsibility on others. These obstacles explain the limited effectiveness of many voluntary initiatives when not part of a broader policy package. Industry actors such as the European Sustainable Business Federation have also recognized the limits of voluntary policies and the need for binding regulation in order to effectively prevent single-use plastics (Ecopreneur.eu 2018).
130. However, these obstacles to consumer avoidance of single-use plastics can be turned into opportunities. Alternatives to single-use plastics can be made as accessible and convenient as single use plastics (for more detail, see reference to PWP outputs on reusables). Strong habits that are consistent with single-use plastic prevention can be cultivated, and citizen science and community clean-ups have shown their effectiveness in this regard, in addition to contributing to environmental education, awareness and social norms (Kießling *et al.* 2017; see also Chile and Rwanda case studies).
131. While consumer behaviour relating to plastic recycling has been widely studied, few studies focus on consumer behaviour to prevent, avoid or reduce consumption of single-use plastics (Heidbreder *et al.* 2019). However, Lymeus (2021) highlights the importance of behavioural science for policy making. It supports green nudging, an emerging policy instrument derived from behavioural science, as part of policymakers' approach to reducing plastic litter and pollution from single-use cups and some similar products, that could even be more successful at targeting environmental issues than other policy instruments. For Lymeus (2021), while public information campaigns are usually costly, not easy to evaluate, and effects are weak or difficult to predict, nudging is generally accepted to most people compared to other instruments, and it can change specific behaviours in measurable ways. An example of a combination of three nudges is presented for take-away coffee cups, which are a major contributor to plastic pollution with the increased sales of take-away: single-use cups are not

the default option; self-service is made easier with reusable cups; refillable cups with coffee subscriptions are tied to branded cups. Nudging requires alliances with businesses and experts in behavioural sciences. Nudges need to be evaluated and adapted to local conditions.

132. There is also a significant research gap relating to behaviour of other constituencies involved in single-use plastic policies including investors, business-owners, workers in establishments producing and selling single-use plastics, law-enforcement officers and policymakers.
133. Resistance to policies preventing single-use plastic has come from businesses in the plastic production and fast-moving consumer goods sectors. For Knoblauch (2021), the plastic industry has a structural and decisive power and strongly resists to plastic bag legislation. Producer Responsibility Organization Ecoembes set-up in the context of Spain's EPR scheme has fought policies to ban or otherwise prevent single-use plastics (Changing Markets Foundation 2021).
134. In India, the All India Plastic Manufacturers Association and the PET Packaging Association for Clean Environment successfully lobbied to weaken the 2016 Plastic Waste Management Rules that mandated a phase-out for all unrecyclable and multilayered plastic packaging, with a 2018 amendment reducing the phase-out to "multi-layered plastic which is non-recyclable or non-energy recoverable or with no alternate use" (Shah 2021). According to UNEP (2015) and Bezerra *et al.* (2021), Malawi has attempted to approve a plastic bag since 2012, however the ban remains inactive, with government decisions challenged by plastic manufacturers.

4.4.8. Levels of jurisdiction

135. Local governments are often those in charge of municipal waste management, including its cost, such as in the USA. For this reason, municipalities have often initiated innovative legislation on single-use plastics, particularly in the absence of national and state actions, to reduce their costs and local environmental impacts (Wagner 2020). Subnational jurisdictions (state, province, canton, or municipal) have passed a significant number of policies to prevent or reduce single-use plastics (Oceana and Plastic Oceans 2019).
136. Even though some policies may be passed at the national level, collaboration with local government and institutions, as well as local businesses and communities, is key for successful enforcement (Ocean Conservancy and Trash-Free Seas Alliance 2019). For instance, China's 2008 hybrid plastic bag ban and levy policy was effective in triggering a strong decrease of plastic bag use in supermarkets, but not in food markets or among small retailers (Xanthos & Walker 2017).
137. At the same time, different levels of jurisdiction can sometimes come into conflict over policies to prevent single-use plastics, as demonstrated by state-level pre-emption policies reversing local policies to prevent single-use plastics in the USA (see USA case study, and UNEP 2018). Several states introduced laws that forbid local governments to introduce bans or to restrict single-use plastics (Knoblauch *et al.* 2021).

4.4.9. Monitoring

138. Monitoring is key to assess compliance with policies to prevent single-use plastics as well as overall effectiveness, and broader impacts (UNEP 2018). Few policies to prevent single-use plastics have consistent monitoring and publicly available monitoring data, and punctual assessments in the academic and grey literature are no substitute for sustained monitoring and evaluation.
139. However, governments have shown keen awareness of the need to address this gap. G20 countries have agreed the "G20 Implementation Framework for Actions on Marine Plastic Litter" which encourages to monitor marine litter including marine plastic litter in a more consistent manner (Ministry of Environment of Japan 2019). In addition, countries have elaborated plans to better monitor the impacts of policies to prevent single-use plastics in particular. Indonesia is planning to more systematically collect data on plastics going for recovery, disposal, and leaking into the open environment (Ministry of Environment and Forestry 2020).
140. Digital technologies such as image recognition or use of cryptographic anchors on single-use plastics have been suggested to optimize sorting of plastic wastes and

provide data for EPR schemes (World Economic Forum 2019). Silva (2020) considers there is a need to develop new technological approaches, to improve both monitoring and mapping of plastic pollution, for example with drones. There is currently no literature exploring the potential of these digital technologies for monitoring the enforcement of and compliance with single-use plastic regulations, and this could be an avenue for future research.

141. Research to quantify effectiveness of policies to reduce microplastic pollution could include monitoring of microplastics in wastewater effluent and at wastewater treatment plants and releases in aquatic environments at baseline levels before policies are implemented, and at regular intervals after entry into force (Xanthos & Walker 2017). This monitoring could help quantify the impacts of exemptions to microbead bans for medical purposes (such as in the USA and New Zealand) and establish whether bans on microbeads in cosmetic rinse-off products is effective enough, or whether bans need to be extended to microbeads used in other sectors of the economy, as well as other primary microplastics such as glitter.
142. The literature suggests a gap in monitoring of compliance with policies to prevent single-use plastics and their impacts, or at least a deficit in making such information publicly available. Monitoring over longer time frames that can reveal evolutions in compliance and rebound effects is also lacking.

4.4.10. Effectiveness

143. Although they can be sometimes challenging to disentangle in practice, it is important to make an analytical distinction between effectiveness (design aspect) and enforcement (operational aspect) of policies to prevent single-use plastics. In particular, bans on single-use plastics may be more effective than levies and other market-based instruments because no banned items may be consumed, while market-based instruments still allow some level of consumption of regulated products. However, bans may be more challenging to enforce at first, and may therefore appear to be less effective until enforcement challenges are overcome. Enforcement is therefore a condition for overall effectiveness, but not a guarantee of effectiveness in such. Likewise, low impact due to poor enforcement does not mean a policy is intrinsically ineffective.
144. The academic literature examining the effectiveness of policies to prevent single-use plastics is limited given that most policies to prevent single-use plastics are relatively new (Schnurr *et al.* 2018, Karasik *et al.* 2019). Grey literature addresses this gap to some extent. For instance, several organizations have made useful attempts to systematically gather effectiveness data for single-use plastic prevention policies (Scientist Action and Advocacy Network (ScaAN) and PlasticBagBan.org's effectiveness database⁶; UNEP 2018), but further academic research on the effectiveness of policies to prevent single-use plastics is needed (Bezerra *et al.* 2021).
145. While there are numerous mentions of effectiveness and enforcement issues in plastics prevention policies, detailed research on effectiveness and enforcement remains scarce in all regions and across all types of single-use plastics. This gap is apparent when considering the inventory of policies to prevent and reduce single-use plastics provided by UNEP in 2018. The report identified 148 regional, national, and local policies adopted between 1970 and 2018. For a vast majority of these policies (62%) on all continents, information on the impact was not available. For example, information on impact was not available for 79% of the policies identified by UNEP in Central and South America, 60% of the policies identified in Africa and in Europe, and for 36% of the policies identified in Asia.
146. Diana *et al.* (2022) did the most extensive research on the topic, with a meta-analysis of the peer-reviewed and grey literature focused on effectiveness of plastic pollution policy, from 2000 to 2019. They remind the low availability of data on effectiveness. For instance, of all the policies included in the vast Duke University Inventory, only 5% of national policies have effectiveness studies in the peer-reviewed literature, with quantitative and qualitative outcomes observed and that can be linked to the policies. They show that in most cases, plastics pollution policies have significant short-term results (1-2 years), with an average decrease of 66% plastic bag consumption across

⁶ https://scaan.net/plastic_global/.

regulatory and economic policies. They also point out that only few studies evaluated policy-effectiveness in the long-term (at least 2 years after the adoption of the policy). These few studies show a reduction of >50% of plastic bags consumption in Toronto, Wales, Malta, Washington D.C, Taiwan (province of China), Seattle, England, Italy, China and Ireland.

147. Introducing new policies also always involves a period of adjustment and adaptation for law-enforcement, businesses, and consumers alike. It is therefore challenging to assess the effectiveness of new policies to prevent single-use plastics in the months and even the first year after their introduction (also recognized in UNEP 2018). In this sense, a number lessons learnt will be provided over time and reflected in academic and grey research. There seems to be no research on adjustment time for plastics policy, although this would be useful for policy makers.
148. The overall literature available on effectiveness focuses on plastic bags and suggests that policy instruments may not necessarily eliminate plastic bag pollution, nor are likely to completely change consumer behaviour, but that both bans and market-based measures have shown significant and consistent reductions in bag consumption (Karasik *et al.* 2019). According to Schnurr *et al.* (2018), the effectiveness of single-use plastics bag policies ranges between 33 and 96% of reduction in bag use.
149. There are few studies on the effectiveness of microbeads bans. These policies are still limited: national microbead bans have been passed in only 12 countries by 2018, and typically focus on rinse-off cosmetics while failing to address microplastics in other sectors including industrial applications, except for New Zealand who has the most comprehensive microbead regulations (UNEP & WRI 2018; Anagnosti *et al.* 2021). These policies have also been inconsistently implemented and have not been consistently monitored (Xanthos & Walker 2017).
150. For Diana *et al.* (2022), the choice between bans and economic instruments is not decisive for effectiveness. The effectiveness of taxes, fees, levies or bans targeting plastic bags are rather impacted by the fee amount (that might need to increase during the implementation), availability of cheap reusable alternatives, public awareness and enforcement mechanisms. The convenience, availability and affordability of sustainable reusable alternatives is also quoted as an important component for the effectiveness of policies preventing single-use plastics, as illustrated by O'Brien and Thondhlana's 2019 study of South Africa's plastic bag levy.
151. According to Diana *et al.* (2022), the nature and scale of single-use plastic production and sales are a major obstacle in the evaluation of policy effectiveness. They support that to inform policy, data on the amounts of plastics sold could be disclosed.
152. UNEP and WRI (2020) reviewed the literature on the impacts of regulatory interventions. Among the main findings, they suggest that most of the policies adopted globally are not comprehensive, since they target only certain single-use plastics products or specific circumstances.
153. Finally it is still not clear what action will be the most effective to combat plastic pollution. A number of policies have been developed at local, national and regional level, and scientists, and the NGO sector are committed to find solutions, however a global evidence-based strategy with practical and measurable action is still lacking, to help build adequate strategies (Lau *et al.* 2020). Lau and his team worked on a model of stocks and flows of municipal solid waste and 4 sources of microplastics, to estimate the effectiveness of current action to reduce plastic pollution. Assuming full implementation of current commitments, they projected that annual plastic pollution rates into the environment (both aquatic and terrestrial) would have decreased only by approximately 7% by 2040. They also projected that even if all feasible interventions were implemented, plastic pollution would be reduced by 40% from 2016 rates and 78% relative to business as usual, meaning we use current knowledge and technology. However, this still means a massive accumulation of plastic into the environment. For the authors, this calls for urgent coordinated action at the global level to reduce plastic consumption.

4.5 IMPACT OF COVID-19 PANDEMIC ON PLASTIC PREVENTION AND MINIMIZATION POLICIES

154. The COVID-19 pandemic had and still has major direct and indirect impacts both on the use of single-use plastics globally, as well as on plastic prevention and minimization policies.
155. Lifestyles, consumption patterns and supply chains were strongly modified, during and after the confinements decided in many parts of the world, affecting several billion people since the outbreak of COVID-19. The use of many types of single-use plastics rose globally, including plastic personal protective equipment (PPE) in medical and non-medical settings (e.g. masks, gloves, shoe covers, head caps, robes), single-use plastic packaging, used in e-commerce, for food take-away and delivery services like single-use plastic bags, packaging and film, as well as single-use hygiene products (e.g. wipes) (Graulich *et al.* 2021; Prata *et al.* 2020). The outbreak thus led to a sudden increase in single-use plastic waste (Prata *et al.* 2020) and littering on land and oceans (OECD 2022). Medical waste due to the pandemic rose sharply, for instance up to 370% in Hubei Province (Knoblauch and Mederake 2021).
156. Benson *et al.* (2021:8) estimated that 1,6 million tonnes of facemasks, corresponding to 3.4 billion single-use facemasks, were disposed every day globally when writing the article in 2021, including 1.8 billion in Asia. Directly attributable to the COVID-19 outbreak, the authors showed it could aggravate the existing plastic pollution and even represent an “impending threat to our collective existence and the survival of marine organisms”.
157. Looking at how this trend could impact climate change, the European Environment Agency (Graulich *et al.* 2021) estimated that the surge in imports to the EU of facemasks and gloves between April and September 2020 caused the emission of 2.4 to 5.7 million tonnes of CO₂ eq. (for facemasks) and 1.5 million (for gloves), during production, transport, and waste treatment. As the pandemic is expected to continue, changes to the consumption patterns and supply chains may persist, and even once it is over (Graulich *et al.* 2021).
158. Assessing alternatives that allow reductions of plastic protective equipment is needed. Silva *et al.* (2021) recommend a sustainable/rational use of plastic protective equipment both in medical and non-medical setting.
159. The surge in the use of single-use facemasks is linked mainly to authorities in large parts of the world mandating citizens to wear masks outside their home, usually in medical establishments, shops, offices, public transports, and often in open air spaces as well (Silva *et al.* 2020), while the risk of contamination in nature was not proved.
160. In some cases, authorities recommended the use of single-use serviceware, although no evidence of contamination was reported. For instance, in the USA, the Centre for Disease Control and Prevention (CDC) recommended the use of single-use service items in restaurants and bars, due to the COVID-19 (Silva *et al.* 2020).
161. The outbreak of COVID-19 also impacted policies aiming at preventing single-use plastics (OECD 2022) with delays in numerous places. Plastic industry lobbyists raised doubts on reusable bags and containers, leaning on safety concerns over the role of reusable plastics as potential vectors for COVID-19 (Silva *et al.* 2020; Prata *et al.* 2020). Many countries used health as an argument against plastic bag bans (Knoblauch and Mederake 2021). In some instances, policies to prevent single-use plastics have been put on hold, with support of the plastic industry (Silva *et al.* 2020, Prata *et al.* 2020). It is the case in Massachusetts and New Hampshire, where single-use plastics were reintroduced, and reusable shopping bags were banned due to concerns over potential health threats to workers and customers (Knoblauch and Mederake 2021). Bans on single-use plastic items were also postponed in India, Portugal, Senegal, multiple states in the United States and South Australia (OECD 2022) and Canada (Knoblauch and Mederake 2021). In the UK, a tax on plastic bags has been halted for online deliveries. There is a risk that these recent measures, although temporary at the time, could become permanent, while there seem to be limited or no benefits for people health or the economy. This could delay the transition towards a circular economy (OECD 2022).

162. Pandemic-related single-use plastic, PPE consumption and contamination will be important areas to assess in the future (Prata *et al.* 2020). It will also be relevant to track the impact of the COVID-19 outbreak on policies to regulate single-use plastics.
163. More research to assess long-term effectiveness of policies to prevent and reduce single-use plastics would be useful, including:
 - (a) The comparative effectiveness of immediate and gradual approaches;
 - (b) The comparative effectiveness of policies to prevent single-use plastics at different levels of jurisdiction, and the role of cooperation and conflict across levels of jurisdiction and government agencies;
 - (c) The comparative effectiveness of policies in countries that are isolated in their efforts to prevent single-use plastics, and in countries that benefit from active cross-border cooperation on the issue;
 - (d) The interplay between virgin plastic prices and the effectiveness of policies to prevent single-use plastics.
164. There is currently limited information available on how effectiveness of policies to prevent single-use plastics is impacted by the behaviour of key constituencies for single-use plastic policies including investors, industry associations, business-owners, workers in establishments producing and selling single-use plastics, law-enforcement officers and policymakers.

5. CASE STUDIES

165. This section explores legal frameworks for policies to prevent single-use plastics, implementation successes and challenges, impacts, and best practice elements, for countries or regions where these aspects are covered in academic or grey literature. Best practice elements are highlighted at the end of each case study.

Antigua and Barbuda case study

166. Antigua and Barbuda is among the top 10 global polluters per capita (Clayton *et al.* 2021). Like the other countries of the Caribbean Small Island Developing States, it faces serious challenges for waste management and plastic litter. Caribbean states suffer from poor waste management systems, limited recycling and illegal plastic waste dumping (UNEP 2018). Some estimations put the wider Caribbean region as one of highest plastic concentration floating globally. 80% of Caribbean marine litter would be composed of single-use plastic and polystyrene. However, they rely strongly on marine ecosystems, especially for tourism (Clayton *et al.* 2021). Like many SDIS, Antigua and Barbuda introduced policies to prevent plastic waste. The state was the first, in the Latin America and Caribbean region, to introduce a ban on single-use plastics (UNEP & WRI 2020).

Policy framework

167. The state of Antigua and Barbuda adopted a phased approach. In July 2016, a ban was introduced on the importation, manufacture and trade of plastic bags. The distribution of bags was prohibited in July 2016, leaving time for retailers to finish their stocks, first in supermarkets, and leaving 3 additional months to smaller shops.
168. During the elaboration of the legislation, four round of stakeholders' consultations were conducted. They included the Ministry of Health, Wellness and the Environment, the Ministry of Foreign Affairs, Immigration and Trade, as well as the National Solid Waste Management Authority, customs control authorities, major retailers and producers. The consultations allowed the industry to share inputs on enforcement challenges and solutions. The ban was incorporated into existing law, rather than creating a whole new law, as it was more rapid.
169. Instrumental to the success of the legislation, was the communication around it. It benefited from an awareness raising campaign all along. Minister of Health and Environment appeared on television before the ban. Frequent TV clips also informed on the progress on the implementation (UNEP 2018).
170. The government promoted the use of reusable bags, and free reusable bags were distributed for free following the ban. The campaign also included an interschool competition to design the campaign logo and local celebrities as ambassadors. The government also introduced a training programme for tailors to fabricate reusable bags. Finally, some materials were selected to become tax free (sugar cane, bamboo, paper and potato starch) to encourage the manufacture of alternatives to single-use bags.

Effectiveness and impacts

171. This ban was considered a success by the government, with a 15% drop in the amount of plastics discarded in landfills. It was followed by later legislation to ban the importation of plastic food containers and cups, in July 2017, and, in January 2018, a ban of single-use plastic utensils, food trays and egg cartons (UNEP 2018).

Antigua and Barbuda: best practice elements

- (a) Phased approach;
- (b) Several rounds of consultation before drafting legislation, including all stakeholders;
- (c) Extensive communication and awareness-raising.

USA case study

172. The USA generates more plastic packaging waste per capita than any other country (UNEP 2018). In 2016, the USA was also the top country generating plastic waste with an estimated 42 Mt, 89% of which was exported to countries facing significant waste management challenges (Law *et al.* 2020).

Policy framework

173. Historically, local governments in the USA have displayed leadership in passing regulations on single-use plastics in order to reduce waste-management costs and environmental harm, particularly in the absence of national and state regulation (Wagner 2017 and 2020). As of April 2021, at least 968 local policies to prevent single-use plastics had been passed across the country (Surfrider Foundation 2021).
174. Policies on single-use EPS illustrate this trend: between 1988 and 2019, 259 municipal single-use EPS bans were passed targeting food containers and service ware. Most bans (75%) were either narrow, only targeting restaurants and food service businesses (with exemptions), or partial, only targeting distribution in government facilities or in large, permitted events, and not broader production, import or distribution. 16% of bans expanded beyond EPS food service ware to single-use EPS coolers and other single-use plastic food service ware. By way of contrast, while Maine was the first jurisdiction to regulate EPS with a partial state ban in 1987, by 2019, only two other states and the District of Columbia had adopted EPS bans (Wagner 2020).
175. Single-use plastic bag policies offer a similar picture. The earliest regulations came from the state of Maine in 1989 requiring retailers to offer paper bags and making plastic bags on demand only (which was since overturned). However, most policy action occurred at the local level, with 271 binding bans, taxes or levies passed between 1990 and September 2017, in addition to countless voluntary policies. 94% of these municipal policies were single-use plastic bag bans, over 57% of which also had levies on paper bags. The remaining 6% of policies were only levies on all single-use bags (Wagner 2017). By September 2020, the number of local plastic bag ordinances has reached 500 in 28 states, while only 8 states have adopted state-wide laws⁷.
176. However, these local efforts have been blocked by preemption laws at the state level removing municipalities' power to pass policies on single-use plastics, particularly since 2018. Preemption laws on plastics have been promoted by sectors of the US plastics industry have now reached 15 states, invalidating existing local regulations and blocking new ones on plastic bags or on all plastic containers (Surfrider Foundation 2019a,b; Changing Markets Foundation 2020). Preemption has also been used to block progressive legislation on other issues such as fracking bans, tobacco control, gun control, anti-discrimination and workers' rights⁸ (Scharff 2018, Briffault 2018).
177. Policies regulating microbeads in the USA have followed a different path, beginning at the state level in 2014 following campaigning by pioneering environmental and scientific groups such as 5Gyres, with Illinois's SB2727 microbead ban. By December 2015, the US Congress had passed the Microbead-Free Waters Act banning microbeads in cosmetics (McDevitt *et al.* 2017).

Effectiveness & impacts

178. Many studies have been conducted to assess the effectiveness of local policies to prevent or reduce single-use plastics in the USA. The Scientist Action and Advocacy Network (ScaAN) in partnership with PlasticBagLaws.org have summarized key findings in a publicly-accessible database⁹, from which several insights emerge.
179. Assessments of plastic bag regulations show that levies and hybrid ban-levy regulations are more effective than ban-only regulations, with measurable impacts in avoided single-use plastic bag use, reduced pollution of storm drains and reduced obstruction of municipal waste management operations, as plastic bags are notoriously problematic for waste-sorting machines. Hybrid ban-levy models typically ban single-use plastic bags and impose fees on single-use paper bags and reusable bags,

⁷ [PlasticBagLaws.org](https://plasticbaglaws.org).

⁸ <https://grassrootschange.net/preemption-watch/>.

⁹ https://scaan.net/plastic_US/.

which reduces consumers' reliance on single-use bags regardless of the material, and supports an overall shift from linear consumption towards waste prevention and reuse (Surfrider Foundation 2019c).

180. However, levy-only models can only be considered where there is some prospect to manage resulting waste in an environmentally-sound manner. For EPS, bans were preferred over levies as single-use EPS cannot be mechanically recycled or composted (Wagner 2020).
181. The interplay between policies at different levels of jurisdiction highlights several issues. Larger business interests may find it easier to comply with policies passed at a higher level, such as the national microbeads ban, rather than having to adapt to than widely varying policies at state or local level (King 2019). However, leadership rarely comes from the national level, and the national microbeads ban would not exist had it not been preceded by state-level policies, while the US still lacks national regulations on other single-use plastics, and even state-level regulations on single-use plastics bags and EPS have a large debt to local leadership (Wagner 2020). The autonomy of local and state governments to experiment with new policies before they are considered at national level is also a key argument invoked by proponents of US federalism (Lowery *et al.* 2011).
182. Therefore, state preemption policies are a genuine threat to the progress of environmental policy in the USA, because they block the key role of localities in raising the bar on environmental legislation including policies on single-use plastics, even though these localities are responsible for shouldering waste-management costs including those arising from single-use plastics (Wagner 2020). State preemption policies do not just nullify local policy, but can impose harsh penalties including fiscally debilitating measures for localities (Schraff 2018) and removal from office of local elected officials, such as in Florida (Schraff 2018; Briffault 2018).

USA: best practice elements

- (a) Hybrid ban-fee policies;
- (b) National microbeads ban.

Rwanda case study

183. Rwanda is often cited in policy circles as a pioneer for its plastic bag policies. It is both one of the first African countries to pass binding environmental legislation on plastic bags, and a leader in terms of effective implementation. Although the plastic pollution issue is often framed in terms of marine impacts, Rwanda is a landlocked country and shows the relevance of plastic pollution beyond a narrow marine frame.

Policy framework

184. Rwanda's earliest legislation on plastic bags was the "2004 Ministerial Instructions on the use and manufacturing of plastic bags in Rwanda", which banned the import, manufacturing and use of plastic bags under 60 microns in thickness. The fact that the ban specifically targeted plastic bags of a specific micronnage when law-enforcement officials and other stakeholders were unequipped to measure it appears to have been a significant obstacle to implementation, according to the explanatory note for the draft 2019 law (Republic of Rwanda 2019a).
185. The 2004 Ministerial Instructions were repealed and replaced by Law 57/2008 of 10/09/2008 relating to the prohibition of manufacturing, importation, use and sale of polythene bags in Rwanda. The 2008 law targeted single-use low-density polyethylene (LDPE) "carry bags" without specifying thickness, with the possibility of exemptions authorised by the Rwanda Environment Management Authority (REMA) or as defined by Order of the Prime Minister, including the use of plastic bags to package meat, chicken, fish and milled cassava leaves for ease of refrigeration (Nshimiyimana & Musore 2021). Penalties included prison terms between 6 and 12 months, moderate fines, and in some instances the confiscation of goods. Fines for manufacturers and businesses ranged between 100,000 and 500,000 RWF (about 85-425 EUR), fines for individual sellers ranged between 10,000 to 300,000 RWF (about 8-258 EUR), and fines for individual users ranged between 5000 and 100,000 RWF (about 4-85 EUR) (Republic of Rwanda 2009).

186. Law 17/2019 of 10/8/2019 repealed and replaced the 2008 law, extending its scope, changing its nature from a pure ban to a hybrid ban and levy, and modulating penalties. Law 17/2019 prohibits the manufacturing, import, use and sale of single-use LDPE “carry bags” and other single-use plastic items, including water bottles, as well as containers for carbonated drinks, juice and milk, in addition to single-use plastic straws, plates, cups and forks (Nshimiyimana & Musore 2021). The law allows for exemptions with prior authorization from relevant authorities, including but not limited to home-compostable plastics and woven polypropylene. However, the law does not exempt oxo-degradable plastics. The 2019 law also imposed a levy on imported goods packaged in plastic, of an unspecified amount.
187. Law 17/2019 modified penalties compared to the 2008 law, by removing imprisonment, broadening the confiscation of goods, and increasing fines to 10,000,000 RWF (about 8,6 EUR) for manufacturers, ten times the value of imports for importers, 700,000 RWF (about 602 EUR) for wholesalers, 300,000 RWF (about 258 EUR) for retailers, and 50,000 RWF (about 43 EUR) for individual users who litter plastic bags. The law allows for a transition period, exempting single-use plastic items already on hand or ordered for 3 months after entry into force, while manufacturing prohibited items have 2 years to comply.

Effectiveness and impacts

188. The literature appears to converge in noting the effective implementation of Rwanda’s 2008 ban and 2019 hybrid ban and levy approach. In terms of environmental impacts, a sharp reduction in plastic bag littering was particularly noticeable in Kigali and other parts of the country (Behuria 2019). Meanwhile, the reduction of plastic bag imports and manufacturing triggered by these policies did not prejudice industrial growth (Babayemi *et al.* 2019). However, smuggling of banned plastic bags continues across borders from neighbouring countries and illicit use persists, albeit on a reduced scale (Behuria 2019).
189. The literature offers some insights on possible explanations for the successful implementation of Rwanda’s plastic bag laws of 2008 and 2019. Behuria points to the Rwandan government’s significant nation-wide awareness-raising campaign in 2004 after a 2003 REMA-funded study showed litter, soil pollution, drainage obstruction and heightened cow morbidity and mortality from plastic bag ingestion (Behuria 2019). In addition, Rwandan authorities used the compulsory monthly community clean-up and gardening sessions called “Umuganda” to conduct awareness-raising on upcoming regulations targeting plastic bags (Danielsson 2017). They also organized the Beat Plastic Pollution Walk in Kigali during Car Free Day in 2018, conducted media campaigns and displayed messaging on roadside billboards, and continue to make regular announcements on flights and tourism websites (Nshimiyimana & Musore 2021).
190. Behuria also considers how the very small size of Rwanda’s plastic industry meant it did not exert significant or effective “business power” on the government - neither in terms of instrumental power (lobbying, the use of political connections and the financing of political parties) or structural power (the pressure that firms apply through their investment decisions).
191. The consistency between the plastic bag laws and the Rwandan government’s tourism policy and commitment to turning its capital Kigali into a model city attracting investments may have also contributed to the Rwandan government’s commitment to implementing its plastic bag policies (Behuria 2019). External policy pressure from the East African Community (EAC)’s 2017 *Polythene Materials Control Bill* prohibiting the manufacturing, sale, import and use of polythene materials contributed to the diffusion of plastic bag reduction norms (Behuria 2019).
192. And indeed, implementation is strict with controls at Rwanda’s borders and points of entry and surprise checks in stores and factories, matched with dissuasive penalties, including prison terms under the 2008 law and no prison terms but heightened fines under the 2019 law (Behuria 2019, Republic of Rwanda 2009 and 2019b).
193. Rwandan authorities’ support for businesses manufacturing alternative products and packaging also contributed to the ban’s effectiveness. While their initial focus was supporting producers of single-use paper and bamboo products and packaging, REMA officials are now also putting increasing emphasis on reuse. While some retailers’

switch from plastic to more expensive packaging such as aluminium has increased the prices of certain goods, increased consumption of paper and bamboo products manufactured locally instead of imported plastic bags has stimulated Rwanda's economy (Nshimiyimana & Musore 2021).

194. There are several gaps in information about Rwanda's single-use plastic bag policies that could be addressed in future research. These include a specific assessment of the effectiveness of the levy on imported goods in plastic packaging in the 2019 law. A detailed analysis of the environmental impacts of the 2019 law would also be needed to inform future amendments and possible extensions to other single-use plastics.
195. In addition, the persistent issue of smuggling of plastic bags from neighbouring countries points to the limits of what national policy can achieve to prevent and reduce single-use plastics. In this respect, a worthwhile line of research could be to investigate the comparative success of countries in preventing single-use plastics when they are alone in their region, when neighbouring countries have similar measures, and when there is active cross-border cooperation on the issue.

Rwanda: best practice elements

- (a) Early environmental education and awareness-raising efforts;
- (b) Effective enforcement and dissuasive penalties;
- (c) Co-benefits with tourism and broader environmental policies;
- (d) Favorable regional policies.

Chile case study

196. Chile is a country with over 4,500km of coastline and significant biodiversity with many endemic species including in its Patagonia region. Before its regulations on single-use plastics bags, plastic bags represented a significant share of plastic anthropogenic marine debris, particularly in waters and beaches in windy coastal areas. Building on a foundation of civic engagement and municipal plastic bag bans, Chile was the first Latin American country to ban the distribution of plastic bags across its national territory in 2018 (Cristi *et al.* 2020).

Policy framework

197. Chile's plastic bag regulations first emerged at the municipal level, with the earliest single-use plastic ban in Pucón in 2013, spreading to 62 other Chilean municipalities over five years, particularly in areas with significant tourism. Municipalities engaged local businesses in their policies to reduce or ban single-use plastic bags and adopted a gradual implementation approach. In 2014, municipalities had to roll back binding regulations and establish voluntary policies following a government decision arising from complaints by single-use plastic bag distributors (Cristi *et al.* 2020).
198. The elaboration of Chile's national law on plastic bags began in 2013 and went through several iterations before being adopted in 2018. Law 21.100 bans commercial establishments from distributing single-use plastic bags, for in-person shopping, deliveries, and e-commerce, across the country. The ban includes polyethylene and polypropylene bags but excludes bio-based biodegradable plastic bags as well as plastic bags used as primary food containers, such as bags used for bread, fish, fruit, and vegetables.
199. Penalties include fines up to five "monthly tax units" (currently about \$330 in total; monthly tax units are adjusted periodically for inflation) for each plastic bag distributed by a commercial establishment, and prior offenses, the offender's economic circumstances, and the number of plastic bags distributed are taken into account to determine the fine. The law provides that the fines benefit the municipality in which the offense takes place, and that local police forces are responsible for enforcement.
200. The law also provides for environmental education programs covering the use of plastic shopping bags, their environmental impacts, reuse and recycling (Republic of Chile 2018).

201. Chilean authorities opted for a gradual implementation plan. The law was published in the official gazette on 3 August 2018, and for the first six months, all businesses could distribute a maximum of two plastic bags per purchase. From 3 February 2019, the ban began to apply to large businesses including supermarkets and retail stores. Smaller businesses (micro, small and medium-sized businesses) continued to have the option to distribute two bags per purchase during a two-year window until 3 August 2020¹⁰.

Effectiveness and impacts

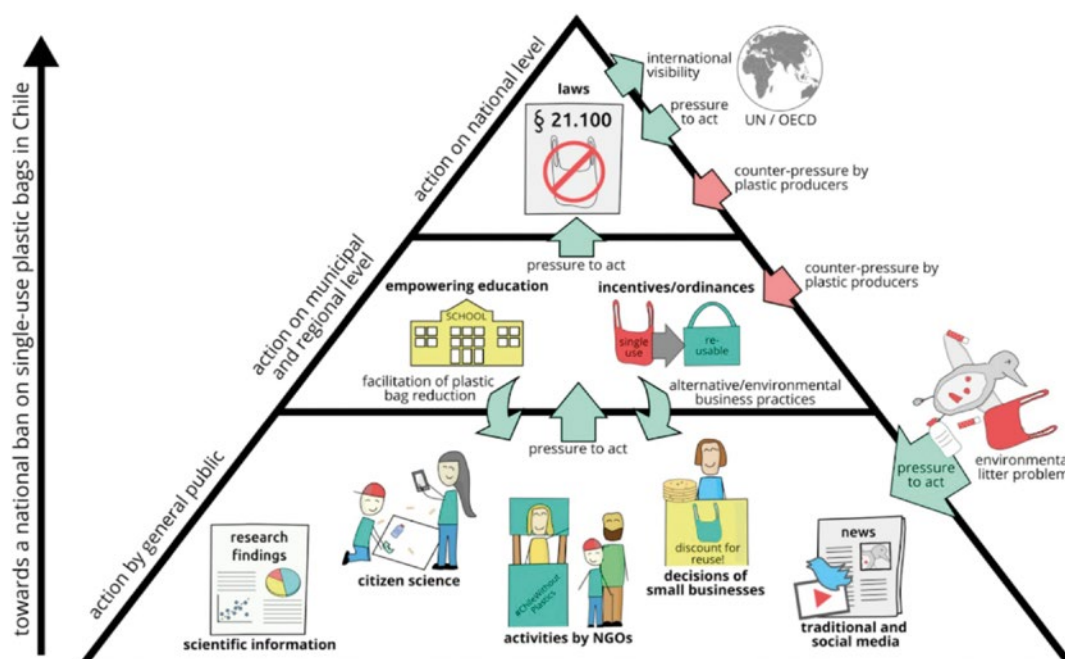
202. Law 21.100 was successfully implemented, according to available academic and grey literature (Cristi *et al.* 2020; Bohaud Ausset 2020). Chile's Ministry of the Environment estimated that prior to law 21.100 and in spite of existing municipal bans, the average annual consumption of single-use plastic bags in Chile was 3,800 million bags per year, and that law 21.100 prevented the use of 1,000 million plastic bags in the first 6 months since its entry into force and despite its gradual implementation (Government of Chile, Ministry of the Environment 2019).
203. However, an increase in illicit distribution of single-use shopping bags by commercial establishments was noted across the country during the COVID-19 pandemic, pointing to the fragility of gains in compliance and behavioural change achieved so far, and persistence of implementation challenges (Bohau Ausset 2020). In addition, some groups have pointed to the risk of increased environmental impacts from increased use of single-use paper bags.
204. Engagement of Chilean citizens through NGOs and citizen science projects since the early 2000s created strong awareness of the environmental impacts of plastic pollution in Chile, and foundation municipal single-use plastic bans. Even though municipalities had to amend their binding regulations to make them voluntary in 2014, municipal regulations on single-use plastic bags continued to increase, along with environmental education and certification schemes to encourage businesses and citizens to comply (Cristi *et al.* 2020).
205. Behavioural shifts around the use of single-use plastic bags were already well underway before Law 21.100 was passed, and can be attributed to bottom-up movement of NGOs, citizen science and municipalities. The 2017-2018 National Environment Survey showed that 66% of Chileans already had the habit of bringing reusable bags when going shopping, usually reusable cotton or polypropylene bags (Bohau Ausset, 2020; Cristi *et al.* 2020).
206. This bottom-up policy, normative and behavioural shift towards pro-environmental behaviour set the ground for the successful enactment and implementation of Law 21.100 (2018), with a likely spillover effect to other single-use plastic items that cause plastic pollution (Cristi *et al.*, 2020). Social media campaigns also contributed to the success of Law 21.100, including Greenpeace Chile's #ChileSinPlasticos and the Ministry of Environment's #ChaoBolsasPlasticas campaigns (Cristi *et al.*, 2020).

Chile: best practices elements

- (a) Citizen science, environmental education;
- (b) Bottom-up ambition from municipal to national level;
- (c) Gradual implementation;
- (d) Shift towards a comprehensive approach.

¹⁰ <https://www.gob.cl/en/news/chaobolsasplasticas-law-banning-chilean-stores-providing-plastic-bags-begins-take-effect-today/>

Graph 3: Schematic overview of bottom-up events that illustrate the informal alliance that helped to generate the broad public support, which is considered instrumental to reach the national ban on SUPBs in Chile.



Source: Amendábar Cristi et al., 2020.

European Union case study

207. The European Union (EU) produces around 60 million tons of plastics every year, which is almost 20% of the global production. Estimates of plastic leaking into the environment in the EU differ greatly, from 500 000 to 6,5 million tons yearly. Considering the higher figure, the UE share of plastic pollution could constitute up to over 7% of global plastic pollution (Halme 2020). Marine pollution is considered severe in the EU.

Policy framework

208. The severe marine pollution in EU requires an urgent and holistic response. It is now considered among the highest priorities of the Union.
209. Plastic pollution, especially in oceans, was first mentioned in 2011 with the “Roadway to a more sustainable Europe”, introducing the protection of marine environments against pollutants, including plastics. Several strategies and regulations for a circular economy, a key component of environmental policy in EU have been adopted during the 2010 decade (Charitou *et al.* 2021).
210. The 2015 EU Plastic Bags Directive (2015/720) significantly reduced the use of plastic bags in many EU countries (Powell 2018). It included a progressive reduction of annual consumption by Member States from 90 lightweight plastic bag per person in December 2019 to 40 by December 2025.
211. Shortly after China banned a majority of plastic waste imports, which was effective in January 2018, the EU adopted the most comprehensive circular approach to regulate plastic (Knoblauch 2021). Its approach, and especially Directive 2019/904, adopted in 2019, provides multilevel coordination at the regional level with unparalleled global impact (Abril Ortiz *et al.* 2020). Indeed circular economy is considered as a key component of environmental policy in the EU. The adoption of the European Strategy for Plastics in Circular Economy identified plastics as a priority: “The significant negative environment, health and economic impact of certain plastics products calls for the setting up of a specific legal framework to effectively reduce those negative effects”. One of its main objectives, is that by 2030, all plastic packaging placed on the EU market is reusable or recyclable in a cost-effective manner.

212. Directive 2019/904 on the reduction of the impact of certain plastic products on the environment, is the first legally binding directive concerning plastics (Charitou *et al.* 2021). Member States have obligations to implement the directive nationally. It is the also first legislation in EU that focus on the plastic itself, rather than focusing on plastic waste (Halme 2020).
213. Below are detailed provisions of Directive 2019/204 concerning prevention and minimization of single-use plastics:
 - (a) 10 single-use plastics were selected to be banned urgently, as they are the most common marine litter items found on beaches of Europe (Addamo *et al.* 2017). The aim is to reduce the amount of single-use plastic products most often found on Europe's beaches, and targeting single-use plastics for which alternatives exist on the market. They would constitute 70% of all waste found in the sea (Halme 2020). These products were prohibited by 3rd of July 2021. They include plastic cutlery, straws, balloon sticks, and food and beverage containers made of EPS. By 3rd July 2024, plastic caps in beverage bottles are allowed only if the cap is attached to the bottle until the end of use (Halme 2020);
 - (b) Restriction of the use of intentionally added microplastics;
 - (c) Ban on products made from oxo-biodegradable plastics;
 - (d) Measures to reduce consumption: Member States are to take measures to achieve a "measurable quantitative reduction" in the consumption of beverage cups, including covers and lids and of specific food containers made of plastic, by 2026, leading to a "substantial reversal of increasing consumption trends" (Cipriani Schirmacher 2021);
 - (e) Specific labelling of some products: sanitary towels, tampons, tampon applicators, wet wipes, tobacco products with filters, filters marketed for use in combination with tobacco products and cups for beverages made of or containing plastic should bear "a conspicuous, clearly legible and indelible marking on its packaging or on the product itself" to inform on the appropriate waste management option, waste options to be avoided, presence of plastic in the products and resulting negative consequences of littering of inappropriate waste disposal (Cipriani Schirmacher 2021). These single-use plastic products were targeted because are often disposed through the sewer networks, leading to pollution and damage to the networks;
 - (f) Application of the Extended Producer Responsibility for tobacco filters and fishing gear (Abril Ortiz 2021) starting in January 2023 and December 2024 respectively (Halme 2020).
214. The legislation imposes information campaigns to inform the citizens, including the alternatives for single-use plastics and impacts of littering on the environment, as well as impacts of plastics in sewage systems.
215. Member States are required to submit statistics yearly, including data on the reduced single-use plastics. The Commission will publish reports and analysis of the effects of the directive by July 2027, and will include, if necessary, further goals for single-use plastics. For Halme (2020), in doing so, the EU will support further national involvement to combat plastic pollution more efficiently.
216. Going further than Directive 2019/214, the UE is willing to support an international treaty on single-use plastics (Halme 2020).
217. EU Member States had till July 2021 to come up with the legislation to comply with the EU 2019/904 Directive. As this is very recent, analysis on impact and effectiveness of Directive 2019/904 is not yet available.
218. It is interesting to note that Italy introduced a plastics tax, however due to several factors, including COVID-19 outbreak, application of the legislation has been pushed several times and is planned to be implemented in 2023 (Zecchini 2021).

EU: best practices elements

- (a) Urgent ban on most polluting single-use plastics;
- (b) Yearly statistics to be provided to the EU Member States to monitor progress;
- (c) Ban on products made from oxo-biodegradable plastics/

France case study

219. France is the first European Union member state to have successfully passed measures to implement the ambitious EU Directive on the reduction of the impact of certain plastic products on the environment (henceforth, EU Single-Use Plastics Directive) (BreakFreeFromPlastic 2020).

Policy framework

220. France's policy approach to single-use plastics began in a piecemeal fashion. Its first single-use plastic policies were three provisions adopted in 2015 within broader environmental Law 2015-992. One provision banned the manufacturing, distribution and sale of oxo-degradable plastic packaging and bags from August 2015. The second provision banned the use of non-compostable packaging for press and advertisement mailings from 1 January 2017. The third provision banned disposable plastic plates and cups except for compostable and bio-based items from 1 January 2020.
221. In 2016, ministerial decree 2016-379 also banned single-use plastic bags under 50 microns in thickness, but exempted compostable bags with a minimal threshold of bio-based feedstock, increasing gradually from 30% in 2017 60% in 2025. Later in the year, environmental Law 2016-1087 added two further provisions banning plastic microbeads in cosmetic products from 1 January 2018 and single-use plastic cotton-buds from 1 January 2020. Single-use plastic cotton-buds for medical use were later exempted from the ban by ministerial decree 2017-291.
222. Law 2018-938 added a ban on the distribution or sale of still water in single-use plastic bottles in school cafeterias from 1 January 2020, except where potable tap water is not available. The law also introduced bans on single-use straws, cutlery, steak skewers, cup covers, food trays, ice-cream containers, clamshells, bowls and stirrers which were initially intended to take effect on 1 January 2020 but delayed to January 2021 by Decree 2019-1451.
223. Law 2020-105 ("anti-waste") consolidated and extended existing provisions to implement the EU Single-Use Plastics Directive, and in some instances even goes beyond it (in particular for plastic confetti and steak skewers). Law 2020-105 also sets a target to phase out all single-use plastic packaging by 2040, as well as single-use plastic reduction targets to be renewed every five years.
224. The law contains other provisions on reuse, recycling, EPR, pellets leakage and secondary microplastic mitigation which are relevant but fall outside the scope of this publication.
225. The law adopts a gradual approach banning single-use plastics including packaging and microbeads over several years:
- (a) From January 2021: ban on straws (except in medical settings), cutlery, stirrers, EPS food containers (for take-away and ready-to-eat food), EPS bottles, plastic-coated paper plates, balloon sticks (except for industrial or professional uses), steak skewers, confettis (not required under the EUP SUP Directive); ban on the free distribution of water in plastic bottles in establishments receiving members of the public;
 - (b) From January 2022 : ban on plastic packaging for fruit and vegetables except for packages weighing 1.5kg or more, and a list of delicate fruit and vegetables fixed by decree; on plastic teabags; on the free distribution of plastic toys (such as by fast-food chains); ban on public procurement of single-use plastics for use in government buildings except where required for health or safety;
 - (c) From January 2024: ban on microbeads in medical products;
 - (d) From January 2025: ban on plastic food containers and food service items, including for reheating or cooking food, in pediatric facilities, obstetrics and maternity clinics, nurseries and school cafeterias due the vulnerability of fetuses, infants, children and teenagers to endocrine disruption triggered by plastic products and their additives;
 - (e) From January 2026: ban on microbeads in cosmetics not already regulated by previous provisions;

- (f) From January 2027: ban on microbeads in detergents and cleaning products. (Zero Waste France 2020a, Surfrider Europe 2020, French Republic 2020).
- (g) While France is leading the way in transposing EU regulations into its domestic legislation, it continues to face challenges in enforcing its earlier policies to prevent single-use plastics. Plastic bags are still a relatively common sight in France, due to a mix of fraud, of use of bags of 50 microns or above as single-use bags (under the pretense of “reuse”), and due to the exemption of compostable bio-based bags. Also, the sale of single-use tableware seemed to continue after the ban in major shops, sometimes under the false claim of “reusable” (Zero Waste France 2020a).

France: best practice elements

- (a) Consolidation of disparate provisions within a single legal framework with ambitious overall objectives and targets renewed every five years;
- (b) Inclusion of plastic confetti.

China case study

226. China has a large population and is a big producer and consumer of plastics. For a long time, China has been actively committed to solving the problem of plastic pollution and has gradually established policies to prevent single-use plastics.

Policy Framework

- 227. In 2007, China formally introduced a plastic bag ban in 2007, effective since June 2008, prohibiting the production and use of ultra-thin plastic bags. However, the rise of China’s e-commerce industry, online shopping, and food delivery services has significantly increased single-use plastic waste. Addressing these concerns, on September 9, 2019, the 10th meeting of the Central Comprehensive Deepening Reform Commission approved a new policy on the basis of the previous plastic bag ban: Opinions on Further Strengthening Plastic Pollution Control (New Plastic Ban). It entered into force in January 2020 and will be fully carried out by 2025.
- 228. The new plastic ban adopts a gradual approach banning different kinds of non-degradable single-use plastics between 2020 and 2025:
 - (a) Prohibiting by the start of 2020 the production and sale of ultra-thin plastic shopping bags (thinner than 0.025 mm), polyethylene agricultural mulch (thinner than 0.01 mm), disposable foam plastic tableware;
 - (b) Prohibiting by the end of 2020: disposable plastic cotton swabs (production and sale), household chemicals containing plastic beads (production), non-degradable plastic bags and non-degradable disposable plastic tableware (use in large cities), non-degradable single-use plastic straws,
 - (c) Prohibiting by the end of 2022: household chemicals containing plastic beads (sale), non-degradable plastic bags and non-degradable disposable plastic tableware (beyond large cities); disposable plastic products in star-rated hotels; non-degradable plastic packaging bags for take-away and delivery in specific provinces;
 - (e) Prohibit by the end of 2025: non-degradable plastic bags (expanded to villages, towns and rural areas); non-degradable disposable plastic tableware in the food and beverage delivery areas of cities above the prefecture level will be reduced by 30%; disposable plastic products in all hotels; non-degradable plastic packaging bags and plastic tape for take-away and delivery (beyond the provinces affected by the 2022 prohibition).

Effectiveness and implementation

229. The ban produced fruitful tangible results in the following years. From 2008 to 2016, data from China’s National Development and Reform Commission (NDRC) shows that the use of plastic bags in hotspots like supermarkets and shopping malls decreased by two-thirds, accounting for 1.40 million tons in plastic. However, ultra-thin plastic

bags remain available in wet markets and among small retailers (China Development Brief 2018).

230. To promote the implementation of the new plastic ban, nine ministries, such as the NDRC and the Ministry of Ecology and Environment, jointly issued a supporting announcement - Notice on Solidly Promote Implementation of Plastic Pollution Control, clarifying requirements for relevant ministries, provinces and municipalities. By the end of 2020, all provinces and municipalities had issued their own action plans accordingly. For example, Beijing identified six key industries, four key locations, and four key alignments for their action, and classified four key scenarios to formulate green daily lives habits.
231. The production and consumption of single-use compostable and degradable plastic products and packaging has increased significantly as a result of these policies. Local environmental groups have raised concerns about associated environmental impacts (China Development Brief 2018).

China: best practice elements

- (a) Nationwide consistency with provincial flexibility to adjust to local situations;
- (b) Top down approach, provenience level has flexibility to adjust based on local situation;
- (c) Coverage of single-use plastic products beyond plastic bags;
- (d) A comprehensive policy covering a verities of consumable plastic products to cultivate green habits;
- (e) Inclusion of the emerging e-commerce industry;
- (f) Dynamic directory.

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7. ANNEXES

ANNEX 1. SAMPLE OF NATIONAL, SUBNATIONAL AND LOCAL POLICIES TO REDUCE AND PREVENT SINGLE-USE PLASTICS COMPILED FROM UNEP 2018 AND KARASIK *ET AL.* 2020

National Scale

Geographic Coverage	Year	Features
Andorra	2017	Ban of lightweight plastic bags
Antigua and Barbuda	2017	Ban on the importation, distribution, sale and use of plastic carrier bags
	2019	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
Australia	2011	Ban of plastic bags <35µ or as per corresponding regulation
Bahamas	2019	Ban of single use plastic food ware and non-biodegradable single-use plastic bags
Bangladesh	2002	Ban on polyethylene plastic bags
Barbados	2019	Ban on importation or manufacture of plastic bags, Ban on importation, distribution or use single use plastic containers and cutlery
Belgium	2007	Levy on consumer to reduce distribution of free plastic carrier bags
Belize	2020	Ban on single-use plastic shopping bags, Styrofoam, and plastic food utensils
Benin	2018	Ban on production, import, export, marketing, distribution, possession and use of non-biodegradable plastic bags
Bhutan	2009	Ban on plastic bags
Botswana	2007	Levy on retailer. No enforcement upon retailers to charge for plastic bags. Retailers decide if and how much to charge
Bulgaria	2011	Levy on supplier on PE bags
Burkina Faso	2014	Ban on production, import, marketing and distribution of non-biodegradable plastic packaging and bags
Cameroon	2012	Ban of manufacture, import, possession and free sale or distribution of non-biodegradable plastic packaging at low density not exceeding 60 microns
Canada	2017	Ban on manufacture, importation or sale of any toiletries that contain microbeads
Cape Verde	2017	Ban on the sale and use of plastic bags
Chile	2018	Ban on the sale of plastic bags
China	2008	Ban on non-biodegradable plastic bags <25 µ and Levy on consumer for thicker ones
Colombia	2016	Ban on disposable plastic bags smaller than 30x30 cm
	2017	Levy on consumer on single-use plastic bags (20 Colombian pesos, around \$1)
	2019	Prohibits the Entry of Single-Use Plastics in the Areas of the System of National Natural Parks Colombia
Cook Islands	2008	Ban on importation of non-biodegradable plastic carrier bags
Costa Rica	2019	Ban on the sale and distribution of single-use plastic straws and bags
Cote d'Ivoire	2014	Ban on the importation, production, use and sale of plastic bags

Geographic Coverage	Year	Features
Croatia	2014	Levy on supplier, with levies to go to the Environmental Protection and Energy Efficiency Fund
Cyprus	2018	Levy on consumer (€ 0.05, around \$0.06) for plastic bags in supermarkets
Czech Republic	2018	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
Democratic Republic of the Congo	2013	Ban on manufacture, import and marketing of nonbiodegradable packaging
Denmark	1994	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)
Djibouti	2016	Ban on the import and marketing of non-biodegradable plastic bags and packaging not produced in the national territory
Dominica	2018	Ban of plastic straws, plastic plates, plastic forks, plastic knives, Styrofoam cups, Styrofoam containers
Ecuador	2018	Ban on single-use plastic strewers, service ware, containers, stirrers, non biodegradable bags, bottles, cotton swabs in educational establishments
Eritrea	2004	Ban on the importation, production, sale, and distribution of plastic bags
Estonia	2017	Levy on consumer on plastic bags
Ethiopia	2007	Ban on production and importation of non-biodegradable plastic bags <30µ
Fiji	2017	Levy on consumer, FJD 0.10 (\$0.05) per plastic bags
	2020	Ban on manufacture, sale, supply or distribution of polystyrene products
France	2015	By 2020, a Ban on all disposable tableware not made from 50% biologically sourced materials that can be composted at home
	2016	Ban on lightweight single-use plastic carrier bags
	2020	Ban on the sale of Q-tips with plastic stem and cosmetic or cleaning products including microbeads
Gabon	2010	Ban of the manufacture and sale of non-recyclable plastic bags
The Gambia	2015	Ban on the sale, importation, manufacture and use of plastic bags
Guatemala	2019	Ban of the use and distribution of single-use plastic bags, plastic straws, disposable plastic plates, glasses and stirrers, and disposable plastic or expanded polystyrene food containers
Guinea-Bissau	2016	Ban on the use of plastic bags
Guyana	2015	Ban on the importation, manufacture and sale of expanded polystyrene products (except for prepackaged food)
Haiti	2013	Ban on the importation of Styrofoam products (NOT CLEAR in legislation, TO CHECK)
India	2016	Ban on non-compostable plastic bags <50µ + Levy on plastic carrier bags
Ireland	2001	Levy on consumer for plastic bags (initially set at €0.15 and later augmented to €0.22, around \$0.26). In 2011 legislation allowed the Levy to be amended once a year, with a ceiling of €0.70 (\$0.86) per bag
Israel	2017	Ban on bags
Italy	2011	Ban on non-biodegradable plastic bags <100µ, with exemption of reusable plastic bags. The Ban only became fully effective in 2014
	2018	Levy on consumer for lightweight plastic bags in supermarkets and grocery stores (around \$0.025 – \$0.12). Only biodegradable and compostable lightweight plastic bags are allowed to be provided or sold

Geographic Coverage	Year	Features
Jamaica	2018	Ban on import or distribution of single-use plastics in commercial quantities (exemption for plastic bags delivery of raw meat ,eggs, flour, sugar, rice or baked goods; in the medical field; and plastic single-use straws for use by persons with disabilities)
Jordan	2017	Ban on the production, import, and circulation of black plastic bags except for those used for waste collection and agricultural seedlings
Kenya	2008	Ban on the manufacture of bags <10 microns. Plastic bags shall be charged at the rate of 50% of their value
	2017	Ban on the importation, production and use of plastic bags
	2018	Ban on manufacture, import, export, use or offer for sale plastic carrier bags and flat plastic bags
	2019	Ban of use of plastic bottles, straws and related products within the protected areas in the national parks, national reserves, conservation areas and any other designated wildlife protected area
Latvia	2009	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
	2021	Ban on sale of single-use products: cotton buds, tableware (forks, knives, spoons, chopsticks), plates, straws, beverage stirrers, balloon sticks, EPS food packaging and beverage containers, including their caps and lids, and cups for beverages
Lesotho	2018	Levy on articles for the conveyance or packing of goods, of plastics; stoppers, caps, lids and other closures, or plastics bags (including cones) with a thickness of 24 microns or more
Lithuania	2016	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
Macedonia	2015	Ban on marketing of non-biodegradable plastic carrier bags
Madagascar	2017	Ban on the import, production for the local market, marketing, distribution, creation and the use of the plastic bags with a thickness less than or equal to 50 microns
Malawi	2015	Ban on the use, sale, production, exportation and importation of plastic bags
Malaysia	2017	Ban on non-biodegradable plastic bags and food containers in Malaysia's Federal Territories
Maldives	2021	Ban on the importation of drinking straws, plates, cutlery and stirrers, Styrofoam lunch boxes, 30x30 cm carrier bags, betel nuts in plastic wrapping, below 250ml coffee cups, cotton wool buds, 50 ml and smaller toiletry bottles, and, below 500ml PET beverage bottles. After December 1, 2022, importation of carrier bags below 50-micron thickness; 50-200 ml toiletry bottles; and, one-liter PET beverage bottles, will also be prohibited.
Mali	2014	Ban on the production, importation and marketing of nonbiodegradable plastic bags
Malta	2004	Levy on plastic bags
	2009	Levy on consumer on all sorts of plastic bags (€0.15, around \$0.18)
Marshall Islands	2016	Ban on importation, manufacture, sale and distribution of plastic shopping bags, styrofoam cups and plates, disposable plastic cups and plates
Mauritania	2013	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
Mauritius	2015	[REVOKED] 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
	2020	Ban on export, import, manufacture or supply, distribution, sale, possession, use of plastic carrier bags, not biodegradable or compostable

Geographic Coverage	Year	Features
Mongolia	2009	Ban on the importation and use of non-biodegradable plastic bags <25µ
Morocco	2009	Ban on the production, importation, sale and distribution of black plastic bags
	2015	Ban on the production, importation, exportation, sale and distribution of plastic bags
Mozambique	2015	Ban on the production, importation, possession and use of plastic bags
The Netherlands	2016	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)
New Zealand	2017	Ban on the sale of cosmetics or cleaning products including microbeads
	2018	Ban on the sale of plastic bags
Niger	2015	Ban on production, importation, usage and stocking of plastic bags
	2019	Ban of use, manufacturing, importation or sale of plastic bags
Nigeria	2019	Ban of plastic Bags
Pakistan	2013	Ban on the importation, manufacture, stockpiling, trade, supply, distribution, sale or use of non-biodegradable plastic bags
Palau	2017	Ban on the importation and distribution of plastic shopping bags
	2018	Ban if use or disposable plastic and polystyrene beverage containers, including water bottles and polystyrene cups, in all government offices and agencies
Panama	2018	Ban of the use of polyethylene bags in supermarkets, self-service stores, warehouses or stores in general for the transportation of products or merchandise.
	2019	Ban on the sale and use of nonbiodegradable plastic bags
	2020	Ban on use and commercialization of plastic ear swabs, plastic covers for laundry clothes, disposable plastic utensils, disposable plastic revolvers, plastic balloons, disposable plastic containers, plastics reeds, disposable plastic caps for glasses, disposable plastic packaging for products
Papua New Guinea	2016	Ban on non-biodegradable plastic shopping bags
Paraguay	2015	Levy on single-use carrier bags for consumer
Peru	2018	Prohibition of the purchase, entry and use of single-use plastic bags, plastic straws and EPS containers in administration offices
Portugal	2015	Levy on supplier. The charge of € 0.10 (around \$0.12) per bag between 15-50µ was mostly passed on to the consumer
Republic of Congo	2011	Ban on the production, import, marketing and use of plastic bags and oxo-biodegradable films
Romania	2009	Levy of €0.05 (around \$0.06) on consumer on non-biodegradable plastic bags
	2018	Ban of the sale of plastic carrier bags <50 microns with a handle
Rwanda	2008	Ban on the production, use, importation and sale of all polyethylene bags
	2019	Ban on the manufacture, use, import or sale of polythene bags and single-use plastic items and Levy on consumer goods packaged in polythene bags or single-use plastic items.
Saint-Vincent and the Grenadines	2017	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
Samoa	2006	Ban on the importation of plastic products
	2019	Ban on the importation, manufacture, export, sale and distribution of plastic shopping bags, packing bags and straws

Geographic Coverage	Year	Features
São Tomé and Príncipe	2020	Ban on the production, importation, marketing and distribution of non-biodegradable plastic bags
Senegal	2016	Ban on the production, importation, possession and use of plastic bags <30µ
	2020	Ban on various single-use plastics products
Seychelles	2012	Ban on export, import, manufacture and sale of bags <30µ
	2013	Ban on import, manufacture, trade and commercial distribution of PVC labels for the purpose of labeling beverage containers for use
	2017	Ban on manufacture, import, distribution of plastic utensils and Polystyrene boxes for use within the Republic of Seychelles
	2017	Ban on manufacture, importation, distribution and sale of plastic bags, for use within the Republic of Seychelles
Slovakia	2018	Levy on consumer for plastic bags between 15 and 50µ
South Africa	2002	Ban on the manufacture, trade and distribution of plastic bags <80 microns
	2003	Ban on the manufacture, trade and distribution of plastic carrier bag and Levy on retailer for thicker ones
Spain	2018	Ban on the distribution of bags<50µ except for very light plastic bags (exemption for bags with a minimum portion of recycled plastic) and Levy on plastic bags for consumers
Sri Lanka	2017	Ban on the sale, and use of polyethylene bags
	2017	Ban on the manufacture of food wrappers from polythene as a raw material for in country use; and the sale, offer for sale, offer free of charge, exhibition or use of food wrappers manufactured from polythene as a raw material within the country
Taiwan, province of China	2017	Ban on manufacture, import and sale of personal care and cosmetic products containing plastic microbeads (apart from those enterprises already manufacturing or importing the products as of August 23, 2016)
Tanzania	2006	Ban on plastic bags and bottles
	2019	Ban on sale of beverage or other commodities wrapped in plastic (unless the nature of such commodities enquire wrappings by plastics). Ban on import, export, manufacture and sale of plastic carrier bags
	2019	Ban on import, export, manufacture, sale, storage, supply and use of all plastic bags
Togo	2011	Ban on the production, importation, marketing and sale of non-biodegradable plastic bags and packaging
Tonga	2013	Levy on plastic bags (importer)
Tunisia	2017	Ban on the production, importation and distribution of single-use plastic bags in major supermarkets and Levy on consumers on thicker ones (>50µ)
Tuvalu	2019	Ban on the import, manufacture, sale and distribution of plastic bags, plastic beverage bottles less than 1.5 liters, plastic straws, polystyrene plates, cups and take-away containers, plastic cutlery, plastic sheet for food wrapping, plastic flags
Uganda	2009	Ban on the importation, manufacture, sale or use plastic bags
United States	2015	Ban on manufacture or introduction or delivery for introduction into interstate commerce of a rinse-off cosmetic that contains intentionally-added plastic microbeads
Uruguay	2018	Ban on the manufacture, import, distribution, sale and delivery of non compostable or biodegradable plastic bags
	2018	Ban on plastic wrappings for newspapers
	2019	Ban on the importation of non-compostable single-use bags
Uzbekistan	2018	Ban on free delivery or sale a at a lower cost of polymer film bundles; production of polymer film packages <40 microns

Geographic Coverage	Year	Features
Vanuatu	2014	Ban on the manufacture, sale or distribution of disposable containers, single-use plastic bags and straws
	2018	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
Vietnam	2012	Levy on plastic bags
	2012	Levy on retailer for non-biodegradable plastic bags
Zambia	2018	Ban on the manufacture, trade and commercial distribution of plastics carrier bags and flat bags < 30 microns
Zimbabwe	2010	Ban on plastic bags
	2017	Ban on Styrofoam products

Subnational and local policies

Country	Scale	Location	Year	Features
Argentina	City	Cordoba	2009	Ban on the use of polyethylene bags
	City	Buenos Aires	2017	Ban on non-biodegradable plastic shopping bags <50 microns
Australia	City	Coles Bay	2003	Ban on non-biodegradable plastic checkout bags
	State	South Australia	2008	Ban on the supply of lightweight checkout style plastic shopping bags
	City	Canberra	2010	Ban on Plastic Shopping Bags
	State	Australian Capital Territory	2011	Ban on lightweight plastic bags
	State	Northern Territory	2011	Ban on plastic bags <35µ
	State	Tasmania	2013	Ban on plastic bags <35µ
	State	Northern Territory	2016	Ban on plastic carry bags <35 microns
	State	Queensland	2017	Ban on plastic carry bags <35 microns
	State	Western Australia	2018	Ban on plastic bags
	State	Queensland	2018	Ban on plastic bags <30µ
	State	Victoria	2018	Ban on plastic bags
	State	Victoria	2019	Ban on sale or provision of plastic bags <35 microns
	State	New South Wales	2021	Ban on supply of lightweight plastic bags <35 microns, including biodegradable, compostable or bio-plastics lightweight bags; single-use plastics straws, stirrers, cutlery, bowls, plates, EPS food service items, plastic cotton buds and microbeads in certain personal care products
	State	New South Wales	2021	Ban on supply of lightweight plastic bags <35 microns, including biodegradable, compostable or bio-plastics lightweight bags; single-use plastics straws, stirrers, cutlery, bowls, plates, EPS food service items, plastic cotton buds and microbeads in certain personal care products
Belgium	Region	Wallonia	2016	Ban on the use of single-use plastic bags
	City	Brussels	2017	Ban on plastic bags
Brazil	City	Sao Paulo	2015	Ban on non-biodegradable plastic bags
	City	Rio de Janeiro	2018	Ban on the distribution and sale of single-use plastic carryout bag to customers

Country	Scale	Location	Year	Features
Canada	City	Leaf Rapids	2007	Ban on plastic bags
	City	Thompson Manitoba	2010	Ban on the sale or give-away for free of plastic shopping bags
	City	Municipality of Wood Buffalo	2010	Ban on single-use plastic bags (<571µ)
	ND	ND	2011	Ban on distribution of beverage containers connected by plastic rings or other connecting devices
	State	Ontario	2015	Ban on manufacture or addition of microbeads in cosmetics, soaps or similar products
	City	Montreal	2016	Ban on plastic bags <50µ
	City	Qualicum Beach British Columbia	2018	Ban on sale or provision of plastic bag and plastic straw. Does not apply to the sale of plastic bags and straws intended for use at the customer's home or business, and solid in packages or multiple
Chad	City	N'Djamena	2010	Ban on the sale of mineral water in plastic packaging «leyda»
Chile	City	Punta Arenas	2014	Ban on polyethylene bags except for perishable food products
China	Province	Jilin province	2014	Ban on production and sale of nonbiodegradable plastic bags and tableware
Ecuador	Islands	Galapagos	2015	Ban on plastic bags
	City	Quito	2019	Ordenanza Metropolitana Para la disminución de plásticos de un solo uso en el distrito metropolitano de Quito
Egypt	City	Hurghada	2009	Ban on the use of plastic bags
Guatemala	City	San Pedro La Laguna	2017	Ban on plastic bags and Styrofoam containers
	City	Cantel	2017	Ban on plastic bags and Styrofoam containers
	City	Quetzaltenango	2017	Ban on plastic bags and Styrofoam containers
	City	San Juan Sacatepéquez	2017	Ban on plastic bags and Styrofoam containers
Honduras	City	Roatán	2016	Ban on plastic bags
	City	Utila	2016	Ban on plastic bags
	City	Guanaja	2016	Ban on plastic bags

Country	Scale	Location	Year	Features
India	State	State of Sikkim	1998	Ban on delivery or purchasing of goods and materials in plastic wrappers or plastic bags
	State	Meghalaya India	2001	Ban on the manufacture, sale, use and throwing of low density plastic bags
	State	West Bengal	2001	Ban on plastic bags <40µ and blanket Ban in certain areas
	State	Tamil Nadu	2002	Ban on sale, storage, transport or use of carrier bag, tumbler or plate made of, or containing, plastic; Ban on sale, storage, distribution or transport of magazine or periodical in plastic wrapper; Ban on use by restaurants of plastic articles: carrier bag, cup, tumbler, plate, spoon, fork, knife, straw, box, string, cord, sheet, mat or other article made of, or containing plastic
	State	Himachal Pradesh	2004	Ban on the production, storage, use, sale and distribution of non-biodegradable plastic bags<70µ. In 2011 a Ban on disposable plastic products, such as plastic cups, drinking glasses and plates was introduced
	State	Haryana	2010	Ban on the manufacture, stocking, distribution, sale or use of plastic carry bags
	State	Karnatka	2016	Ban on manufacture, supply, transport, sale, distribution and use of plastic carry bags, plastics banners, plastic buntings, flex, plastic flags, plates, cups, spoons, cling films and plastic sheets
	State	Punjab	2016	Ban on the manufacture, stocking, distribution, sale or use of single-use plastic carry bags and containers. Exemption on export
	State	Karnatka	2016	Ban on the manufacture, supply, store, transport, sale or distribute use of plastic carrier bags, plastic banners, plastic buntings, flex, plastic flags, plastic plates/cup/spoons, cling films and plastic sheets used for spreading on dining table including the above items made of thermocol and plastic which use plastic microbeads. Exemption include plastic used for packaging of milk or dairy products
	State	Sikkim	2016	Ban on the sale and use of disposable items such as cups, plates, spoons, containers, etc. made from Styrofoam
	City	New Delhi	2017	Ban on all kinds of disposable plastics
	State	Maharashtra	2018	Ban on plastic bags <50µ
	State	Punjab	2018	Ban on plastic carrier bags <50 microns and Levy of at least 0,10\$. Plastic sachets as food containers are limited; Ban on the sale or provision of commodities to consumer in carrier bags or plastic sheet or multilayered packaging
Indonesia	City	Bandung	2016	Ban on the use of Styrofoam
	City	Banjarmasin	2016	Ban on plastic bags
	City	ND	2016	Levy on plastic bags imposed on customers (equivalent to \$0.015 per bag) at selected retailers in 23 cities

Country	Scale	Location	Year	Features
Kenya	County	Nairobi Kenya	2015	Ban on manufacture, possession, sale and distribution or carry bags <30 microns and less than «8x12»
Malaysia	State	Penang	2011	Levy on plastic bags
	State	Penang	2012	Ban on polystyrene
	State	Penang	2017	Ban on single-use plastic bags
Mexico	City	ND	2010	Retailers must charge for plastic bags, which must also be biodegradable
	City	Queretaro City	2018	Ban on disposable plastic bags
Myanmar	City	Mandalay	2009	Ban on the use of small and thin plastic bags
	City	Nay Pyi Taw	2009	Ban on the use of small and thin plastic bags
	City	Yangon	2011	Ban on the production, storage, and sale of polyethylene bags
Pakistan	Region	Islamabad Capital Territory	2013	Ban on the sale, purchase, and use of polyethylene bags and introduction of oxobiodegradable plastic bags
	State	Punjab	2013	Ban on the manufacturing, sale and usage of non-degradable plastic products
	City	Khyber Pakhtunkhwa	2017	Ban on the manufacture, importation, sale and use of non-biodegradable plastic bags and regulation of oxo-biodegradable plastic products
	Province	Sindh	2018	Ban of manufacturing, sale and usage certain non-degradable plastic products, including carrier bags
Peru	City	Magdalena del Mar	2017	Ban on acquisition and use of single-use plastic bags, straws, plastic utensils or EPS containers for beverage and food, plastic wrapping in municipal premises
	City	Ancón	2019	Ban on acquisition, use, or sale of single-use plastic bags, EPS containers or containers for beverage and food in protected natural areas, cultural heritage areas, beaches, museums and entities of state administration

Country	Scale	Location	Year	Features
Philippines	City	Muntinlupa	2010	Ban on the use and sale of plastic bags, and use Styrofoam and other similar materials as containers for food, produce and other products
	City	Marikina City	2012	Ban on the use of plastic bags, of Styrofoam packaging, plates, cups, and containers
	City	Quezon City	2012	Ban on the distribution of plastic bags <15 microns
	City	Caloocan City	2013	Ban on the sale, distribution and use of non-biodegradable materials such as polystyrene and plastic bags as secondary packaging on dry and wet goods
	City	Mandaluyon City	2013	Ban of use of plastic bags and Styrofoam in 3 years
	City	San Carlos	2014	Ban on Styrofoam or expanded polystyrene as containers for food and beverages and plastic cellophanes and sando bags as packaging for customers in restaurants and the like
	City	Muntinlupa	2017	Ban on the distribution of plastic bags with thickness lower than 15 microns
	City	Quezon City	2019	Ban of distribution and use of single-use plastic cutlery for dine-in in hotels and restaurants
	City	Muntinlupa	2011	Ban on the use of plastic bags on dry goods and Styrofoam and Styrophor
Somalia	State	Somaliland	2015	Ban on import and trade of disposable plastic bags
Spain	Region	Andalusia	2011	Levy on consumer for plastic bags (€0.05, around \$0.06). From 2012, increases to €0.10 (around \$0.12)
	Region	Catalonia	2016	Ban on free disposable plastic bags, including biodegradable and oxo-degradable ones
Tanzania	City	Zanzibar	2006	Ban on the importation, distribution and sale of plastic bags <30µ
United Kingdom	State	Wales	2010	Levy on consumer for plastic bags (£0.05)
	State	Northern Ireland	2013	Levy on consumer for plastic bags (£0.05, around \$0.07)
	State	Scotland	2014	Levy on consumer for plastic bags (£0.05, around \$0.07)
	State	England	2015	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
	State	England	2017	Ban on the manufacture and supply of rinse-off personal care products containing microbeads
	State	Scotland	2018	Ban on the supply of rinse-off personal care products containing microbeads
	State	Wales	2018	Ban on the manufacture and supply of rinse-off personal care products containing microbeads

Country	Scale	Location	Year	Features
United States	City	Malibu California	2008	Ban on plastic shopping bags
	State	Washington DC	2009	Levy on consumer for plastic bags (\$0.05)
	City	Los Angeles, California	2010	Ban on sale of plastic carrier bags
	City	American Samoa	2011	Ban on the sale and use of petroleum based plastic bags (some exceptions possible for fresh and frozen products and others)
	City	Seattle WA	2011	Ban on the distribution of single-use plastic carryout bag
	County	Maui and Pala, Hawaii	2008	Ban on single-use plastic bags
	City	Kauai, Hawaii	2011	Ban on single-use plastic bags
	City	Big Island, Hawaii	2013	Ban on single-use plastic bags
	City	Alameda, California	2012	Ban on the distribution and sale of single-use plastic carryout bag
	City	Carmel-by-the-sea	2012	Ban on the distribution and sale of single-use plastic carryout bag
	County	Montgomery County, Maryland	2012	Levy on carryout bag
	County	San Mateo County, California	2012	Ban on the distribution and sale of single-use plastic carryout bag
	County	San Francisco, California	2012	Ban on single-use checkout plastic bags and Levy on consumer on compostable bags, recycled paper bags or reusable (>125 uses) bag of \$0.10
	City	Arcata, California	2013	Ban on the distribution and sale of single-use plastic carryout bag
	City	Austin, Texas	2013	Ban on single-use plastic bags (< 101µ)
	City	Ashland, Oregon	2014	Ban on the distribution of single-use plastic bags
	State	California	2014	Ban on single-use plastic bags and Levy on thicker reusable ones (at least US\$ 0.10)
	State	Illinois	2014	Ban on sale of personal care product containing plastic microbeads by 2018 (over the counter drug excepted) or by 2019 (counter drug included)
	City	American Canyon California	2015	Ban on the distribution of single-use plastic carryout bag
	City	Chicago	2015	Levy on consumer for plastic bags (\$0.07)
	City	New York City	2015	Ban on single-use Styrofoam containers. The Ban was lifted in 2015 and reintroduced in 2017
	City	Aquinnah Massachusetts	2016	Ban on the distribution of single-use plastic carryout bag
	State	Hawaii	2016	Ban on single-use plastic
	City	San Francisco	2016	Ban on the distribution and sale of single-use plastic carryout bag
	City	Avon, Colorado	2017	Ban on the distribution and sale of single-use plastic carryout bag
	State	Oregon	2017	Ban on the distribution and sale of single-use plastic carryout bag to customers

Country	Scale	Location	Year	Features
United States	City	Portland, Oregon	2017	Ban on Single-Use Plastic Polystyrene Foam food containers, single-use plastic checkout bags and restrictions on single-use plastic serveware
	City	Seattle	2017	Ban on single-use plastic bags, including bags labelled with biodegradable, degradable, decomposable or similar, and voluntary Levy on thicker (> 57µ) plastic bags
	City	Chicago	2017	Levy on consumer plastic bags (\$0.07)
	City	Avalon New Jersey	2018	Ban of use of polystyrene/plastic foam, single-use plastic bag, disposable plastic service ware
	City	Manhattan Beach California	2018	Ban on the distribution or sale of single-use plastic carryout bags, of use, distribution and sale of polystyrene food service ware, coolers, packing materials, egg cartons, and produce and meat trays, single-use plastic straws, stirrers, and utensils
	Islands	Nantucket Massachusetts	2018	Ban on the commercial sale, distribute and use of non-recyclable beverage pods, plastic and non-recyclable water containers of 1 L or less, drinking cups and lids, straws and drink stirrers, can and bottle flexibles yokes, single-use plastic plates, bowls and utensils
	City	Acton, Massachusetts	2019	Ban of sale and distribution of thin-fin single-use plastic checkout bags
	City	Amesbury, Massachusetts	2019	Ban of sale and distribution of thin-fin single-use plastic checkout bags
	City	Attleboro, Massachusetts	2019	Ban of sale and distribution of thin-fin single-use plastic checkout bags
	State	Delaware	2019	Ban on the distribution and sale of single-use plastic carryout bag
	State	New York State	2019	Ban on the distribution and sale of single-use plastic carryout bag
	State	Oregon	2019	Ban on the distribution and sale of single-use plastic carryout bag to customers
	City	Peabody Massachusetts	2019	Ban on the distribution and sale of single-use plastic carryout bag to customers
	City	San Francisco California	2019	Ban on the sale, distribution service Ware that is not either compostable or recyclable, any Food Service Ware made, in whole or in part, from Polystyrene Foam, single-use stirrers, splash sticks, cocktail sticks, or toothpicks made with plastic, including compostable, bio- or plant-based plastic, or beginning January 1, 2020, any Food Service Ware that is Compostable and not Fluorinated Chemical Free, packing Materials, including shipping boxes and packing peanuts, coolers, ice chests, or similar containers
	State	Vermont	2019	Ban on the distribution and sale of single-use plastic carryout bag to customers, food or beverage in an expanded polystyrene food service product
	County	Monterey County California	2020	Restrictions on the Use of Polystyrene Foam Food Packaging by Food Providers
	City	Roanoke Virginia	2021	Levy on disposable Plastic Bag

ANNEX 2. DATABASE OF ARTICLES ON REDUCTION AND PREVENTION POLICIES FOR SINGLE-USE PLASTICS

Authors names	Date	Title	Publication name
Kitz, Robert; Walker, Tony; Charlebois, Sylvain; Music, Janet	2022	Food packaging during the COVID-19 pandemic: Consumer perceptions	International Journal of Consumer Studies
Stefen-O'Brien, Aleke; Naji, Abolfazl; Brooks, Amy L.; Jambeck, Jenna R.; Khan, Farhan R.	2022	Marine plastic debris in the Arabian/ Persian Gulf: Challenges, opportunities and recommendations from a transdisciplinary perspective	Marine Policy
Wu, Hsing Hao	2022	A study on transnational regulatory governance for marine plastic debris: Trends, challenges, and prospect	Marine Policy
Borriello, Antonio; Rose, John M.	2022	The issue of microplastic in the oceans: Preferences and willingness to pay to tackle the issue in Australia	Marine Policy
Sarkar, Binoy; Dissanayake, Pavani Dulanja; Bolan, Nanthi S.; Dar, Jaffer Yousuf; Kumar, Manish; Haque, Md Niamul; Mukhopadhyay, Raj; Ramanayaka, Sammani; Biswas, Jayanta Kumar; Tsang, Daniel C.W.; Rinklebe, Jörg; Ok, Yong Sik	2022	Challenges and opportunities in sustainable management of microplastics and nanoplastics in the environment	Environmental Research
Ahmed, Jashim Uddin; Islam, Quazi Tafsirul; Ahmed, Asma; Amin, Sakib Bin	2022	Extending Resource Value-Based Circular Economy Business Model in Emerging Economies: Lessons from India	Business Perspectives and Research
Oyinlola, Muiyiwa; Schröder, Patrick; Whitehead, Timothy; Kolade, Oluwaseun; Wakunuma, Kutoma; Sharifi, Soroosh; Rawn, Barry; Odumuyiwa, Victor; Lendelvo, Selma; Brighty, Geoff; Tijani, Bosun; Jaiyeola, Tomi; Lindunda, Lukonga; Mtonga, Radhia; Abolfathi, Soroush	2022	Digital innovations for transitioning to circular plastic value chains in Africa	Africa Journal of Management
Karima, Afif; Claudia, Rebolledo; Jacques, Roy	2022	Evaluating the effectiveness of the weight-based packaging tax on the reduction at source of product packaging: The case of food manufacturers and retailers	International Journal of Production Economics
Homonoff, Tatiana; Kao, Lee Sien; Selman, Javiera; Seybolt, Christina	2022	Skippping the Bag: The Intended and Unintended Consequences of Disposable Bag Regulation	Journal of Policy Analysis and Management

Authors names	Date	Title	Publication name
Abdolahpur Monikh, Fazel; Hansen, Steffen Foss; Vijver, Martina G.; Kentin, Esther; Nielsen, Maria Bille; Baun, Anders; Syberg, Kristian; Lynch, Iseult; Valsami-Jones, Eugenia; Peijnenburg, Willie J.G.M.	2022	Can Current Regulations Account for Intentionally Produced Nanoplastics?	Environmental Science and Technology
Peng, Guyu; Xu, Baile; Li, Daoji	2022	Gray Water from Ships: A Significant Sea-Based Source of Microplastics?	Environmental Science and Technology
Manalo, Hernani; Manalo, Ma Riza	2022	Slave to sachet economy: Socio-cultural insights	Transnational Marketing Journal
Etim, Mmemek Abasi; Omole, David O.; Araoye, Oyindamola V.	2022	Impact of COVID-19 on medical waste management and disposal practices in Nigeria	Cogent Engineering
Waldschläger, Kryss; Brückner, Muriel Z.M.; Carney Almroth, Bethanie; Hackney, Christopher R.; Adyel, Tanveer Mehedi; Alimi, Olubukola S.; Belontz, Sara Lynn; Cowger, Win; Doyle, Darragh; Gray, Andrew; Kane, Ian; Kooi, Merel; Kramer, Matthias; Lechthaler, Simone; Michie, Laura; Nordam, Tor; Pohl, Florian; Russell, Catherine; Thit, Amalie; Umar, Wajid; Valero, Daniel; Varrani, Arianna; Warriar, Anish Kumar; Woodall, Lucy C.; Wu, Nan	2022	Learning from natural sediments to tackle microplastics challenges: A multidisciplinary perspective	Earth-Science Reviews
Gibbons, David W.; Sandbrook, Chris; Sutherland, William J.; Akter, Rezvin; Bradbury, Richard; Broad, Steven; Clements, Andy; Crick, Humphrey Q.P.; Elliott, Joanna; Gyeltshen, Ngawang; Heath, Melanie; Hughes, Jonathan; Jenkins, Richard K.B.; Jones, Alastair H.; Lopez de la Lama, Rocio; Macfarlane, Nicholas B.W.; Maunder, Mike; Prasad, Ravikash; Romero-Muñoz, Alfredo; Steiner, Noa; Tremlett, James; Trevelyan, Rosie; Vijaykumar, Savita; Wedage, Irushinie; Ockendon, Nancy	2022	The relative importance of COVID-19 pandemic impacts on biodiversity conservation globally	Conservation Biology
Hayat, Khizar; Jianjun, Zhu; Ali, Sharafat; Ageli, Mohammed Moosa	2022	Eco-advertising and Ban-on-Plastic: the Influence of CSR Green Practices on Green Impulse Behavior	Journal of the Knowledge Economy
Huang, Yu Kai; Woodward, Richard T.	2022	Spillover Effects of Grocery Bag Legislation: Evidence of Bag Bans and Bag Fees	Environmental and Resource Economics

Authors names	Date	Title	Publication name
Morin-Crini, Nadia; Lichtfouse, Eric; Liu, Guorui; Balaram, Vysetti; Ribeiro, Ana Rita Lado; Lu, Zhijiang; Stock, Friederike; Carmona, Eric; Teixeira, Margarida Ribau; Picos-Corrales, Lorenzo A.; Moreno-Piraján, Juan Carlos; Giraldo, Liliana; Li, Cui; Pandey, Abhishek; Hocquet, Didier; Torri, Giangiacomo; Crini, Grégorio	2022	Worldwide cases of water pollution by emerging contaminants: a review	Environmental Chemistry Letters
Gimiliani, Giovana Teixeira; Izar, Gabriel	2022	Difficulties in Comparison Among Different Microplastic Studies: The Inconsistency of Results and Lack of Guide Values	Environmental Toxicology and Chemistry
Nikiema, Josiane; Asiedu, Zipporah	2022	A review of the cost and effectiveness of solutions to address plastic pollution	Environmental Science and Pollution Research
Kataki, Sampriti; Nityanand, Krithika; Chatterjee, Soumya; Dwivedi, Sanjai K.; Kamboj, Dev Vrat	2022	Plastic waste management practices pertaining to India with particular focus on emerging technologies	Environmental Science and Pollution Research
Çevik, Cem; Kıdeys, Ahmet Erkan; Tavşanoğlu, Ülkü Nihan; Kankılıç, Gökben Başaran; Gündoğdu, Sedat	2022	A review of plastic pollution in aquatic ecosystems of Türkiye	Environmental Science and Pollution Research
Ageel, Hassan Khalid; Harrad, Stuart; Abdallah, Mohamed Abou Elwafa	2022	Occurrence, human exposure, and risk of microplastics in the indoor environment	Environmental Science: Processes and Impacts
Seay, Jeffrey; Ternes, Mary Ellen	2022	A review of current challenges and legal advances in the global management of plastic waste	Clean Technologies and Environmental Policy
Ali, Sharafat; Ahmed, Waqas; Solangi, Yasir Ahmed; Chaudhry, Imran Sharif; Zarei, Nasibeh	2022	Strategic analysis of single-use plastic ban policy for environmental sustainability: the case of Pakistan	Clean Technologies and Environmental Policy
Molloy, Shen; Varkey, Priyanka; Walker, Tony R.	2022	Opportunities for single-use plastic reduction in the food service sector during COVID-19	Sustainable Production and Consumption
N., Sakthipriya	2022	Plastic waste management: A road map to achieve circular economy and recent innovations in pyrolysis	Science of the Total Environment
Deme, Gideon Gywa; Ewusi-Mensah, David; Olagbaju, Oluwatosin Atinuke; Okeke, Emmanuel Sunday; Okoye, Charles Obinwanne; Odii, Elijah Chibueze; Ejeromedoghene, Onome; Igun, Eghosa; Onyekwere, Joseph Okoro; Oderinde, Olayinka Kehinde; Sanganyado, Edmond	2022	Macro problems from microplastics: Toward a sustainable policy framework for managing microplastic waste in Africa	Science of the Total Environment
Wang, Qian; Guan, Chunya; Han, Jie; Chai, Minwei; Li, Ruili	2022	Microplastics in China Sea: Analysis, status, source, and fate	Science of the Total Environment

Authors names	Date	Title	Publication name
Johansen, Mathilde Rosenberg; Christensen, Thomas Budde; Ramos, Tiffany Marilou; Syberg, Kristian	2022	A review of the plastic value chain from a circular economy perspective	Journal of Environmental Management
Badola, Neha; Bahuguna, Ashish; Sasson, Yoel; Chauhan, Jaspal Singh	2022	Microplastics removal strategies: A step toward finding the solution	Frontiers of Environmental Science and Engineering
Prata, Joana C.; Silva, Ana L.Patício; Duarte, Armando C.; Rocha-Santos, Teresa	2022	The road to sustainable use and waste management of plastics in Portugal	Frontiers of Environmental Science and Engineering
Bui, Thanh Khiet L.; Pham, Quoc Khanh; Doan, Nhu Thuy; Nguyen, Thanh Ban; Nguyen, Van Nghia; Nguyen, Kieu Lan Phuong; Nguyen, Hong Hanh; Nguyen, Hong Quan	2022	Marine litter pollution along sandy beaches of Can Gio coast, Ho Chi Minh City, Vietnam	IOP Conference Series: Earth and Environmental Science
Hoang, T. T.T.; Nguyen, B. A.; Pham, N. N.Q.; Nguyen, N. B.; Tran, T. K.T.; Tu, T. C.L.; Huynh, T. D.; Nguyen, T. N.T.; Pham, T. P.Q.; Nguyen, T. V.; Nguyen, T. L.; Le, Q. H.	2022	The potential emission of personal care products derived plastic microbeads: a case study of Ho Chi Minh City, Vietnam	IOP Conference Series: Earth and Environmental Science
Bauer, Fredric; Nielsen, Tobias D.; Nilsson, Lars J.; Palm, Ellen; Ericsson, Karin; Frâne, Anna; Cullen, Jonathan	2022	Plastics and climate change breaking carbon lock-ins through three mitigation pathways	One Earth
Vuori, Larissa; Ollikainen, Markku	2022	How to remove microplastics in wastewater? A cost-effectiveness analysis	Ecological Economics
Ansink, Erik; Wijk, Louise; Zuidmeer, Frederiek	2022	No clue about bioplastics	Ecological Economics
Subedi, Surya P.; Pandey, Amrisha	2022	Legal Lamination to Transboundary Movement of Plastic Pollutants	Environmental Policy and Law
Trubetskaya, Anna; Scholten, Philip Benjamin Vincent; Corredig, Milena	2022	Changes towards more sustainable food packaging legislation and practices. A survey of policy makers and stakeholders in Europe	Food Packaging and Shelf Life
Friedrich, Daniel	2022	How environmental goals influence consumer willingness-to-pay for a plastic tax: a discrete-choice analytical study	Environment, Development and Sustainability
Bell, Liza; Todoran, Gina Scutelnicu	2022	Plastic bag legislation in the United States: influential factors on its creation	Journal of Environmental Studies and Sciences
Diana, Zoie; Vegh, Tibor; Karasik, Rachel; Bering, Janet; D. Llano Caldas, Juan; Pickle, Amy; Rittschof, Daniel; Lau, Winnie; Virdin, John	2022	The evolving global plastics policy landscape: An inventory and effectiveness review	Environmental Science and Policy
Ngwome, Gideon Fosoh	2022	Plastic waste pollution, environmental impacts and regulatory challenges: The Cameroonian example	Environmental Law Review

Authors names	Date	Title	Publication name
Nguyen, Thu Trang T.; Ha, Ngan Ha; Bui, Thanh Khiat L.; Nguyen, Kieu Lan Phuong; Tran, Diem Phuc T.; Nguyen, Hong Quan; El-Arini, Ashraf; Schuyler, Qamar; Nguyen, Thu Thi Le	2022	Baseline Marine Litter Surveys along Vietnam Coasts Using Citizen Science Approach	Sustainability (Switzerland)
Zhao, Changping; Qi, Xinli; Wang, Jin; Du, Fengyang; Shi, Xiaolan	2022	Predicting Possible New Links to Future Global Plastic Waste Trade Networks	Sustainability (Switzerland)
Raniewska, Marta	2022	Compostable Packaging Waste Management "Main Barriers, Reasons, and the Potential Directions for Development	Sustainability (Switzerland)
Ouyang, Chenlu; Jiang, Huiqi; Sheng, Qing; Liu, Guannan; Jiang, Minghui	2022	Tripartite Evolutionary Game Analysis for Plastic Pollution Prevention and Control under the Background of China's Plastic Ban	Sustainability (Switzerland)
Molloy, Shen; Medeiros, Andrew S.; Walker, Tony R.; Saunders, Sarah J.	2022	Public Perceptions of Legislative Action to Reduce Plastic Pollution: A Case Study of Atlantic Canada	Sustainability (Switzerland)
Wang, Wenhuan; Wei, Jianping; Wu, Dan	2022	The Optimal Strategy of China's Plastic Drinking Straws Ban Based on Consumer Heterogeneity and Retailer Competition	Sustainability (Switzerland)
Campanale, Claudia; Massarelli, Carmine; Bagnuolo, Giuseppe; Savino, Ilaria; Uricchio, Vito Felice	2022	The Problem of Microplastics and Regulatory Strategies in Italy	Handbook of Environmental Chemistry
Gionfra, Susanna; Richer, Clémentine; Watkins, Emma	2022	The Role of Policy in Tackling Plastic Waste in the Aquatic Environment	Handbook of Environmental Chemistry
Stock, Friederike; Reifferscheid, Georg; Brennholt, Nicole; Kostianaia, Evgeniia	2022	Concluding Remarks on the Role of Stakeholders in Addressing Plastic Pollution of the Aquatic Environment	Handbook of Environmental Chemistry
Lara, Octavio H.; Spalding, Mark J.; Navarrete, Alejandra H.; Park, Courtne A.; Braestrup, Angel	2022	The Current State of Law on Plastic Pollution in Mexico and a View Toward the Future	Handbook of Environmental Chemistry
Roberts, Keiron P.; Phang, Sui C.; Williams, John B.; Hutchinson, David J.; Kolstoe, Simon E.; de Bie, Jasper; Williams, Ian D.; Stringfellow, Anne M.	2022	Increased personal protective equipment litter as a result of COVID-19 measures	Nature Sustainability
Royle, Jo; Jack, Ben; Parris, Hannah; Elliott, Tim; Castillo, Arturo Castillo; Kalawana, Shenali; Nashfa, Hawwa; Woodall, Lucy C.	2022	Plastic Drawdown: A rapid assessment tool for developing national responses to plastic pollution when data availability is limited, as demonstrated in the Maldives	Global Environmental Change
Novák, Adam	2022	Legal Regulation of the Management of Primary Microplastics at the EU Level and in Some European Countries	Acta Universitatis Carolinae Iuridica

Authors names	Date	Title	Publication name
Baxter, Lisa; Lucas, Zoe; Walker, Tony R.	2022	Evaluating Canada's single-use plastic mitigation policies via brand audit and beach cleanup data to reduce plastic pollution	Marine Pollution Bulletin
Widagdo, Setyo; Anggoro, Syahriza Alkohir	2022	Combating Ocean Debris: Marine Plastic Pollution and Waste Regulation in Indonesia	International Journal of Marine and Coastal Law
Barouta, Despoina; Alassali, Ayah; Picuno, Caterina; Bruno, Martina; Syranidou, Evdokia; Fiore, Silvia; Kuchta, Kerstin	2022	E-plastics in a circular economy: A comprehensive regulatory review	Journal of Cleaner Production
Barrowclough, Diana; Birkbeck, Carolyn Deere	2022	Transforming the Global Plastics Economy: The Role of Economic Policies in the Global Governance of Plastic Pollution	Social Sciences
Yusuf, Ahmed; Sodiq, Ahmed; Giwa, Adewale; Eke, Joyner; Pikuda, Oluwadamilola; Eniola, Jamiu O.; Ajiwokewu, Bilkis; Sambudi, Nonni Soraya; Bilad, Muhammad Roil	2022	Updated review on microplastics in water, their occurrence, detection, measurement, environmental pollution, and the need for regulatory standards	Environmental Pollution
Grodzińska-Jurczak, Małgorzata; Krawczyk, Aleksandra; Akhshik, Arash; Dedyk, Zuzanna; Strzelecka, Marianna	2022	Contradictory or complementary? Stakeholders' perceptions of a circular economy for single-use plastics	Waste Management
Fogt Jacobsen, Lina; Pedersen, Susanne; Thøgersen, John	2022	Drivers of and barriers to consumers' plastic packaging waste avoidance and recycling - A systematic literature review	Waste Management
Tramoy, R.; Blin, E.; Poitou, I.; Noûs, C.; Tassin, B.; Gasperi, J.	2022	Riverine litter in a small urban river in Marseille, France: Plastic load and management challenges	Waste Management
Arriagada, Ricardo; Lagos, Felipe; Jaime, Marcela; Salazar, César	2022	Exploring consistency between stated and revealed preferences for the plastic bag ban policy in Chile	Waste Management
Jehangir, Alishba; Imtiaz, Maleeha; Salman, Verda	2022	Pakistan's plastic bag ban: an analysis of citizens' support and ban effectiveness in Islamabad Capital Territory	Journal of Material Cycles and Waste Management
Senturk, Gulsah; Dumludag, Devrim	2022	The relationship between consumption of single-use plastic bags, environmental awareness, and socio-demographic factors	Journal of Material Cycles and Waste Management
Yoshida, Aya	2022	China's ban of imported recyclable waste and its impact on the waste plastic recycling industry in China	Journal of Material Cycles and Waste Management
Chen, Yuan; Awasthi, Abhishek Kumar; Wei, Fan; Tan, Quanyin; Li, Jinhui	2021	Single-use plastics: Production, usage, disposal, and adverse impacts	Science of the Total Environment

Authors names	Date	Title	Publication name
Vanapalli, Kumar Raja; Sharma, Hari Bhakta; Ranjan, Ved Prakash; Samal, Biswajit; Bhattacharya, Jayanta; Dubey, Brajesh K.; Goel, Sudha	2021	Challenges and strategies for effective plastic waste management during and post COVID-19 pandemic	Science of the Total Environment
Tomar, Nandini; Srivastava, Ritesh; Mittal, Veena	2021	Mining public opinion on plastic ban in India	Advances in Intelligent Systems and Computing
Pirlot, Alice	2021	Sections 42-85 and schedules 9-15: Plastic packaging tax	British Tax Review
Rafey, Abdul; Siddiqui, Faisal Zia	2021	A review of plastic waste management in India: challenges and opportunities	International Journal of Environmental Analytical Chemistry
Urbina, M. A.; Luna-Jorquera, G.; Thiel, M.; Acuña-Ruz, T.; Amenábar Cristi, M. A.; Andrade, C.; Ahrendt, C.; Castillo, C.; Chevallier, A.; Cornejo-D'Ottone, M.; Correa-Araneda, F.; Duarte, C.; Fernández, C.; Galbán-Malagón, C.; Godoy, C.; González-Aravena, M.; Hinojosa, I. A.; Jorquera, A.; Kiessling, T.; Lardies, M. A.; Lenzi, J.; Mattar, C.; Munizaga, M.; Olguín-Campillay, N.; Perez-Venegas, D. J.; Portflitt-Toro, M.; Pozo, K.; Pulgar, J.; Vargas, E.	2021	A country's response to tackling plastic pollution in aquatic ecosystems: The Chilean way	Aquatic Conservation: Marine and Freshwater Ecosystems
Porta, Raffaele	2021	Anthropocene, the plastic age and future perspectives	FEBS Open Bio
Skoczinski, Pia; Krause, Lars; Raschka, Achim; Dammer, Lara; Carus, Michael	2021	Current status and future development of plastics: Solutions for a circular economy and limitations of environmental degradation	Methods in Enzymology
Mathur, Aakriti; Singh, Kanwal D.P.	2021	Analysis of plastic waste management in India: Study of law and behaviour	World Review of Entrepreneurship, Management and Sustainable Development
Hurmelinna-Laukkanen, P. I.A.; Paukku, Eelis; Taskila, Sanna	2021	Innovation management responses to regulation-SUP-Directive and replacing plastic	International Journal of Innovation Management
McKinnon, Aaron	2021	Journalism needs to get political about plastic pollution: French vs us approaches	Critical Studies on Corporate Responsibility, Governance and Sustainability
Walker, Tony R.; McGuinty, Eamonn; Charlebois, Sylvain; Music, Janet	2021	Single-use plastic packaging in the Canadian food industry: consumer behavior and perceptions	Humanities and Social Sciences Communications

Authors names	Date	Title	Publication name
Muposhi, Asphat; Mpiganjira, Mercy; Wait, Marius	2021	Efficacy of plastic shopping bag tax as a governance tool: Lessons for south Africa from Irish and Danish success stories	Acta Commercii
Syberg, Kristian; Nielsen, Maria Bille; Westergaard Clausen, Lauge Peter; van Calster, Geert; van Wezel, Annemarie; Rochman, Chelsea; Koelmans, Albert A.; Cronin, Richard; Pahl, Sabine; Hansen, Steffen Foss	2021	Regulation of plastic from a circular economy perspective	Current Opinion in Green and Sustainable Chemistry
Calero, Monica; Godoy, Veronica; Quesada, Lucia; Martin-Lara, Maria Angeles	2021	Green strategies for microplastics reduction	Current Opinion in Green and Sustainable Chemistry
Aragaw, Tadele Assefa	2021	Microplastic pollution in African countries water systems: a review on findings, applied methods, characteristics, impacts, and managements	SN Applied Sciences
Borkowski, Kazimierz	2021	Plastics waste litter in oceans as a driving force for regulations plastics	Polimery/Polymers
Wen, Zongguo; Xie, Yiling; Chen, Muhan; Dinga, Christian Doh	2021	China's plastic import ban increases prospects of environmental impact mitigation of plastic waste trade flow worldwide	Nature Communications
Iroegbu, Austine Ofondu Chinomso; Ray, Suprakas Sinha; Mbarane, Vuyelwa; Bordado, João Carlos; Sardinha, José Paulo	2021	Plastic Pollution: A Perspective on Matters Arising: Challenges and Opportunities	ACS Omega
Schmidt, Jannick; Auer, Maximilian; Moesslein, Jochen; Wendler, Pascal; Wiethoff, Stefan; Lang-Koetz, Claus; Woidasky, Jörg	2021	Challenges and Solutions for Plastic Packaging in a Circular Economy	Chemie-Ingenieur-Technik
Lopez-Fernandez, María Del Mar; Gonzalez-García, Francisco; Franco-Mariscal, Antonio Joaquín	2021	Should We Ban Single-Use Plastics? A Role-Playing Game to Argue and Make Decisions in a Grade-8 School Chemistry Class	Journal of Chemical Education
Bank, Michael S.; Ok, Yong Sik; Swarzenski, Peter W.; Duarte, Carlos M.; Rillig, Matthias C.; Koelmans, Albert A.; Metian, Marc; Wright, Stephanie; Provencher, Jennifer F.; Sanden, Monica; Jordaan, Adrian; Wagner, Martin; Thiel, Martin	2021	Global plastic pollution observation system to aid policy	Environmental Science and Technology
Borg, Kim; Lindsay, Jo; Curtis, Jim	2021	When news media and social media meet: How Facebook users reacted to news stories about a supermarket plastic bag ban	New Media and Society

Authors names	Date	Title	Publication name
Zaheer, Maryam; Hussain, Basharat; Fatima, Tehniyat; Edgley, Alison	2021	Consumers' opinions on the plastic bag ban and using eco-friendly bags for shopping in Pakistan	Asian Journal for Public Opinion Research
Vasilenok, V. L.; Ignatieva, T. A.; Liubarskaia, M. A.; Pilyavsky, V. P.	2021	Circular Economy and Digital Technologies as a Tool for Overcoming the Post-Pandemic Crisis in Russia	Smart Innovation, Systems and Technologies
Woods, John S.; Verones, Francesca; Jolliet, Olivier; Vázquez-Rowe, Ian; Boulay, Anne Marie	2021	A framework for the assessment of marine litter impacts in life cycle impact assessment	Ecological Indicators
Sicotte, Diane M.; Seamon, Jessica L.	2021	Solving the Plastics Problem: Moving the U.S. from Recycling to Reduction	Society and Natural Resources
Newell, Ben R.; Moss, Jeremy	2021	Making it easier to take environmental actions is not enough: Policymakers must also emphasize why action is necessary	Behavioral Science and Policy
Cowan, Emily; Booth, Andy M.; Misund, Andreas; Klun, Katja; Rotter, Ana; Tiller, Rachel	2021	Single use plastic bans: Exploring stakeholder perspectives on best practices for reducing plastic pollution	Environments - MDPI
Muposhi, Asphat; Shamhuyenzva, Roy	2021	Retailer Volunteerism as a Plastic Shopping Bag Governance Tool: Shoppers' Reflections and Contributions to Environmental Social Marketing	Social Marketing Quarterly
Hardy, Scott; Bartolotta, Jill	2021	Farmers Markets and Single-Use Plastic: Why Environmentally Conscious Consumers Don't Bring Reusable Bags	Journal of Extension
Browning, Shelby; Beymer-Farris, Betsy; Seay, Jeffrey R.	2021	Addressing the challenges associated with plastic waste disposal and management in developing countries	Current Opinion in Chemical Engineering
Filiciotto, Layla; Rothenberg, Gadi	2021	Biodegradable Plastics: Standards, Policies, and Impacts	ChemSusChem
El Mekaoui, Amina; Benmouro, Youness; Mansour, Hicham Ait; Ramirez, Othon Banos	2021	Plastic bags ban and social marginalization: Evidence from Morocco	Polish Journal of Environmental Studies
Azevedo-Santos, Valter M.; Brito, Marcelo F.G.; Manoel, Pedro S.; Perroca, Julia F.; Rodrigues-Filho, Jorge Luiz; Paschoal, Lucas R.P.; Gonçalves, Geslaine R.L.; Wolf, Milena R.; Blettler, Martin C.M.; Andrade, Marcelo C.; Nobile, André B.; Lima, Felipe P.; Ruocco, Ana M.C.; Silva, Carolina V.; Perbiche-Neves, Gilmar; Portinho, Jorge L.; Giarrizzo, Tommaso; Arcifa, Marlene S.; Pelicice, Fernando M.	2021	Plastic pollution: A focus on freshwater biodiversity	Ambio

Authors names	Date	Title	Publication name
Islam, Ariful; Kalam, Md Abul; Sayeed, Md Abu; Shano, Shahanaj; Rahman, Md Kaisar; Islam, Shariful; Ferdous, Jinnat; Choudhury, Shusmita Dutta; Hassan, Mohammad Mahmudul	2021	Escalating SARS-CoV-2 circulation in environment and tracking waste management in South Asia	Environmental Science and Pollution Research
Dharmaraj, Selvakumar; Ashokkumar, Veeramuthu; Hariharan, Sneha; Manibharathi, Akila; Show, Pau Loke; Chong, Cheng Tung; Ngamcharussrivichai, Chawalit	2021	The COVID-19 pandemic face mask waste: A blooming threat to the marine environment	Chemosphere
Shi, Jiujie; Zhang, Chao; Chen, Wei Qiang	2021	The expansion and shrinkage of the international trade network of plastic wastes affected by China's waste management policies	Sustainable Production and Consumption
Courtene-Jones, Winnie; Maddalene, Taylor; James, Molly K.; Smith, Natalie S.; Youngblood, Kathryn; Jambeck, Jenna R.; Earthrowl, Sally; Delvalle-Borrero, Denise; Penn, Emily; Thompson, Richard C.	2021	Source, sea and sink-A holistic approach to understanding plastic pollution in the Southern Caribbean	Science of the Total Environment
Mallick, Suraj K.; Pramanik, Malay; Maity, Biswajit; Das, Pritiranjana; Sahana, Mehebab	2021	Plastic waste footprint in the context of COVID-19: Reduction challenges and policy recommendations towards sustainable development goals	Science of the Total Environment
Chowdhury, Rubel Biswas; Khan, Ayushi; Mahiat, Tashfia; Dutta, Hillol; Tasmee, Tahana; Binth Arman, Afra Bashira; Fardu, Farzin; Roy, Bidhan Bhuson; Hossain, Mohammad Mosharraf; Khan, Niaz Ahmed; Amin, A. T.M.Nurul; Sujaudhin, Mohammad	2021	Environmental externalities of the COVID-19 lockdown: Insights for sustainability planning in the Anthropocene	Science of the Total Environment
Mallik, Abhijit; Xavier, K. A.Martin; Naidu, Bejawada Chanikya; Nayak, Binaya Bhusan	2021	Ecotoxicological and physiological risks of microplastics on fish and their possible mitigation measures	Science of the Total Environment
Parashar, Neha; Hait, Subrata	2021	Plastics in the time of COVID-19 pandemic: Protector or polluter?	Science of the Total Environment
Turner, Andrew; Filella, Montserrat	2021	Lead in plastics - Recycling of legacy material and appropriateness of current regulations	Journal of Hazardous Materials
Haq, Md Sazzadul; Sharif, Shafkat; Masnoon, Aseer; Rashid, Ebne	2021	SARS-CoV-2 pandemic-induced PPE and single-use plastic waste generation scenario	Waste Management and Research
Velasco Perez, Maribel; Sotelo Navarro, Perla Xochitl; Vazquez Morillas, Alethia; Espinosa Valdemar, Rosa María; Hermoso Lopez Araiza, Jessica Paola	2021	Waste management and environmental impact of absorbent hygiene products: A review	Waste Management and Research

Authors names	Date	Title	Publication name
Tsai, Wen Tien	2021	Analysis of plastic waste reduction and recycling in Taiwan, Province of China	Waste Management and Research
Akan, Otobong Donald; Udofia, Godwin Evans; Okeke, Emmanuel Sunday; Mgbachidinma, Chiamaka Linda; Okoye, Charles Obinwanne; Zoclanclounon, Yedomon Ange Bovys; Atakpa, Edidiong Okokon; Adebajo, Omosalewa Oluwafunmilayo	2021	Plastic waste: Status, degradation and microbial management options for Africa	Journal of Environmental Management
Liu, Zhe; Liu, Weili; Walker, Tony R.; Adams, Michelle; Zhao, Jingjing	2021	How does the global plastic waste trade contribute to environmental benefits: Implication for reductions of greenhouse gas emissions?	Journal of Environmental Management
Willis, K. A.; Hardesty, B. D.; Wilcox, C.	2021	State and local pressures drive plastic pollution compliance strategies	Journal of Environmental Management
Hantoko, Dwi; Li, Xiaodong; Pariatamby, Agamuthu; Yoshikawa, Kunio; Horttanainen, Mika; Yan, Mi	2021	Challenges and practices on waste management and disposal during COVID-19 pandemic	Journal of Environmental Management
Xu, Yuyao; Chan, Faith Ka Shun; He, Jun; Johnson, Matthew; Gibbins, Christopher; Kay, Paul; Stanton, Thomas; Xu, Yaoyang; Li, Gang; Feng, Meili; Paramor, Odette; Yu, Xubiao; Zhu, Yong Guan	2021	A critical review of microplastic pollution in urban freshwater environments and legislative progress in China: Recommendations and insights	Critical Reviews in Environmental Science and Technology
Liang, Yangyang; Song, Qingbin; Wu, Naiqi; Li, Jinhui; Zhong, Yuan; Zeng, Wenlei	2021	Repercussions of COVID-19 pandemic on solid waste generation and management strategies	Frontiers of Environmental Science and Engineering
Turner, Andrew; Filella, Montserrat	2021	Hazardous metal additives in plastics and their environmental impacts	Environment International
Tan, Wenbing; Cui, Dongyu; Xi, Beidou	2021	Moving policy and regulation forward for single-use plastic alternatives	Frontiers of Environmental Science and Engineering
Krysovaty, Andriy; Zvarych, Roman; Zvarych, Iryna; Reznikova, Nataliia; Homotiuk, Viktoriia	2021	Circular Economy as an anti-crisis method for global economy recovery under COVID-19: employment and tax shift effect	Procedia Environmental Science, Engineering and Management
Prabawa, F. Y.; Adi, N. S.; Pranowo, W. S.; Sukoraharjo, S. S.; Gautama, B. G.; Suhelmi, I. R.	2021	Strategy on marine debris reduction in Indonesia: A review and recommendation	IOP Conference Series: Earth and Environmental Science
Syari, I. A.; Manik, J. D.N.; Akhrianti, I.; Pamungkas, A.	2021	Marine debris: Sources, characteristics, and environmental impact on Baturusa River, Bangka Belitung	IOP Conference Series: Earth and Environmental Science
Ain, K. Q.; Nasri, M. A.; Alamsyah, M. N.; Pratama, M. D.R.; Kurniawan, T.	2021	Collaborative governance in managing plastic waste in Bali	IOP Conference Series: Earth and Environmental Science

Authors names	Date	Title	Publication name
Nurhayati, E.; Tangahu, B. V.; Mahardini, I. R.; Berlianto, M.; Yuliawati, A. A.	2021	Marine debris monitoring in the coastal area of the District of Banyuwangi, Indonesia: Characterization of the debris type and composition	IOP Conference Series: Earth and Environmental Science
Akbar, D.; Mariani; Yudiantmaja, W. E.; Edison	2021	Governance of mangrove restoration and conservation to climate change resilience in Bintan Island	IOP Conference Series: Earth and Environmental Science
Zhou, Xi; Yi, Cen; Deng, Dexiang	2021	Sustainable development strategy of beverage straws for environmental load reduction	IOP Conference Series: Earth and Environmental Science
Taryono; Wulandari, D. Y.	2021	Management strategy of plastic waste in the Cimandiri River-Sukabumi, West Java	IOP Conference Series: Earth and Environmental Science
Hermawan, M.; Heriyati, P.; Andrew, N.	2021	Exploring program on ocean plastic pollution management: Case of NGO in Jakarta	IOP Conference Series: Earth and Environmental Science
Li, Bowen; Liu, Jinxi; Yu, Boxin; Zheng, Xiaoyu	2021	The Environmental Impact of Plastic Grocery Bags and Their Alternatives	IOP Conference Series: Earth and Environmental Science
Nizardo, Noverra M.; Budianto, Emil; Djuwita, Ratna	2021	Plastic waste management model solution in Ciliwung River Basin	IOP Conference Series: Earth and Environmental Science
Chen, Caihong	2021	Treatment of plastic pollution based on the perspective of internet + “plastic ban”	IOP Conference Series: Earth and Environmental Science
Cortés, Giovanna Del Pilar Garzon; Velandia, Krystle Danitza Gonzalez; Garcia, Helmut Espinosa; Sanabria, Camilo Torres	2021	Re-thinking the Academic Role in the Circular Economy Discourse	Ambiente e Sociedade
Shen, Chenhao; Deng, Yixiang; Zhang, Jiaxu; Zhang, Chenglong	2021	Improve Life Cycle Management of Plastic Pollution in China	Research of Environmental Sciences
Mensah, Angela Cindy Emeffa	2021	Tax elasticity of demand for plastic: the cause of plastic pollution in Ghana	Journal of Environmental Economics and Policy
Rondon-Jara, Evelyn; Lipa-Echevarria, Kimberly; Marchena-Barrientos, Sabrina; Chambi-Quispe, Mery Laura; Carocancha-Condori, Gonzalo Jesus	2021	Comparison of the enacted laws on the consumption of plastic bags in Peru and Chile	Produccion y Limpia
Jahan, Ishrat	2021	Do We Need an International Instrument for the Recognition of the Right to a Healthy Environment?	Environmental Policy and Law
Freestone, David	2021	Can we save the blue half of our planet?	Environmental Policy and Law

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Poto, Margherita Paola; Elvevoll, Edel Oddny; Sundset, Monica Alterskjaer; Eilertsen, Karl Erik; Morel, Mathilde; Jensen, Ida Johanne	2021	Suggestions for a systematic regulatory approach to ocean plastics	Foods
Liu, Fei Fei; Wang, Su Chun; Zhu, Zhi Lin; Liu, Guang Zhou	2021	Current progress on marine microplastics pollution research: A review on pollution occurrence, detection, and environmental effects	Water (Switzerland)
Foolmaun, Rajendra Kumar; Chamilall, Dinkar Sharma; Munhurrin, Girish; Sookun, Anand	2021	Was Mauritius really successful in banning plastic carry bags, after promulgation of the regulation prohibiting plastic bags usage?	Environment, Development and Sustainability
Tavana, Madjid; Khalili Nasr, Arash; Mina, Hassan; Michnik, Jerzy	2021	A private sustainable partner selection model for green public-private partnerships and regional economic development	Socio-Economic Planning Sciences
Sumanik, Novike Bela; Meilvidiri, Wayrohi; Siregar, Lamtiar; Hidayat, Serli Hatul	2021	Public Policy Analysis on Plastic Waste Control in Merauke	Review of International Geographical Education Online
Behuria, Pritish	2021	Ban the (plastic) bag? Explaining variation in the implementation of plastic bag bans in Rwanda, Kenya and Uganda	Environment and Planning C: Politics and Space
Rostvik, Camilla Mork	2021	Do Not Flush Feminine Products! The Environmental History, Biohazards and Norms Contained in the UK Sanitary Bin Industry Since 1960	Environment and History
Hermawan, Sapto; Astuti, Wida	2021	Analysing several ASEAN countries' policy for combating marine plastic litter	Environmental Law Review
Aretoulaki, Eleni; Ponis, Stavros; Plakas, George; Agalianos, Kostantinos	2021	MARINE PLASTIC LITTERING: A REVIEW OF SOCIO ECONOMIC IMPACTS	Journal of Sustainability Science and Management
Meng, Mingfu; Wen, Zongguo; Luo, Weijun; Wang, Shijie	2021	Approaches and policies to promote zero-waste city construction: China's practices and lessons	Sustainability (Switzerland)
Cayumil, Romina; Khanna, Rita; Konyukhov, Yuri; Burmistrov, Igor; Kargin, Jumat Beisembekovich; Mukherjee, Partha Sarathy	2021	An overview on solid waste generation and management: Current status in Chile	Sustainability (Switzerland)
Kumar, Rakesh; Verma, Anurag; Shome, Arkajyoti; Sinha, Rama; Sinha, Srishti; Jha, Prakash Kumar; Kumar, Ritesh; Kumar, Pawan; Shubham; Das, Shreyas; Sharma, Prabhakar; Prasad, P. V. Vara	2021	Impacts of plastic pollution on ecosystem services, sustainable development goals, and need to focus on circular economy and policy interventions	Sustainability (Switzerland)
Liu, Chen; Bunditsakulchai, Pongsun; Zhuo, Qiannan	2021	Impact of covid-19 on food and plastic waste generated by consumers in Bangkok	Sustainability (Switzerland)

Authors names	Date	Title	Publication name
Zhao, Changping; Liu, Mengru; Du, Huanzheng; Gong, Yu	2021	The evolutionary trend and impact of global plastic waste trade network	Sustainability (Switzerland)
Farrelly, Trisia A.; Borrelle, Stephanie B.; Fuller, Sascha	2021	The strengths and weaknesses of pacific islands plastic pollution policy frameworks	Sustainability (Switzerland)
Heath, Abigail; Cotton, Matthew	2021	Responsibility, engagement, and policy strategy for ocean plastic waste management: a Q-method study of stakeholder perspectives	Journal of Environmental Planning and Management
Shipton, Leah; Dauvergne, Peter	2021	Health concerns of plastics: energizing the global diffusion of anti-plastic norms	Journal of Environmental Planning and Management
Hunt, Claire F.; Lin, Wilson H.; Voulvoulis, Nikolaos	2021	Evaluating alternatives to plastic microbeads in cosmetics	Nature Sustainability
Mah, Alice	2021	Future-proofing capitalism: The paradox of the circular economy for plastics	Global Environmental Politics
De La Varga Pastor, Aitana	2021	Extended Producer Responsibility as an instrument to achieve an effective circular economy. Approach to EU legislation and the Spanish law on waste and contaminated soils	Revista de Direito Economico e Socioambiental
Schamber, Pablo Javier; Tognetti, Mariana Paula	2021	Controversies around the sanction of legislative initiatives for the management of packaging waste in developing countries: Reflections from the Argentine case (2003-2019)	Revista Direito GV
Boto Álvarez, Alejandra	2021	Challenges involving circular economy and anti-waste regulation in France	Revista General de Derecho Administrativo
Tong, Hong Lam; Duong, Tien Ha My	2021	The Impact of Environmental Protection Tax on Plastic Bag Use: A Case Study of Vietnam	Journal of Asian Finance, Economics and Business
Zucchella, Antonella; Previtali, Pietro; Strange, Roger	2021	Proactive and reactive views in the transition towards circular business models. A grounded study in the plastic packaging industry	International Entrepreneurship and Management Journal
Ahuja, Simran; Arora, Sanjiv	2021	Challenges and practices for effectual waste management during COVID-19	Current Science
Alfonso, Maria B.; Arias, Andrés H.; Menendez, Maria C.; Ronda, Ana C.; Harte, Agustín; Piccolo, Maria C.; Marcovecchio, Jorge E.	2021	Assessing threats, regulations, and strategies to abate plastic pollution in LAC beaches during COVID-19 pandemic	Ocean and Coastal Management
Neto, Arnaldo Mailes; Gomes, Thiago Santiago; Pertel, Monica; Vieira, Louise A.V.P.; Pacheco, Elen B.A.V.	2021	An overview of plastic straw policies in the Americas	Marine Pollution Bulletin
Fanini, Lucia; Guittard, Alice	2021	On single use plastic straws: Pre-ban findings on touristic beaches in Crete	Marine Pollution Bulletin
Gündogdu, Sedat; Walker, Tony R.	2021	Why Türkiye should not import plastic waste pollution from developed countries?	Marine Pollution Bulletin

Authors names	Date	Title	Publication name
Masseti, Luciano; Rangel-Buitrago, Nelson; Pietrelli, Loris; Merlino, Silvia	2021	Litter impacts on marine birds: The Mediterranean Northern gannet as case study	Marine Pollution Bulletin
Martin-Lara, M. A.; Godoy, V.; Quesada, L.; Lozano, E. J.; Calero, M.	2021	Environmental status of marine plastic pollution in Spain	Marine Pollution Bulletin
Walker, Tony R.	2021	Plastic industry plan to sue the Canadian federal government for listing plastic as toxic may increase plastic marine pollution	Marine Pollution Bulletin
Charitou, Anastasia; Naasan Aga-Spyridopoulou, Roxani; Mylona, Zoi; Beck, Rahel; McLellan, Fabienne; Addamo, Anna Maria	2021	Investigating the knowledge and attitude of the Greek public towards marine plastic pollution and the EU Single-Use Plastics Directive	Marine Pollution Bulletin
Anagnosti, Lamprini; Varvaresou, Athanasia; Pavlou, Panagoula; Protopapa, Evangelia; Carayanni, Vilelmine	2021	Worldwide actions against plastic pollution from microbeads and microplastics in cosmetics focusing on European policies. Has the issue been handled effectively?	Marine Pollution Bulletin
Clayton, C. Andrea; Walker, Tony R.; Bezerra, Joana Carlos; Adam, Issahaku	2021	Policy responses to reduce single-use plastic marine pollution in the Caribbean	Marine Pollution Bulletin
Castillo-Díaz, Francisco José; Belmonte-Ureña, Luis Jesús; Camacho-Ferre, Francisco; Tello-Marquina, Julio César	2021	The management of agriculture plastic waste in the framework of circular economy. Case of the Almería greenhouse (Spain)	International Journal of Environmental Research and Public Health
Miraj, Shaima S.; Parveen, Naima; Zedan, Haya S.	2021	Plastic microbeads: small yet mighty concerning	International Journal of Environmental Health Research
Sun, N.; Tabata, T.	2021	Environmental impact assessment of China's waste import ban policies: An empirical analysis of waste plastics importation from Japan	Journal of Cleaner Production
Li, Cai; Wang, Ling; Zhao, Jinsong; Deng, Liangchun; Yu, Shuxia; Shi, Zhihua; Wang, Zhen	2021	The collapse of global plastic waste trade: Structural change, cascading failure process and potential solutions	Journal of Cleaner Production
Ranjbari, Meisam; Saidani, Michael; Shams Esfandabadi, Zahra; Peng, Wanxi; Lam, Su Shiung; Aghbashlo, Mortaza; Quatraro, Francesco; Tabatabaei, Meisam	2021	Two decades of research on waste management in the circular economy: Insights from bibliometric, text mining, and content analyses	Journal of Cleaner Production
Kolcava, Dennis; Scholderer, Joachim; Bernauer, Thomas	2021	Do citizens provide political rewards to firms engaging in voluntary environmental action?	Journal of Cleaner Production
Raha, Utpal Kumar; Kumar, B. Ramesh; Sarkar, Santosh Kumar	2021	Policy Framework for Mitigating Land-based Marine Plastic Pollution in the Gangetic Delta Region of Bay of Bengal- A review	Journal of Cleaner Production
Knoblauch, Doris; Mederake, Linda	2021	Government policies combatting plastic pollution	Current Opinion in Toxicology

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Conti, Ilaria; Simioni, Carolina; Varano, Gabriele; Brenna, Cinzia; Costanzi, Eva; Neri, Luca Maria	2021	Legislation to limit the environmental plastic and microplastic pollution and their influence on human exposure	Environmental Pollution
Meert, Jenna; Izzo, Austin; Atkinson, John D.	2021	Impact of plastic bag bans on retail return polyethylene film recycling contamination rates and speciation	Waste Management
Kumamaru, Hirotaka; Takeuchi, Kenji	2021	The impact of China's import ban: An economic surplus analysis of markets for recyclable plastics	Waste Management
Wang, Bairong; Li, Yong	2021	Plastic bag usage and the policies: A case study of China	Waste Management
Liu, Chen; Thang Nguyen, Trung; Ishimura, Yujiro	2021	Current situation and key challenges on the use of single-use plastic in Hanoi	Waste Management
Bharadwaj, Bishal; Subedi, Mukti Nath; Chalise, Bishal K.	2021	Where is my reusable bag? Retailers' bag use before and after the plastic bag ban in Dharan Municipality of Nepal	Waste Management
Liang, Yangyang; Tan, Quanyin; Song, Qingbin; Li, Jinhui	2021	An analysis of the plastic waste trade and management in Asia	Waste Management
Dhanshyam, M.; Srivastava, Samir K.	2021	Effective policy mix for plastic waste mitigation in India using System Dynamics	Resources, Conservation and Recycling
Omondi, Isaac; Asari, Misuzu	2021	A study on consumer consciousness and behavior to the plastic bag ban in Kenya	Journal of Material Cycles and Waste Management
Sasaki, So	2021	The effects on Thailand of China's import restrictions on waste: measures and challenges related to the international recycling of waste plastic and e-waste	Journal of Material Cycles and Waste Management
Anuardo, R. G.; Espuny, M.; de, V.; de Oliveira, O. J.	2021	Guidelines for solid waste management: Overcoming challenges and exploit opportunities	Environmental Management: Ecosystems, Competitiveness and Waste Management
Feliren, Vicky; Nugraha, Yudhistira; Nasution, Bahrul Ilmi; Febria Finola, Clarissa; Kanggrawan, Juan I.; Suherman, Alex L.	2021	The Effect of Plastic Bag Ban Policy towards Waste Complaints in Jakarta through JAKI and Qlue	8th International Conference on ICT for Smart Society: Digital Twin for Smart Society, ICISS 2021 - Proceeding
Puluhulawa, Fenty; Puluhulawa, Mohammad Rusdiyanto	2021	Plastic Waste: Environmental Legal Issues and Policy Law Enforcement for Environmental Sustainability	E3S Web of Conferences
Puluhulawa, Fenty; Puluhulawa, Mohammad Rusdiyanto	2021	Plastic Waste in Modern Era: Developing Plastic Waste Management for Sustainability	E3S Web of Conferences
Lavelle-Hill, Rosa; Goulding, James; Smith, Gavin; Clarke, David D.; Bibby, Peter A.	2020	Psychological and demographic predictors of plastic bag consumption in transaction data	Journal of Environmental Psychology
Ryan, Peter G.; Maclean, Kyle; Weideman, Eleanor A.	2020	The Impact of the COVID-19 Lockdown on Urban Street Litter in South Africa	Environmental Processes

Authors names	Date	Title	Publication name
Nwafor, Ndubuisi; Walker, Tony R.	2020	Plastic Bags Prohibition Bill: A developing story of crass legalism aiming to reduce plastic marine pollution in Nigeria	Marine Policy
Luís, Sílvia; Roseta-Palma, Catarina; Matos, Marta; Lima, Maria Luísa; Sousa, Cãtia	2020	Psychosocial and economic impacts of a charge in lightweight plastic carrier bags in Portugal: Keep calm and carry on?	Resources, Conservation and Recycling
Crowley, Julia	2020	Plastic bag consumption habits in the Northern Philippines	Resources, Conservation and Recycling
Khan, Muhammad Shahid; Saengon, Poramet; Alganad, Amr Mohammed Nasser; Chongcharoen, Duangkamol; Farrukh, Muhammad	2020	Consumer green behaviour: An approach towards environmental sustainability	Sustainable Development
Song, Gahyung; Lee, Youngeun; Jung, Eui chul	2020	Developing the 'OU Cup': Promoting ecological behavior through a cup-sharing service system based on the Comprehensive Action Determination Model and choice architecture	Archives of Design Research
Galaiduk, Ronen; Lebreton, Laurent; Techera, Erika; Reisser, Julia	2020	Transnational Plastics: An Australian Case for Global Action	Frontiers in Environmental Science
Singh, Narendra; Tang, Yuanyuan; Ogunseitan, Oladele A.	2020	Environmentally Sustainable Management of Used Personal Protective Equipment	Environmental Science and Technology
Prata, Joana C.; Silva, Ana L.P.; Walker, Tony R.; Duarte, Armando C.; Rocha-Santos, Teresa	2020	COVID-19 Pandemic Repercussions on the Use and Management of Plastics	Environmental Science and Technology
Ye, Jiaming; Cheng, Yuqi; Li, Jiajin; Chen, Haotian	2020	No More PET Bottles? Modeling on Single-Serving Water Bottles Future Usage and Environmental Effects	IOP Conference Series: Earth and Environmental Science
Adam, Issahaku; Walker, Tony R.; Bezerra, Joana Carlos; Clayton, Andrea	2020	Policies to reduce single-use plastic marine pollution in West Africa	Marine Policy
Burlakovs, J.; Jani, Y.; Kriipsalu, M.; Grinfelde, I.; Pilecka, J.; Hogland, W.	2020	Implementation of new concepts in waste management in tourist metropolitan areas	IOP Conference Series: Earth and Environmental Science
Herberz, Timo; Barlow, Claire Y.; Finkbeiner, Matthias	2020	Sustainability assessment of a single-use plastics ban	Sustainability (Switzerland)
Gaibor, Nikita; Condo-Espinel, Veronica; Cornejo-Rodríguez, María Herminia; Darquea, Jodie J.; Pernia, Beatriz; Domínguez, Gustavo A.; Briz, María Esther; Màrquez, Lady; Laaz, Enrique; Alemán-Dyer, Carlos; Avendaño, Ulises; Guerrero, Johanna; Preciado, Mercy; Honorato-Zimmer, Daniela; Thiel, Martin	2020	Composition, abundance and sources of anthropogenic marine debris on the beaches from Ecuador - A volunteer-supported study	Marine Pollution Bulletin

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Wilson, Garrath T.; Bhamra, Tracy	2020	Design for sustainability: The need for a New Agenda	Sustainability (Switzerland)
Bharadwaj, Bishal; Baland, Jean Marie; Nepal, Mani	2020	What makes a ban on plastic bags effective? the case of Nepal	Environment and Development Economics
Pacatang, David Harold Q.	2020	Local Economic and Environmental Changes Associated with Plastic Ban Policy Implementation	Sustainability (United States)
Amenàbar Cristi, María; Holzapfel, Camila; Nehls, Medina; De Veer, Diamela; Gonzalez, Camila; Holtmann, Geraldine; Honorato-Zimmer, Daniela; Kiessling, Tim; Muñoz, Ailin Leyton; Reyes, Soledad Narvãez; Nuñez, Paloma; Sepulveda, Jose Miguel; Vãsquez, Nelson; Thiel, Martin	2020	The rise and demise of plastic shopping bags in Chile - Broad and informal coalition supporting ban as a first step to reduce single-use plastics	Ocean and Coastal Management
Wagner, Travis P.	2020	Policy instruments to reduce consumption of expanded polystyrene food service ware in the USA	Detritus
Macintosh, Andrew; Simpson, Amelia; Neeman, Teresa; Dickson, Kirilly	2020	Plastic bag bans: Lessons from the Australian Capital Territory	Resources, Conservation and Recycling
Koeng, Septorm; Sharp, Alice; Hul, Seingheng; Kuok, Fidero	2020	Plastic bag management options in Phnom Penh, Cambodia	GMSARN International Journal
Srivastava, Swati; Singh, Juginder Pal; Mangal, Deepak	2020	Time and Domain Specific Twitter Data Mining for Plastic Ban based on Public Opinion	2nd International Conference on Innovative Mechanisms for Industry Applications, ICIMIA 2020 - Conference Proceedings
Chen, Hongzhe; Wang, Sumin; Guo, Huige; Lin, Hui; Zhang, Yuanbiao	2020	A nationwide assessment of litter on China's beaches using citizen science data	Environmental Pollution
Lange, C. N.; Inganga, F.; Busienei, W.; Nguru, P.; Kiema, J.; Ngeywo, S.	2020	The effect of plastic bags ban on the prevalence of plastic bags waste in the rumen of slaughtered livestock at three abattoirs in Nairobi Metropolis, Kenya and the implications on livestock industry	Livestock Research for Rural Development
Pazienza, Pasquale; De Lucia, Caterina	2020	The EU policy for a plastic economy: Reflections on a sectoral implementation strategy	Business Strategy and the Environment
Bharadwaj, Bishal; Subedi, Mukti Nath; Chalise, Bishal K.	2020	Where is my reusable bag? Retailers' bag use before and after the plastic bag ban in Dharan Municipality of Nepal	Waste Management
Van Rensburg, Melissa L.; Nkomo, S'phumelele L.; Dube, Timothy	2020	The "plastic waste era"; social perceptions towards single-use plastic consumption and impacts on the marine environment in Durban, South Africa	Applied Geography

Authors names	Date	Title	Publication name
Zen, Irina Safitri	2020	Plastic Bag Ban in the Context of Corporate Social Responsibility: Consumption and Trade vis-à-vis Environmental Sustainability Concerns	World Sustainability Series
Anagnosti, Lambrini; Varvaresou, Athanasia; Protopapa, Evangelia; Pavlou, Panagoula; Karagianni, Vilelmini	2020	Microplastics in cosmetics	Epitheorese Klinikes Farmakologias kai Farmakokinetikes
Makki, Fadi; Lamb, Anna; Moukaddem, Rouba	2020	Plastics and the coronavirus pandemic: a behavioral science perspective	Mind and Society
Vassanadumrongdee, Sujitra; Hoontrakool, Dawisa; Marks, Danny	2020	Perception and behavioral changes of thai youths towards the plastic bag charging program	Applied Environmental Research
Sicotte, Diane M.; Seamon, Jessica L.	2020	Solving the Plastics Problem: Moving the U.S. from Recycling to Reduction	Society and Natural Resources
Stefanini, Roberta; Borghesi, Giulia; Ronzano, Anna; Vignali, Giuseppe	2020	Plastic or glass: a new environmental assessment with a marine litter indicator for the comparison of pasteurized milk bottles	International Journal of Life Cycle Assessment
Borg, Kim; Lindsay, Jo; Curtis, Jim	2020	When news media and social media meet: How Facebook users reacted to news stories about a supermarket plastic bag ban	New Media and Society
Yang, Zining; Kim, Sekwen	2020	Diffusion of environmental protectionism: Single-use plastic bags ban policy in California	Advances in Intelligent Systems and Computing
Adanu, Kwami	2020	The growing global plastic waste problem - Lessons for environmental economics policy design and choice	International Journal of Green Economics
Jahnke, Ashlee	2020	Could biopolymers answer the single-use problem?	Reinforced Plastics
Geiger-Oneto, Stephanie; Gelb, Betsy D.; Simkins, Travis	2020	Stigmatized products: how conflicting laws can influence decisions to proceed	Journal of Business Strategy
Khan, Sabaa Ahmad	2020	Symposium on global plastic pollution. Clearly hazardous, obscurely regulated: Lessons from the Basel convention on waste trade	AJIL Unbound
Khandelwal, Chitranshu; Barua, Mukesh Kumar	2020	Prioritizing Circular Supply Chain Management Barriers Using Fuzzy AHP: Case of the Indian Plastic Industry	Global Business Review
Kirk, Elizabeth A.	2020	Symposium on global plastic pollution. The Montreal protocol or the Paris agreement as a model for a plastics treaty?	AJIL Unbound
Mitrano, Denise M.; Wohlleben, Wendel	2020	Microplastic regulation should be more precise to incentivize both innovation and environmental safety	Nature Communications

Authors names	Date	Title	Publication name
Godoy, Veronica; Prata, Joana C.; Blázquez, Gabriel; Almendros, Ana Isabel; Duarte, Armando C.; Rocha-Santos, Teresa; Calero, Monica; Martín-Lara, María Angeles	2020	Effects of distance to the sea and geomorphological characteristics on the quantity and distribution of microplastics in beach sediments of Granada (Spain)	Science of the Total Environment
Vimal, K. E.K.; Mathiyazhagan, K.; Agarwal, Vernika; Luthra, Sunil; Sivakumar, K.	2020	Analysis of barriers that impede the elimination of single-use plastic in developing economy context	Journal of Cleaner Production
Ferraro, Gianluca; Failler, Pierre	2020	Governing plastic pollution in the oceans: Institutional challenges and areas for action	Environmental Science and Policy
Ryan, Peter G.	2020	Land or sea? What bottles tell us about the origins of beach litter in Kenya	Waste Management
Zhang, Chaonan; Wang, Shaodan; Sun, Di; Pan, Zhenkun; Zhou, Aiguo; Xie, Shaolin; Wang, Jun; Zou, Jixing	2020	Microplastic pollution in surface water from east coastal areas of Guangdong, South China and preliminary study on microplastics biomonitoring using two marine fish	Chemosphere
Gong, Jian; Xie, Pei	2020	Research progress in sources, analytical methods, eco-environmental effects, and control measures of microplastics	Chemosphere
Page, Robert; Lavender, Samantha; Thomas, Dean; Berry, Katie; Stevens, Susan; Haq, Mohammed; Udugbezi, Emmanuel; Fowler, Gillian; Best, Jennifer; Brockie, Iain	2020	Identification of tyre and plastic waste from combined Copernicus sentinel-1 and-2 data	Remote Sensing
Bishop, George; Styles, David; Lens, Piet N.L.	2020	Recycling of European plastic is a pathway for plastic debris in the ocean	Environment International
Llorca, Marta; Álvarez-Muñoz, Diana; Ábalos, Manuela; Rodríguez-Mozaz, Sara; Santos, Lucia H.M.L.M.; Leon, Víctor M.; Campillo, J. Antonio; Martínez-Gomez, Concepcion; Abad, Esteban; Farré, Marinella	2020	Microplastics in Mediterranean coastal area: toxicity and impact for the environment and human health	Trends in Environmental Analytical Chemistry
Nakatani, Jun; Maruyama, Tamon; Moriguchi, Yuichi	2020	Revealing the intersectoral material flow of plastic containers and packaging in Japan	Proceedings of the National Academy of Sciences of the United States of America
Bharadwaj, Bishal; Rai, Rajesh Kumar; Nepal, Mani	2020	Sustainable financing for municipal solid waste management in Nepal	PLoS ONE
Sicotte, Diane M.	2020	From cheap ethane to a plastic planet: Regulating an industrial global production network	Energy Research and Social Science
Thushari, G. G.N.; Senevirathna, J. D.M.	2020	Plastic pollution in the marine environment	Heliyon

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da Costa, João Pinto; Mouneyrac, Catherine; Costa, Monica; Duarte, Armando C.; Rocha-Santos, Teresa	2020	The Role of Legislation, Regulatory Initiatives and Guidelines on the Control of Plastic Pollution	Frontiers in Environmental Science
Bucknall, David G.	2020	Plastics as a materials system in a circular economy: Plastics in the Circular Economy	Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences
Alpizar, F.; Carlsson, F.; Lanza, G.; Carney, B.; Daniels, R. C.; Jaime, M.; Ho, T.; Nie, Z.; Salazar, C.; Tibesigwa, B.; Wahdera, S.	2020	A framework for selecting and designing policies to reduce marine plastic pollution in developing countries	Environmental Science and Policy
Ayeleru, Olusola Olaitan; Dlova, Sisanda; Akinribide, Ojo Jeremiah; Ntuli, Freeman; Kupolati, Williams Kehinde; Marina, Paula Facal; Blencowe, Anton; Olubambi, Peter Apata	2020	Challenges of plastic waste generation and management in sub-Saharan Africa: A review	Waste Management
De Weerd, Loïc; Sasao, Toshiaki; Compernelle, Tine; Van Passel, Steven; De Jaeger, Simon	2020	The effect of waste incineration taxation on industrial plastic waste generation: A panel analysis	Resources, Conservation and Recycling
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Ryan, Peter G.; Pichgru, Lorien; Perold, Vonica; Moloney, Coleen L.	2020	Monitoring marine plastics - will we know if we are making a difference?	South African Journal of Science
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Zorpas, Antonis A.	2020	Strategy development in the framework of waste management	Science of the Total Environment
Stubenrauch, Jessica; Ekardt, Felix	2020	Plastic pollution in soils: Governance approaches to foster soil health and closed nutrient cycles	Environments - MDPI
Häder, Donat P.; Banaszak, Anastazia T.; Villafañe, Virginia E.; Narvarte, Maite A.; González, Raul A.; Helbling, E. Walter	2020	Anthropogenic pollution of aquatic ecosystems: Emerging problems with global implications	Science of the Total Environment
Wang, Yanping; Deng, Yixiang; Zhang, Chenglong; Zhang, Jiaxu; An, Lihui; Liu, Ruizhi	2020	Management Policies of Single-Use Plastic Pollution in China	Research of Environmental Sciences
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Nyathi, Brian; Togo, Chamunorwa Aloius	2020	Overview of legal and policy framework approaches for plastic bag waste management in African countries	Journal of Environmental and Public Health
Velasco Perez, Maribel; Sotelo Navarro, Perla Xochitl; Vazquez Morillas, Alethia; Espinosa Valdemar, Rosa María; Hermoso Lopez Araiza, Jéssica Paola	2020	Waste management and environmental impact of absorbent hygiene products: A review	Waste Management and Research
Klee, Albert J.	2020	Environmental Plastics legislation in the U.S.: an overview	
Deng, Yixiang; Zhang, Jiaxu; Zhang, Chenglong; Ding, Zeya; Hao, Chenlin; An, Lihui	2020	Countermeasures on Plastic and Microplastic Garbage Management	Handbook of Environmental Chemistry
Liu, Bin; Hou, Li'an; Wang, Yuan; Ma, Wenchao; Yan, Beibei; Li, Xiangping; Chen, Guanyi	2020	Emission Estimate and Countermeasures of Marine Plastic Debris and Microplastics in China	Research of Environmental Sciences
Urbina, M. A.; Luna-Jorquera, G.; Thiel, M.; Acuña-Ruz, T.; Amenàbar Cristi, M. A.; Andrade, C.; Ahrendt, C.; Castillo, C.; Chevallier, A.; Cornejo-D'Ottone, M.; Correa-Araneda, F.; Duarte, C.; Fernández, C.; Galbàn-Malagon, C.; Godoy, C.; González-Aravena, M.; Hinojosa, I. A.; Jorquera, A.; Kiessling, T.; Lardies, M. A.; Lenzi, J.; Mattar, C.; Munizaga, M.; Olguín-Campillay, N.; Perez-Venegas, D. J.; Portflitt-Toro, M.; Pozo, K.; Pulgar, J.; Vargas, E.	2020	A country's response to tackling plastic pollution in aquatic ecosystems: The Chilean way	Aquatic Conservation: Marine and Freshwater Ecosystems
Narayanan, Mahadevan; Mhatre, Apurva; Nair, Ajun; Panicker, Akilesh; Dhondkar, Ashutosh	2020	Plastic waste profiling using deep learning	Advances in Intelligent Systems and Computing
Wu, Hsing Hao	2020	A study on transnational regulatory governance for marine plastic debris: Trends, challenges, and prospect	Marine Policy
Stanton, Thomas; Kay, Paul; Johnson, Matthew; Chan, Faith Ka Shun; Gomes, Rachel L.; Hughes, Jennifer; Meredith, William; Orr, Harriet G.; Snape, Colin E.; Taylor, Mark; Weeks, Jason; Wood, Harvey; Xu, Yuyao	2020	It's the product not the polymer: Rethinking plastic pollution	Wiley Interdisciplinary Reviews: Water
Meixner, Katharina; Kubiczek, Mona; Fritz, Ines	2020	Microplastic in soil-current status in Europe with special focus on method tests with Austrian samples	AIMS Environmental Science

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Akber Abbasi, Saddam; Khalil, Amjad B.; Arslan, Muhammad	2020	Extensive use of face masks during COVID-19 pandemic: (micro-)plastic pollution and potential health concerns in the Arabian Peninsula	Saudi Journal of Biological Sciences
Moynihan, Ruby; Magsig, Bjørn Oliver	2020	The role of international regimes and courts in clarifying prevention of harm in freshwater and marine environmental protection	International Environmental Agreements: Politics, Law and Economics
Radu, Violeta Monica; Chiriac, Magdalena; Deak, Gyorgy; Pipirigeanu, Mariana; Izhar, Tengku Nurati Tengku	2020	Strategic actions for packaging waste management and reduction	IOP Conference Series: Earth and Environmental Science
Binetti, U.; Silburn, B.; Russell, J.; van Hoytema, N.; Meakins, B.; Kohler, P.; Desender, M.; Preston-Whyte, F.; Fa'abasau, E.; Maniel, M.; Maes, T.	2020	First marine litter survey on beaches in Solomon Islands and Vanuatu, South Pacific: Using OSPAR protocol to inform the development of national action plans to tackle land-based solid waste pollution	Marine Pollution Bulletin
Harianja, A. H.; Saragih, G. S.; Fauzi, R.	2019	Replacing single use plastic bags with compostable carriers: Socio-economic approach	IOP Conference Series: Earth and Environmental Science
Shah, Kalim U.; Niles, Keron; Ali, Saleem H.; Surroop, Dinesh; Jaggeshar, Doorgeshwaree	2019	Plastics waste metabolism in a Petro-Island state: Towards solving a "wicked problem" in Trinidad and Tobago	Sustainability (Switzerland)
Babayemi, Joshua O.; Nnorom, Innocent C.; Osibanjo, Oladele; Weber, Roland	2019	Ensuring sustainability in plastics use in Africa: consumption, waste generation, and projections	Environmental Sciences Europe
Mayoma, Bahati S.; Mjumira, Innocent S.; Efudala, Aubrey; Syberg, Kristian; Khan, Farhan R.	2019	Collection of anthropogenic litter from the shores of lake Malawi: Characterization of plastic debris and the implications of public involvement in the African great lakes	Toxics
Rangel-Buitrago, Nelson; Gracia C., Adriana; Velez-Mendoza, Anubis; Carvajal-Florián, Alexander; Mojica-Martinez, Lilibeth; Neal, William J.	2019	Where did this refuse come from? Marine anthropogenic litter on a remote island of the Colombian Caribbean sea	Marine Pollution Bulletin
Nurulhaq, Harfin; Kismartini,	2019	The Effect of Green Marketing of Plastic Bag Ban Policy in Modern Retail Stores on Consumer Green Behavior in Bogor City	E3S Web of Conferences
Deußing, Guido	2019	Plastic ban please also in tea bags	Deutsche Lebensmittel-Rundschau

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Nelson, Denice; Sellers, Kate; Mackenzie, Stuart; Weinberg, Nadine	2019	Microbeads- a Case Study in How Public Outrage Fueled the Emergence of New Regulations	Current Pollution Reports
McNicholas, Grace; Cotton, Matthew	2019	Stakeholder perceptions of marine plastic waste management in the United Kingdom	Ecological Economics
Darling Selvi, V.; Ilankumaran, G.	2019	Citizen's response to a state's environmental management through enforcement of ban	International Journal of Engineering and Advanced Technology
Abbott, Joshua K.; Sumaila, U. Rashid	2019	Reducing marine plastic pollution: Policy insights from economics	Review of Environmental Economics and Policy
Lim, G. N.; Arumugam, P. V.	2019	Environmental Corporate Social Responsibility Management and Strategy to Reshaping Consumer Behaviour	IOP Conference Series: Earth and Environmental Science
Little, Vicki Janine; Lee, Christina Kwai Choi; Nair, Sumesh	2019	Macro-demarting: The Key to Unlocking Unsustainable Production and Consumption Systems?	Journal of Macromarketing
Guerranti, C.; Martellini, T.; Perra, G.; Scopetani, C.; Cincinelli, A.	2019	Microplastics in cosmetics: Environmental issues and needs for global bans	Environmental Toxicology and Pharmacology
Khanam, Najnin; Wagh, Vasant; Gaidhane, Abhay M.; Quazi, Syyed Zahiruddin	2019	Knowledge, attitude and practice on uses of plastic products, their disposal and environmental pollution: A study among school-going adolescents	Journal of Datta Meghe Institute of Medical Sciences University
Nielsen, Tobias Dan; Holmberg, Karl; Strippel, Johannes	2019	Need a bag? A review of public policies on plastic carrier bags -“Where, how and to what effect?”	Waste Management
Billard, Guillaume; Boucher, Julien	2019	The challenges of measuring plastic pollution	Field Actions Science Report
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Rempe, Christina	2019	EU ban on disposable plastics	Deutsche Lebensmittel-Rundschau
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Mogomotsi, Patricia K.; Mogomotsi, Goemeone E.J.; Phonchi, Nametso D.	2019	Plastic bag usage in a taxed environment: Investigation on the deterrent nature of plastic levy in Maun, Botswana	Waste Management and Research
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Caverly, Isaac T.	2019	Water, water everywhere, but not a straw to drink: How the Americans with disabilities act serves as a limitation on plastic straw bans	Iowa Law Review
Taylor, Rebecca L.C.	2019	Bag leakage: The effect of disposable carryout bag regulations on unregulated bags	Journal of Environmental Economics and Management
Godfrey, Linda	2019	Waste plastic, the challenge facing developing countries-"Ban it, change it, collect it?"	Recycling
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Kombat, Alex Moyem; Wätzold, Frank	2019	The emergence of environmental taxes in Ghana - "A public choice analysis	Environmental Policy and Governance
Yang, Zining; Kim, Sekwen	2019	An agent-based model of plastic bags ban policy diffusion in California	Advances in Intelligent Systems and Computing
Rodzi, Rodzidah Mohd; Nopiah, Zulkifli Mohd; Basri, Noor Ezlin Ahmad	2019	Analysis of solid waste generation and composition in Malaysia TVET campus	International Journal of Integrated Engineering
Alaniz, Alberto J.	2019	Chile Environmental History, Perspectives and Challenges	Chile Environmental History, Perspectives and Challenges
Aryantie, M. H.; Hidayat, M. Y.	2019	Regulatory evaluation of waste management institutions in Yogyakarta, Sleman, and Bantul Metropolitan Areas	IOP Conference Series: Earth and Environmental Science
Rajmohan, Kunju Vaikarar Soundararajan; Ramya, Chandrasekaran; Raja Viswanathan, Manakkal; Varjani, Sunita	2019	Plastic pollutants: effective waste management for pollution control and abatement	Current Opinion in Environmental Science and Health
De Lucia, Caterina; Pazienza, Pasquale	2019	Market-based tools for a plastic waste reduction policy in agriculture: A case study in the south of Italy	Journal of Environmental Management
Fu, Zhilu; Wang, Jun	2019	Current practices and future perspectives of microplastic pollution in freshwater ecosystems in China	Science of the Total Environment
Black, Jeffrey E.; Kopke, Kathrin; O'Mahony, Cathal	2019	A Trip Upstream to Mitigate Marine Plastic Pollution - "A Perspective Focused on the MSFD and WFD	Frontiers in Marine Science
Yurtsever, Meral	2019	Glitters as a Source of Primary Microplastics: An Approach to Environmental Responsibility and Ethics	Journal of Agricultural and Environmental Ethics
Wang, Mary H.; He, Yaodong; Sen, Biswarup	2019	Research and management of plastic pollution in coastal environments of China	Environmental Pollution

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Ferreira, Inês; Venâncio, Cátia; Lopes, Isabel; Oliveira, Miguel	2019	Nanoplastics and marine organisms: What has been studied?	Environmental Toxicology and Pharmacology
Crowe, Matthew R.; Suttle, Rebecca; Richardson, Alice	2019	Quarterly comment by trinity chambers	Environmental Law Review
Barletta, Mário; Lima, André R.A.; Costa, Monica F.	2019	Distribution, sources and consequences of nutrients, persistent organic pollutants, metals and microplastics in South American estuaries	Science of the Total Environment
Li, Daoji	2019	Research Advance and Countermeasures on Marine Microplastic Pollution	Research of Environmental Sciences
Coe, James M.; Antonelis, George “Bud”; Moy, Kirsten	2019	Taking control of persistent solid waste pollution	Marine Pollution Bulletin
Wichai-utcha, N.; Chavalparit, O.	2019	3Rs Policy and plastic waste management in Thailand	Journal of Material Cycles and Waste Management
Moore, Dai; Raff, Murray	2019	Can the market decide? A law and economics analysis of models of legislation banning plastic bags	Environmental and Planning Law Journal
Bailey, Patricia M.	2019	Packaging law Europe	Packaging Law Europe
Balić, Katarina; Luttenberger, Lidija Runko; Slišković, Merica; Deja, Agnieszka	2019	The impact of plastic on the marine environment	International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM
Farmer, Andrew	2019	Developing the circular economy in the European Union	Circular Economy: Global Perspective
Chin, Li Wai; Fung, Tse Hin	2019	Plastic in Marine Litter	Issues in Environmental Science and Technology
Jahani, Akram; Dehdari, Tahereh; Farzadkia, Mahdi; Mansourian, Morteza	2019	Iranian experiences in terms of consumption of disposable single- use plastics: Introduction to theoretical variables for developing environmental health promotion efforts	Environmental Toxicology and Pharmacology
Schnurr, Riley E.J.; Alboiu, Vanessa; Chaudhary, Meenakshi; Corbett, Roan A.; Quanz, Meaghan E.; Sankar, Karthikeshwar; Srain, Harveer S.; Thavarajah, Venukasan; Xanthos, Dirk; Walker, Tony R.	2018	Reducing marine pollution from single-use plastics (SUPs): A review	Marine Pollution Bulletin

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Kentin, Esther; Kaarto, Heidi	2018	An EU ban on microplastics in cosmetic products and the right to regulate	Review of European, Comparative and International Environmental Law
Raubenheimer, Karen; McIlgorm, Alistair; Oral, Nilüfer	2018	Towards an improved international framework to govern the life cycle of plastics	Review of European, Comparative and International Environmental Law
Kirk, Elizabeth A.; Popattanachai, Naporn	2018	Marine plastics: Fragmentation, effectiveness and legitimacy in international lawmaking	Review of European, Comparative and International Environmental Law
Willis, Kathryn; Maureaud, Clémentine; Wilcox, Chris; Hardesty, Britta Denise	2018	How successful are waste abatement campaigns and government policies at reducing plastic waste into the marine environment?	Marine Policy
Muralidharan, Sidharth; Sheehan, Kim	2018	The role of guilt in influencing sustainable pro-environmental behaviors among shoppers: Differences in response by gender to messaging about England plastic-bag levy	Journal of Advertising Research
Zheng, Wen; Dharmasena, Senarath; Capps, Oral; Janakiraman, Ramkumar	2018	Consumer demand for and effects of tax on sparkling and non-sparkling bottled water in the United States	Journal of Agribusiness in Developing and Emerging Economies
Ridler, James	2018	Widespread support for plastic packaging tax	Food Manufacture
So, Wing Kwan; Chan, Kayi; Not, Christelle	2018	Abundance of plastic microbeads in Hong Kong coastal water	Marine Pollution Bulletin
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Dauvergne, Peter	2018	The power of environmental norms: marine plastic pollution and the politics of microbeads	Environmental Politics
Choate, Beth; Davis, Brittany Y.; Verrecchia, Jacqueline	2018	Campus bottled water bans, not always the solution	International Journal of Sustainability in Higher Education
Berger, Wolfram; Nagase, Yoko	2018	Waste management regulation: policy solutions and policy shortcomings	Scottish Journal of Political Economy
Nagarajan, Aravindhan	2018	Maharashtra's war on plastic: Toll on Mumbai's recycling industry	Economic and Political Weekly
Knoblauch, Doris; Mederake, Linda; Stein, Ulf	2018	Developing countries in the lead-what drives the diffusion of plastic bag policies?	Sustainability (Switzerland)
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Poortinga, Wouter; Whitaker, Louise	2018	Promoting the use of reusable coffee cups through environmental messaging, the provision of alternatives and financial incentives	Sustainability (Switzerland)
Slusarczyk, Beata; Kot, Sebastian	2018	Solution for sustainable development: Provisions limiting the consumption of disposable plastic carrier bags in Poland	Journal of Security and Sustainability Issues
Thaysen, Clara; Stevack, Kathleen; Ruffolo, Ralph; Poirier, David; De Frond, Hannah; DeVera, Julieta; Sheng, Grace; Rochman, Chelsea M.	2018	Leachate from expanded polystyrene cups is toxic to aquatic invertebrates (Ceriodaphnia dubia)	Frontiers in Marine Science
Bartolotta, Jill F.; Hardy, Scott D.	2018	Barriers and benefits to desired behaviors for single use plastic items in northeast Ohio's Lake Erie basin	Marine Pollution Bulletin
Mills, Georgina	2018	Government pledges to reduce the ocean's plastic	Veterinary Record
Dangis, Alexandre	2018	EU Plastics Strategy: Taxes, bans, and regulations	Kunststoffe International
Gock, Angela; Dale, Edward; Ou-Yang, Lucinda; Wheeler, Sally; Faunce, Thomas	2018	Legal strategies to cure the plastic planet: Corporate marriage and public health regulation of single-use non-biodegradable plastics	Journal of Law and Medicine
Conkle, Jeremy L.; Bàez Del Valle, Christian D.; Turner, Jeffrey W.	2018	Are We Underestimating Microplastic Contamination in Aquatic Environments?	Environmental Management
Lange, N. C.; Inganga, F.; Busienei, W.; Nguru, P.; Kiema, J.; Wahungu, G.	2018	The prevalence of plastic bag waste in the rumen of slaughtered livestock at three abattoirs in Nairobi metropolis, Kenya and implications on livestock health	Livestock Research for Rural Development
Jiang, Jia Qian	2018	Occurrence of microplastics and its pollution in the environment: A review	Sustainable Production and Consumption
Wagner, Travis P.; Toews, Patti	2018	Assessing the use of default choice modification to reduce consumption of plastic straws	Detritus
Karbalaei, Samaneh; Hanachi, Parichehr; Walker, Tony R.; Cole, Matthew	2018	Occurrence, sources, human health impacts and mitigation of microplastic pollution	Environmental Science and Pollution Research
Wang, Jiajia; Zheng, Lixia; Li, Jinhui	2018	A critical review on the sources and instruments of marine microplastics and prospects on the relevant management in China	Waste Management and Research

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Peng, Guyu; Xu, Pei; Zhu, Bangshang; Bai, Mengyu; Li, Daoji	2018	Microplastics in freshwater river sediments in Shanghai, China: A case study of risk assessment in mega-cities	Environmental Pollution
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Rouillard, Josselin; Lago, Manuel; Abhold, Katrina; Roeschel, Lina; Kafyeke, Terri; Klimmek, Helen; Mattheiß, Verena	2018	Protecting and Restoring Biodiversity across the Freshwater, Coastal and Marine Realms: Is the existing EU policy framework fit for purpose?	Environmental Policy and Governance
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Brennholt, Nicole; Heß, Maren; Reifferscheid, Georg	2018	Freshwater microplastics: Challenges for regulation and management	Handbook of Environmental Chemistry
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Barboza, Luís Gabriel A.; Cozar, Andrés; Gimenez, Barbara C.G.; Barros, Thayanne Lima; Kershaw, Peter J.; Guilhermino, Lucia	2018	Macroplastics pollution in the marine environment	World Seas: An Environmental Evaluation Volume III: Ecological Issues and Environmental Impacts

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Zeng, Eddy Y.	2018	Microplastic contamination in aquatic environments: An emerging matter of environmental urgency	Microplastic Contamination in Aquatic Environments: An Emerging Matter of Environmental Urgency
Wagner, Travis P.	2017	Reducing single-use plastic shopping bags in the USA	Waste Management
Sun, Ying; Wang, Shanyong; Li, Jun; Zhao, Dingtao; Fan, Jin	2017	Understanding consumers' intention to use plastic bags: using an extended theory of planned behaviour model	Natural Hazards
Mary, K. J.	2017	A study on sustainable school environment of secondary schools in Kottayam District	Indian Journal of Environmental Protection
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Madigele, Patricia K.; Mogomotsi, Goemeone E.J.; Kolobe, Mavis	2017	Consumer willingness to pay for plastic bags levy and willingness to accept eco-friendly alternatives in Botswana	Chinese Journal of Population Resources and Environment
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Rivers, Nicholas; Shenstone-Harris, Sarah; Young, Nathan	2017	Using nudges to reduce waste? The case of Toronto's plastic bag levy	Journal of Environmental Management
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Warner, Charles; Vick, Hilary; Walker, Alice; Hill, Kimberley	2017	Contribution of 'Real Nappies for London' to local authority waste prevention - 2012-2016	Proceedings of Institution of Civil Engineers: Waste and Resource Management
Karelovà, Klaudia	2017	From 466 to 90 - Regulation or education? Policy options for a single-use plastic bag consumption reduction in the Slovak Republic	Journal of Environmental Management and Tourism
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Steensgaard, Ida; Syberg, Kristian; Rist, Sinja; Hartmann, Nanna; Boldrin, Alessio; Hansen, Steffen Foss	2017	From macro- to microplastics - Analysis of EU regulation along the life cycle of plastic bags	Environmental Pollution
Gutow, L.; Bergmann, M.	2017	Contamination of our oceans by plastics	Encyclopedia of the Anthropocene
Auta, H. S.; Emenike, C. U.; Fauziah, S. H.	2017	Distribution and importance of microplastics in the marine environment review of the sources, fate, effects, and potential solutions	Environment International
Cheung, Pui Kwan; Fok, Lincoln	2017	Characterisation of plastic microbeads in facial scrubs and their estimated emissions in Mainland China	Water Research
Berck, Peter; Moe-Lange, Jacob; Stevens, Andrew; Villas-Boas, Sofia	2016	Measuring Consumer Responses to a Bottled Water Tax Policy	American Journal of Agricultural Economics
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Blackwood, Katherine	2016	US capital bans Styrofoam food packaging	Frontiers in Ecology and the Environment
Burgin, Shelley; Webb, Tony; Kasbarian, Alicia	2016	Bottled Water: Why so Popular? A Case Study from a University Campus Community	Sustainability (United States)
Muralidharan, Sidharth; Sheehan, Kim	2016	"Tax" and "fee" message frames as inhibitors of plastic bag usage among shoppers: A social marketing application of the theory of planned behavior	Social Marketing Quarterly
Taylor, Rebecca L.; Villas-Boas, Sofia B.	2016	Bans vs. Fees: Disposable carryout bag policies and bag usage	Applied Economic Perspectives and Policy
Li, W. C.; Tse, H. F.; Fok, L.	2016	Plastic waste in the marine environment: A review of sources, occurrence and effects	Science of the Total Environment

Authors names	Date	Title	Publication name
Alethia, Vázquez Morillas; Maribel, Velasco Pérez; Rosa Ma, Espinosa Valdemar; Marcos, Morales Contreras; Saul, Hernández Islas; María Yolanda Leonor, Ordaz Guillén; Hamilcar José, Almeida Filgueira	2016	Generation, legislation and valorization of plastic waste in Latin America	Revista Internacional de Contaminacion Ambiental
Rochman, Chelsea M.; Kross, Sara M.; Armstrong, Jonathan B.; Bogan, Michael T.; Darling, Emily S.; Green, Stephanie J.; Smyth, Ashley R.; Veríssimo, Diogo	2015	Scientific Evidence Supports a Ban on Microbeads	Environmental Science and Technology
González Carman, Victoria; Machain, Natalia; Campagna, Claudio	2015	Legal and institutional tools to mitigate plastic pollution affecting marine species: Argentina as a case study	Marine Pollution Bulletin
NA	2015	The plastic-bag levy: Helping the hoarders	Economist (United Kingdom)
Kasidoni, Maria; Moustakas, Konstantinos; Malamis, Dimitris	2015	The existing situation and challenges regarding the use of plastic carrier bags in Europe	Waste Management and Research
Berman, Elizabeth R.; Johnson, Rachel K.	2015	The unintended consequences of changes in beverage options and the removal of bottled water on a university campus	American Journal of Public Health
Woodford, Will	2015	Better barrier	Flexo
Chen, Chung Ling	2015	Regulation and management of marine litter	Marine Anthropogenic Litter
Newman, Stephanie; Watkins, Emma; Farmer, Andrew; Brink, Patrick Ten; Schweitzer, Jean Pierre	2015	The economics of marine litter	Marine Anthropogenic Litter
Warner, Charles; Vick, Hilary; Phillips, Paul; Lappage, Andrew	2015	The 'real nappies for London' scheme 2007-2012: Key findings to drive a future waste prevention agenda through landfill reduction	Journal of Solid Waste Technology and Management
Oyake-Ombis, Leah; van Vliet, Bas J.M.; Mol, Arthur P.J.	2015	Managing plastic waste in East Africa: Niche innovations in plastic production and solid waste	Habitat International
Pankaj, Vivek Prakash	2015	Sustainable model of plastic waste management	International Journal of ChemTech Research
Ji, Ying	2015	Regional studies on effects of the Ban for Free Plastic Bags	Future Information Engineering and Manufacturing Science - Proceedings of the 2014 International Conference on Future Information Engineering and Manufacturing Science, FIEMS 2014

Authors names	Date	Title	Publication name
Burton, G. Allen	2015	Losing sight of science in the regulatory push to ban microbeads from consumer products and industrial use	Integrated Environmental Assessment and Management
Oosterhuis, Frans; Papyrakis, Elissaios; Boteler, Benjamin	2014	Economic instruments and marine litter control	Ocean and Coastal Management
NA	2014	State Department tackles marine debris, invites SPI into discussion	Plastics Engineering
Shah, Rajiv V.	2014	Exploring the need for direct tax incentives for plastic waste management in India	Environmental Taxation and Green Fiscal Reform: Theory and Impact
Fela, Jen	2014	Dutch lead EU in microbead ban	Frontiers in Ecology and the Environment
Bartl, Andreas	2014	Moving from recycling to waste prevention: A review of barriers and enables	Waste Management and Research
Lee, Jihyun; Pedersen, Anders Branth; Thomsen, Marianne	2014	Are the resource strategies for sustainable development sustainable? Downside of a zero waste society with circular resource flows	Environmental Technology and Innovation
Deša, Romeo	2013	Plastic bag bans and taxes	Polimeri
Zen, Irina Safitri; Ahamad, Rahmalan; Omar, Wahid	2013	No plastic bag campaign day in Malaysia and the policy implication	Environment, Development and Sustainability
Cela, Enian; Kaneko, Shinji	2013	Understanding the implications of environmental taxes: The case of the Danish weight based packaging product charge	Environmental Policy and Governance
Da, Mao; Weihe, Yang	2013	2010: A restless year for environmental policies on packaging	Chinese Research Perspectives on the Environment
Ba, Eirill; Hammervoll, Trond; Tvedt, Kjetil	2013	Environmental impact of refillable vs. non-refillable plastic beverage bottles in Norway	International Journal of Environment and Sustainable Development
Dikgang, Johane; Leiman, Anthony; Visser, Martine	2012	Analysis of the plastic-bag levy in South Africa	Resources, Conservation and Recycling
Dikgang, Johane; Leiman, Anthony; Visser, Martine	2012	Elasticity of demand, price and time: Lessons from South Africa's plastic-bag levy	Applied Economics
Garaffa, Christian; Yepsen, Rhodes	2012	Plastic bag ban and residential sso diversion	BioCycle
He, Haoran	2012	Effects of environmental policy on consumption: Lessons from the Chinese plastic bag regulation	Environment and Development Economics
Liu, Minlan; Chen, Jing	2012	The study on the motivation of the public participation in the ban on using plastic bags in the low-carbon economy	Advanced Materials Research
Seco Pon, Juan Pablo; Becherucci, Maria Eugenia	2012	Spatial and temporal variations of urban litter in Mar del Plata, the major coastal city of Argentina	Waste Management

Authors names	Date	Title	Publication name
Murad, Khairudin; Ramlee, Norhayati	2012	20 Cents worth safeguarding climate change? Stimulating consumer-awareness towards 'No Plastic Bag' campaign	ISBEIA 2012 - IEEE Symposium on Business, Engineering and Industrial Applications
Emblem, H. J.	2012	Packaging and environmental sustainability	Packaging Technology: Fundamentals, Materials and Processes
Nessi, Simone; Rigamonti, Lucia; Grosso, Mario	2012	LCA of waste prevention activities: A case study for drinking water in Italy	Journal of Environmental Management
Dikgang, Johane; Visser, Martine	2012	Behavioural response to plastic bag legislation in Botswana	South African Journal of Economics
Cela, Enian; Kaneko, Shinji	2011	Determining the effectiveness of the Danish packaging tax policy: The case of paper and paperboard packaging imports	Resources, Conservation and Recycling
Zhu, Qunfang	2011	An appraisal and analysis of the law of "Plastic-Bag Ban"	Energy Procedia
Henriksen, Tore	2011	Conservation of marine biodiversity and the international maritime organization	Rule of Law for Nature: New Dimensions and Ideas in Environmental Law
Sharp, Anne; Høj, Stine; Wheeler, Meagan	2010	Proscription and its impact on anti-consumption behaviour and attitudes: The case of plastic bags	Journal of Consumer Behaviour
Luís, Idalina Perestrelo; Spínola, Hélder	2010	The influence of a voluntary fee in the consumption of plastic bags on supermarkets from Madeira Island (Portugal)	Journal of Environmental Planning and Management
Abduli, M. A.; Azimi, E.	2010	Municipal waste reduction potential and related strategies in Tehran	International Journal of Environmental Research
Lazarevic, David; Buclet, Nicolas; Brandt, Nils	2010	The influence of the waste hierarchy in shaping European waste management: The case of plastic waste	Regional Development Dialogue
Murdoch, Maggie	2010	The road to zero waste: A study of the Seattle green fee on disposable bags	Environmental Practice
Ali-Qureshi, Z.	2010	Single use carrier Sacs and reverse logistic a life cycle analysis based approach	American Society of Agricultural and Biological Engineers Annual International Meeting 2010, ASABE 2010
Chan-Halbrendt, Catherine; Fang, Di; Yang, Fang	2009	Trade-offs between shopping bags made of non-degradable plastics and other materials, using latent class analysis: The case of Tianjin, China	International Food and Agribusiness Management Review
Yepsen, Rhodes	2009	High diversion in the alps	BioCycle
Yepsen, Rhodes	2009	What's in a resin? Sustainability of compostable products	BioCycle

Authors names	Date	Title	Publication name
Zhao, Yan; Wang, Hong Tao; Lu, Wen Jing; Damgaard, Anders; Christensen, Thomas H.	2009	Life-cycle assessment of the municipal solid waste management system in Hangzhou, China (EASEWASTE)	Waste Management and Research
Ayalon, Ofira; Goldrath, Tal; Rosenthal, Gad; Grossman, Michal	2009	Reduction of plastic carrier bag use: An analysis of alternatives in Israel	Waste Management
Park, Jill	2009	The search for an other way to shop	Packaging News
Ezrin, Myer	2008	Environmental, recycling and health aspects of plastics failure	Technical Papers, Regional Technical Conference - Society of Plastics Engineers
Spokas, K.	2008	Plastics - still young, but having a mature impact	Waste Management
Saxe, Dianne	2008	Casebook Canada: Cities battle bottles	Pollution Engineering
Convery, Frank; McDonnell, Simon; Ferreira, Susana	2007	The most popular tax in Europe? Lessons from the Irish plastic bags levy	Environmental and Resource Economics
Hasson, Reviva; Leiman, Anthony; Visser, Martine	2007	The economics of plastic bag legislation in South Africa	South African Journal of Economics
Jelsma, Jaap	2006	Designing 'moralized' products	User Behavior and Technology Development: Shaping Sustainable Relations Between Consumers and Techno
NA	2006	Bags in the front line of consumer war	Converter
West, Andrew	2006	A wasted opportunity	Chemical Engineer
Waddington, Shelagh	2006	Plastic bags: A sustainable change?	Teaching Geography
NA	2005	Ban plastic packaging	Packaging Magazine
NA	2005	Scottish bag tax proposal is echoed around the world	British Plastics and Rubber
James, Paul	2005	Waste not, want not	Fashion Business International
Busch, Per Olof; Jörgens, Helge	2005	International patterns of environmental policy change and convergence	European Environment
Millar, Sheila A.	2005	Is a packaging makeover ahead?	Paper, Film and Foil Converter
NA	2005	Bottle bill debate	Waste Age
Vujković, I. A.; Vujković, B. I.; Galić, K.; Ćurić, D.; Roca, B.	2005	Sustainable development and packaging management	Proceedings of 3rd International Congress FLOUR-BREAD 2005 - 5th Croatian Congress of Cereal Technologists
Williams, Caroline	2004	Battle of the bag	New Scientist
NA	2004	Scottish bag tax - And other issues - Come under fire at PIFA	British Plastics and Rubber
Harler, Curt	2004	Swept up	Recycling Today
Gray, N. F.; Gray, R. O.	2004	Litter deposition on minor rural roads in Ireland	Proceedings of the Institution of Civil Engineers: Municipal Engineer

Authors names	Date	Title	Publication name
Moore, Stephen	2003	Bans on bags, other plastics disposables expand in Asia	Modern Plastics
Jacobsen, Henrik Klinge; Birr-Pedersen, Katja; Wier, Mette	2003	Distributional implications of environmental taxation in Denmark	Fiscal Studies
Thiel, M.; Hinojosa, I.; Vázquez, N.; Macaya, E.	2003	Floating marine debris in coastal waters of the SE-Pacific (Chile)	Marine Pollution Bulletin
Christen, Kris	2002	Bagging plastic	Environmental Science and Technology
Bailey, Ian	2002	European environmental taxes and charges: Economic theory and policy practice	Applied Geography
NA	2002	TN Bill for banning plastic products	Textile Magazine
NA	2001	Finnish packaging tax has environmental benefits but raises trade concerns, study finds; Other ecotaxes also evaluated	Environmental Packaging
Hagelstam, J.	2001	Ecotaxes in Finland	European Environmental Law Review
NA	2001	State legislative update: Rep. Stumbo to reintroduce bottle bill legislation in Kentucky; Advance disposal fee for fast-food packaging also included	Environmental Packaging
Neumayer, Eric	2000	German packaging waste management: A successful voluntary agreement with less successful environmental effects	European Environment
Bailey, Ian	2000	Principles, policies and practice: Evaluating the environmental sustainability of Britain's packaging regulations	Sustainable Development
Williams, R.	1999	Commission's reasoned opinion in Danish can ban - legal sense, environmental nonsense?	Environmental Law and Management
Nelson, Joanne	1997	Ban the bottle	BMJ
Sinclair, A. J.; Fenton, R. W.	1997	Stewardship for packaging and packaging waste: Key policy elements for sustainability	Canadian Public Administration
Sjolander, Richard	1996	Market effects of an "environmental" beverage package tax	Scandinavian Journal of Management
Ross, S. S.; Swanson, R. L.	1995	The impact of the Suffolk County, New York, plastics ban on beach and roadside litter	Journal of Environmental Systems
Crews, Patricia Cox; Rich, Wendelin; Niemeyer, Shirley	1994	A summary of environmental legislation targeting disposable diapers and review of related literature	Journal of Environmental Polymer Degradation
NA	1993	Belgium to levy tax on cans and non-returnable bottles	Food, Cosmetics and Drug Packaging
McCarthy, James E.	1993	Recycling and reducing packaging waste: How the United States compares to other countries	Resources, Conservation and Recycling

Authors names	Date	Title	Publication name
Pearce, David; Turner, R. Kerry	1992	Packaging waste and the polluter pays principle: A taxation solution	Journal of Environmental Planning and Management
Quayle, D. V.	1992	Plastics in the Marine Environment: Problems and Solutions	Chemistry and Ecology
O'hara, Kathryn J.	1991	Cleaning north America's beaches. Volunteers across America monitor the quality of our coasts	Coastal Zone: Proceedings of the Symposium on Coastal and Ocean Management
Jacobsen, M.	1988	Disposing of disposables	
Wilber, R. J.	1987	Plastic in the North Atlantic	Oceanus
Bean, Michael J.	1987	Legal strategies for reducing persistent plastics in the marine environment	Marine Pollution Bulletin
Rasmussen, Thomas	1984	The bottle bill: Perceptions of inconvenience, litter and willingness to pay in Western New York	Environment International
Cohen, L.	1982	Minnesota v. Clover Leaf Creamery Co.	Ecology Law Quarterly
Waggoner, Don	1974	Oregon bottle ban	Environmental Science and Technology
Starkel, James C.	1974	Letters: Oregon bottle ban	Environmental Science and Technology
NA	1973	Oregon bans the bottle	Environmental Science and Technology
Klee, A. J.	1973	Environmental plastics legislation in the U.S.: an overview	SPE Journal
Zandi, I.	1972	Management of solid waste systems	J.ENVIRONM.SYST.

ANNEX 3. LIST OF KEYWORDS USED FOR THE RESEARCH ON THE SCOPUS ACADEMIC LITERATURE DATABASE

Keywords list 1 (products)		Keyword list 2 (policy)
plastic single-use plastic disposable plastic single-use plastic product disposable plastic product plastic product plastic container plastic waste plastic packaging cosmetics packaging food packaging plastic wrapping plastic wrap packaging waste plastic bag plastic carrier bag single-use plastic foodware plastic utensil single-use plastic stirrer disposable plastic stirrer single-use plastic fork disposable plastic fork single-use plastic knife disposable plastic knife single-use plastic spoon disposable plastic spoon plastic food container plastic beverage container single-use plastic plate disposable plastic plate single-use plastic bowl disposable plastic bowl single-use plastic cup disposable plastic cup single-use plastic toothpick disposable plastic toothpick single-use plastic straw disposable plastic straw take-away container take-away plastic cup take-away coffee cup take-away beverage cup condiment sachet condiment packet	sanitary product diaper nappy sanitary pad single-use wipe hygiene product tampon primary microplastic intentional microplastic intentionally-added microbead Expanded Polystyrene EPS foam foam packaging packaging foam Styrofoam packing peanuts q-tip cotton swab cotton bud plastic water container plastic bottle water bottle beverage bottle water sachet sachet drinking water PPE single-use mask disposable mask single-use gloves disposable gloves single-use PPE disposable PPE single-use goggles disposable goggles personal protective equipment glitter confetti	Legislation law ordinance guideline ban prohibition tax levy levies voluntary reduction voluntary commitment voluntary pledge voluntary action voluntary initiative voluntary agreement public-private partnership fiscal incentive tax incentive fiscal disincentive tax disincentive

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