



Assessing the role and impact of EPR in the prevention of marine Plastic Packaging Litter

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Executive Summary

The threat of plastic leakage into the marine environment is increasingly being discussed worldwide. Overall, there is a widespread agreement that a proper management of plastic waste is the only way to sustainably prevent waste from leaking into the environment. **A system for a fitting plastic waste management, in which discarded plastic is collected, sorted and recycled or treated environmentally sound, requires sufficient and sustainable financing to effectively reduce plastic litter in general and marine plastic litter in particular.** However, especially in low- and middle-income countries, the funding of operations to effectively prevent plastic litter – i.e., a functional waste management system – has been challenging so far.

Extended Producer Responsibility (EPR) for packaging is increasingly recognized as a policy tool that enables the ability to manage waste sustainably and to shift plastic waste management costs from municipalities to producers. EPR is defined as an “environmental policy approach in which a producer’s responsibility for a product is extended to the waste stage of that product’s life-cycle. In practice, EPR involves producers taking responsibility for the management of products after becoming waste, including: collection; pre-treatment; [...] recovery (including recycling and energy recovery) or final disposal.” (Basel Convention, 2018).

Against the background of strained public budgets, extending the producer’s responsibility has also been recognised as a powerful tool to finance sufficient waste management for plastic packaging and **has also been identified as a key instrument for mitigating the marine litter issue.** The EPR concept has been widely implemented in several European, Asian and American countries. In addition, a continuously increasing number of countries have been or are introducing respective steps and measures towards EPR implementation. Since, however, the amount of marine plastic litter generation has continued to increase since decades, **this report critically assesses how EPR affects marine plastic (packaging) litter generation and how EPR schemes can be adapted to increase their respective mitigation effect in the future.**

To provide such insights, this study highlights the role of EPR within the broader waste management structures and policies in which EPR is embedded, as well as its unique characteristics, and examines what factors impact marine plastic litter. In this regard, the review reveals that

- ▶ the need for financing waste management of plastic packaging particularly in countries with lower national income can be best achieved through implementing EPR for these products.
- ▶ mandatory EPR offers reliable financing of effective waste management infrastructure and service, if implemented and enforced through a robust legal basis.
- ▶ EPR also offers wider benefits than just mitigating marine litter as it can create upstream effects and act as accelerator towards circular economy.

Complementary, the report builds an understanding of how EPR has impacted or can impact the marine plastic litter generation in various countries in the world and where its limitations are. It looks at countries with long operating EPR systems as well as those that have only recently become operational and those whose legislation is just emerging. It builds on an analysis of the factors impacting marine plastic litter generation, such as a country’s socio-economic status – combined with the mitigation potential in this regard of an EPR system that provides reliable, dedicated and sufficient funding.

Despite of information gaps as well as a lack of comparability of data, the study can nevertheless show that

- ▶ **EPR is gaining momentum and an increasing number of countries have implemented it or are in the process of implementing it – with the explicit objective to contribute to reducing marine plastic litter and enabling a transition to a circular economy.** In general, EPR systems are characterised by constant development and modification to address current and new

challenges and developments. Over the last years, challenges for and developments of EPR systems include enabling a transition to a circular economy and to better address marine litter mitigation. With the topic marine litter being increasingly discussed, EPR is gaining momentum. However, given the current implementation dynamics, sound conclusions about the ultimate effectiveness of EPR are premature. The results of the study also make it clear that EPR policies are highly context-specific; a single best-practice approach that can be readily transferred to other jurisdictions cannot be identified. This also means that EPR must be evaluated on a country-specific basis.

- ▶ **If designed and enforced properly, the EPR system can contribute to marine litter mitigation**, e.g., through specifically covering litter-relevant items, specific targets for collection, and prioritising areas that contribute to marine litter over others. This requires high collection rates for the items in scope and a corresponding, robust monitoring of them. When this is met, available data shows a notable effect on certain plastic items, i.e. diverting them from entering the marine environment. While EPR can support marine litter mitigation, experience suggests using it complementarily with other instruments.
- ▶ **Effective monitoring has been identified as key element for the successful operationalisation of EPR in general and, in particular, evaluating the impact on marine plastic litter generation through regular, standardised procedures.**
- ▶ **If suitable in the country's context, Deposit Refund Systems (DRS) can be particularly impactful to reduce marine litter generation for the packaging items, such as beverage containers.**
- ▶ **There is no one single, most suitable setup for EPR to prevent marine litter.** In order to be effective, each EPR scheme must be relevant and tailored to the country concerned and sufficiently consider relevant aspects and

stakeholders. In particular, this includes the sufficient integration of the informal sector in countries where this sector plays an important role.

- ▶ **Voluntary actions failed so far in delivering noticeable results in preventing marine litter generation**, which also emphasises the need to implement mandatory EPR systems. However, this does not imply that voluntary systems cannot be important in facilitating the transition to a mandatory system and thereby eventually supporting the effect of a mandatory EPR for prevention.

Translating these insights into specific guiding principles for implementing or adapting EPR schemes, reveals the following guiding principles:

- 1. EPR must be mandatory to create a measurable impact.** However, as developing and implementing an effective EPR scheme requires time and is a rather complex process, voluntary measures still have value by building first structures and experiences for the later mandatory system and can therefore be important facilitators.
- 2. Effective monitoring is key.** In order for the system to work successfully and to assess whether it is achieving its goals and actually having positive impact on marine plastic litter generation, extensive and regular monitoring efforts based on a solid data base are essential.
- 3. Incorporate marine plastic litter reduction into targets.** Following the guiding principle on monitoring, marine plastic litter related targets could be incorporated into the EPR scheme. While such targets create a higher accountability of responsible stakeholders to achieve them, it is crucial to emphasize that set targets have to be verifiable, which requires intensive monitoring and corresponding data bases.
- 4. Integrating the informal sector.** A functional and effective EPR requires that all relevant stakeholders are included – especially the informal sector in those countries, where this

sector plays a strong role. Otherwise, there is a risk that the informal sector will undermine the EPR system and prevent it from having a positive impact on marine plastic litter generation.

5. **Setting up a nation-wide EPR system.** Litter generation is not driven by a few places, instead it is a transboundary issue. Waste can be carried by wind and water to various place within the country and even beyond. Thus, EPR coverage and actions financed by it should cover the entire territory and not just easy-to-service places such as cities to ensure a larger impact.
6. **Extend the EPR system to all packaging materials and possibly non-packaging SUP items.** Glass bottles and metal cans are also regularly found in litter. Generally, it does not make much difference whether an EPR system is designed for plastic packaging or for all packaging, so EPR should cover not only plastic packaging but all packaging materials.

Furthermore, the mitigation effect of EPR can be further increased by:

- ▶ **Implementation of complementing measures for specific items.** EPR alone is not capable to ensure clean beaches and to reduce and prevent marine litter. It should be supported by other, additional measures to address key items according to country priorities, e.g., DRS for PET beverage bottles or bans on highly problematic and difficult-to-collect single-use items.
- ▶ **Implementation of additional EPR schemes,** such as an EPR system for fishing gear. This applies in particular to waste that demands completely different waste management requirements than plastic packaging and therefore cannot be treated under the same system as plastic packaging.

- ▶ **Invest more into clean-up activities.** This can be done either by expanding EPR activities to include clean-up measures or by covering clean-up costs through other instruments, depending on the country's circumstances. In many countries with established EPR systems, costs are covered by other measures, as marine litter prevention is usually not specifically considered when the system is introduced.

All these points underline the need to apply a wide set of management approaches, suitable to the specific plastic waste items and the country's characteristics. In conclusion, **EPR has been identified as a potentially powerful tool to address marine litter generation – yet always as a part of a multi-faceted policy approach** that also takes into consideration other measures such as bans, incentives or design requirements for problematic items.

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Acronyms

ALDFG	Abandoned, lost or otherwise discarded fishing gear
ANGED	National waste management agency Tunisia
APAL	Coastal Protection and Planning Agency of Tunisia
APCO	Australian Packaging Covenant Organization
BCN	Library of the National Congress of Chile
BRCCC	Brewers' Recycled Container Collection Council British Columbia
CAD	Canadian Dollar
CE	Circular Economy
CDS	Container Deposit System (in Australia)
CIA	Central Intelligence Agency of the United States of America
CONPES	National Policy for the integrated management of solid waste in Colombia
DAWE	Department of Agriculture, Water and Environment of Australia
DRS	Deposit-refund system
EC	European Commission
EMF	Ellen MacArthur Foundation
EPR	Extended Producer Responsibility
EPS	Expanded polystyrene
EC	European Commission
ECO-Lef	Tunisian national packaging recovery system
EU	European Union
EUROPEN	European Organization for Packaging and the Environment
GES	Good Environmental Status
HELCOM	Helsinki Convention
HDPE	High density polyethylene
IUCN	International Union for the conservation of nature
KASA	Ministry of Environment and Water Malaysia
KECO	Korea Environment Corporation
KEPRO	Kenya Extended Producer Organization
KNBS	Kenya national bureau of statistics
KPAP	Kenya Plastic Action Plan
LDPE	Low density polyethylene
LGU	Local government units
MSFD	Marine Strategy Framework Directive of the European Union
MSW	Municipal solid waste
NEPC	National Environment Protection Council of Australia
NWMS	National waste management strategy South Africa
LGUs	Local government units
LMIC	Low and middle-income countries
OECD	Organization for economic cooperation and development
OSPAR	Protection of the Marine Environment of the North East Atlantic
PCS	Plastic credit schemes
PE	Polyethylene
PET	Polyethylene Terephthalate
PETCO	PET recycling company (two organizations with the same name in Kenya and South Africa)
POA	Plastic Oceans Australasia
PP	Polypropylene
PRO	Producer Responsibility Organisation
PS	Product Stewardship

RETC	Registration system for the environment in Chile
SRF	Solid refuse fuel
SUP	Single-use plastics
SUP Directive	Single-use plastics directive of the EU
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Agency
V.A.	Voluntary agreements (Korea)
VBWF	Volume-based waste fees (Korea)
WCS	Waste charge system (Korea)
WWF	World Wide Fund for Nature

Glossary

Circular Economy (CE)

The circular economy is an economic model which aims to preserve the value of utilised resources and materials as long as possible, to use them as frequently as possible, and to produce as little waste as possible (ideally none at all). The concept covers all aspects of economic activity, from resource extraction through production, storage and consumption, ending with disposal or ideally recycling. The idea is to close cycles to turn waste back into a resource. Shifting to such a system has economic as well as social and environmental benefits through reduced import dependency, employment creation, reduced littering, less resource extraction as well as improved human health conditions.

Deposit-Refund System (DRS)

A system in which a surcharge is added to the product price on certain items and containers. When consumers return these containers or products after they have become waste, the surcharge is refunded.

Extended Producer Responsibility (EPR)

An environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle, i.e., when a packaging turns into waste in an EPR scheme for packaging. Thus, already when putting their packaged products on the market, producers and importers are responsible for the later treatment of their packaging waste. Therefore, producers / importers pay a fee upfront when their packed goods are placed on the market. The fee is used for collecting, recycling and disposing of the packaging waste and other costs arising from maintaining the system. It is not used as a contribution to the public budget of a state.

Free riders

Producers and importers who benefit from the EPR system without paying the corresponding fees, including those that under-declare their volumes.

Informal Sector

The informal sector consists of individuals engaged in services to generate employment and income without formal contractual arrangements, or individuals who are formally employed but engage in informal side activities to supplement income on top of formal employment. Informal stakeholders operate at every step in the waste management chain, though they are most heavily involved in collection.

Macroplastics

Anything that is made of plastic and is easily visible. Some examples are plastic bags, water bottles and nets. While they still have a negative impact on the environment, they are less likely to enter the food chain because they are hard to ingest due to their size.

Marine litter

Any persistent, manufactured or processed solid material discarded, disposed of, or abandoned in the marine and coastal environment. Marine litter consists of items that have been made or used by people and deliberately discarded into the sea or rivers or on beaches; carried indirectly to the sea through rivers, sewage, storm water or winds; accidentally lost, including material lost at sea in bad weather (fishing gear, cargo); or deliberately left by people on beaches and shores.

Microplastics

The size of microplastics has been the focus of ongoing debates. Some authors take a broad view, including items less than 5 mm diameter, whereas others restrict the term to items less than 2 mm, less than 1 mm or even less than 500 µm. Depending on the upper size limit, industrial pellets may or may not be included in the definition. Microplastics are categorized as primary and secondary (see below). In this assessment, the definition of microplastics as particles less than 5 mm in diameter is used.

Primary microplastics are purposefully manufactured to carry out a specific function. They include certain cosmetics, hand cleaners, air blast cleaning media, and plastic beads manufactured specifically for this purpose (e.g., abrasive particles, powders for injection moulding). Nurdles or pre-production pellets and resin beads are bulk transported between manufacturing sites. They are produced separately and melted down for use by plastics producers (plastics pellets), by manufacturers of household products (personal care products and cosmetics), for ship and building cleaning (abrasive powders), and in manufacturing (powders for injection moulds and 3D printing).

Secondary microplastics represent the results of wear and tear or fragmentation of larger objects, both during use and following loss to the environment (e.g., textile and rope fibres, weathering and fragmentation of larger litter items, vehicle tyre wear, paint flakes).

Obligated companies

Companies which are obliged to pay a fee within a running EPR system. To ensure the level playing field, these are domestic producers and importers putting packaged products on the market.

Plastic credits

The idea of “plastic credits” is linked to the field of climate change mitigation – companies can offset their greenhouse gas emissions by buying carbon credits for which certified companies implement measures that reduce CO₂ emissions, for example through reforestation. Accordingly, plastic credits can be understood as a “transferable” unit representing a specific quantity of plastic that has been collected and possibly recycled from the environment.

Polluter Pays Principle

The waste producer or owner is the potential polluter and bears the responsibility (including in financial terms). The “polluter pays” principle creates the necessary incentives for environmentally friendly conduct and the required investment.

Producer

In the context of the EPR for packaging, producers are those companies that place packaged goods on the market.

Producer Responsibility Organisation (PRO)

The central element for the organisation of all tasks associated with the EPR system. Allows producers and importers to take responsibility by combining their efforts and jointly managing the generated waste through collective responsibility. The PRO is the most important stakeholder (organisation) and is responsible for setting up, developing and maintaining the system as well as the take-back obligations of the obliged companies. The PRO is also referred to as system operator.

Recyclables	Materials that still have useful physical or chemical properties after serving their original purpose and therefore can be re-manufactured. Some are of positive economic value as well (e.g., rigid PE, PP or PET bottles).
Recyclates	A product which has passed through a life cycle and subsequently a recycling process, which means it is made from used materials (e.g., plastic granules).
Recycler	Companies that recycle pre-processed waste streams (e.g., sorted rigid PE plastics) by washing, flaking, agglomerating and regranulation. With these actions, an economically marketable output product is reached.
Source Separation	The separation of specific materials at the source for selective collection. Source separation is not considered to be part of recycling.
Waste Hierarchy	The waste hierarchy sets the priority of waste management options based on the sustainability principle, with prevention as the most favorable option (no waste), followed by preparation for reuse, recycling, energy recovery, and disposal as the very last option.
Waste Prevention	Measures taken before a substance, material or product has become waste, which reduces quantities of waste and also includes re-use of products and the extension of the lifespan of products. Reducing amounts of hazardous substances used and the negative impacts of the generated waste on the environment and human health.

Introduction

1



Plastics are one of the most versatile materials of our modern society. Their unique combination of light weight, inert properties and high durability gives them an essential role in most economic sectors. This has allowed plastic to evolve from a material for niche applications in the first half of the 20th century to an indispensable and ubiquitous element of our global economy (Plastic Atlas, 2019). **However, concerns about negative impacts caused by increased leakages of plastic waste into our environment are rising globally.**

Plastic waste enters in the environment through various pathways. This is due to deficiencies in end-of-life management, i.e., collection, sorting and further management through recycling, incineration or landfilling. This includes direct dumping by people, e.g., when a plastic item is improperly disposed of after it has become waste. Even after supposedly correct disposal, litter may still leak from the waste management system, for instance when it is blown out of overflowing waste bins or is carried away from landfills or urban run-offs. Eventually, plastics are transported by wind and water into the environment and even to places far off from any human settlement. Depending on the material composition, it slowly breaks down and accumulates in seas, oceans and on beaches in coastal areas worldwide, which is also called marine plastic leakage or marine plastic litter. Marine litter in general consists of items that have been deliberately discarded, unintentionally lost, or transported by winds and rivers, into the sea and on beaches (EC, 2010).

Marine plastic litter can be further differentiated into macroplastics and microplastics depending on its size. While macroplastics can be broadly defined as “anything plastic that can be easily seen” (UNEP, 2021, p. 11), microplastics and its definition have been the focus of ongoing debate based on its size limit.¹ Both macro and microplastics pose various, yet distinct, threats. For instance, wildlife can get tangled up in macroplastics because of its size (UNEP, 2021).

On a global scale, particularly packaging is crucial in light of plastic litter composition: Various

items of plastic packaging are consistently found among the most common items worldwide (Hardesty et al., 2021), due to insufficient management with staggering 32% leakage on the global scale (data based on 2015; see Figure 1).

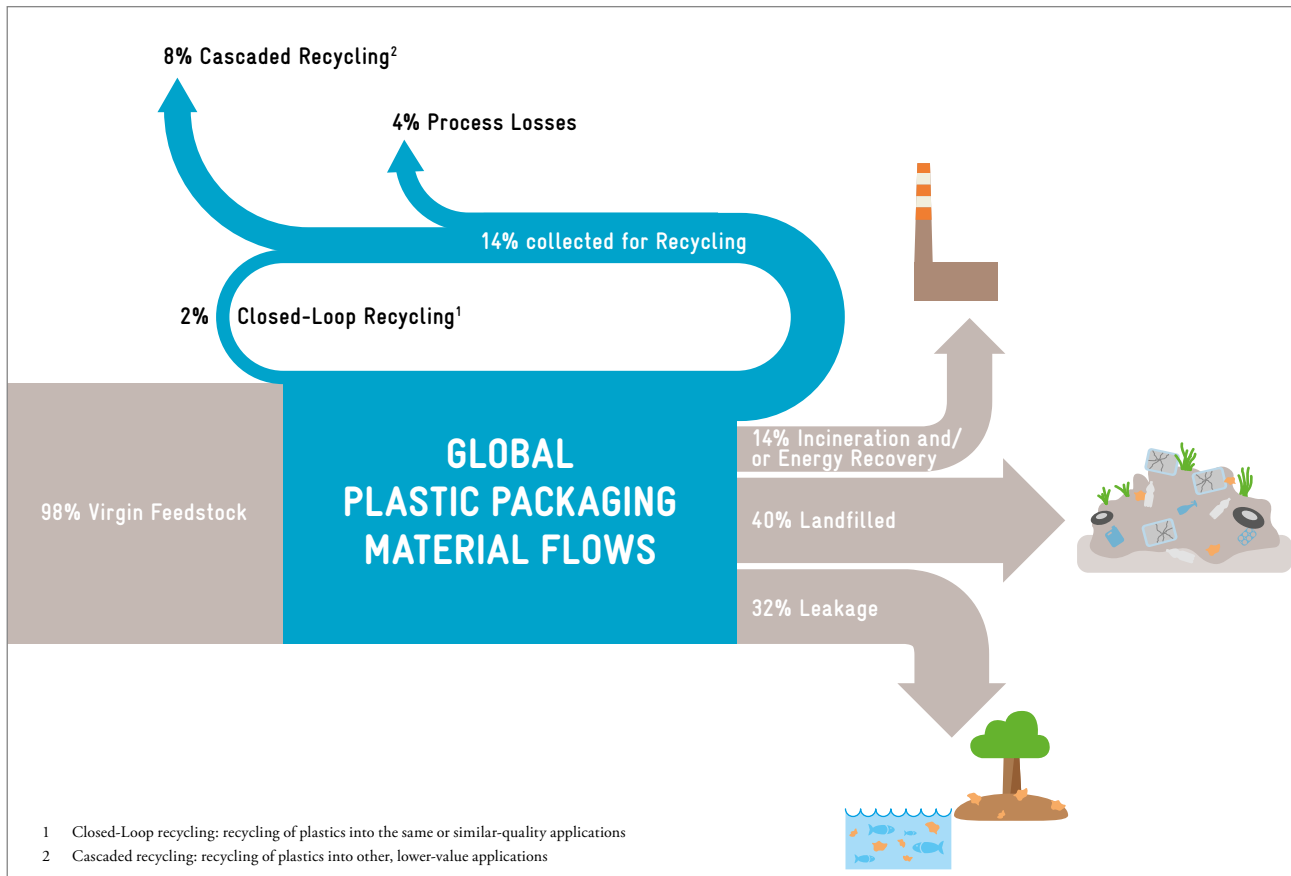
This accumulation of plastic waste in the environment is highly problematic; not only due to aesthetic reasons, but also because of the multiple harmful, often lethal consequences for animals, such as entanglement, digestion of plastics and other environmental and human health impacts, such as soil and water contamination caused by the hundreds of hazardous chemicals found in littered plastic waste (Kühn et al., 2015; Rochman, 2015).

In addition, plastic litter degrades in the environment which impairs or even nullifies its recyclability, so that its value is ultimately lost. At the same time, it adversely affects the economic activities of the tourism and fishing industry, among others (EC, 2018). Moreover, litter clean-up activities are cost intensive. This poses a problem for many local authorities worldwide in general and particularly in low- and middle-income countries (LMIC), as they often already struggle to cover the finances of waste management (PREVENT Waste Alliance 2020a). As most of these negative externalities eventually result from improper and environmentally damaging waste management practices, creating sustainable waste management for plastics and especially plastic packaging is an important step to solve this issue.

Extended Producer Responsibility (EPR) for packaging is increasingly recognized as one such tool that enables a needed sustainable waste management and accelerates the transition to a circular economy. EPR is defined as an “environmental policy approach in which a producer’s responsibility for a product is extended to the waste stage of that product’s life-cycle. In practice, EPR involves producers taking responsibility for the management of products after becoming waste, including: collection; pre-treatment; [...] recovery (including recycling and energy recovery) or final disposal.” (Basel Convention, 2018). Thereby, EPR embodies the ‘*polluter pays*’ principle by obliging companies to take organizational and financial responsibility over their products also at the end-of-life stage, i.e., once they have become waste.

¹ In this study, the definition of microplastics as particles less than 5 mm in diameter is used (following the definition of UNEP, 2021).

Figure 1: Global plastics packaging material flows 2015



Source: EMF, 2021

EPR has also been identified as a key instrument for mitigating the marine litter issue by various institutions and organizations, including among others the EC (2018), UNEP (2021) and the WWF (2019). The EPR concept has been widely implemented in several European, Asian and American countries perceived as an effective instrument to finance and organise waste management of (plastic) packaging. In addition, a continuously increasing number of countries have been or are introducing respective steps and measures towards EPR implementation (PREVENT Waste Alliance, 2020b; EMF, 2021). However, as the amount of marine plastic litter generation has continued to increase since decades (UNEP, 2021), it is important to

- i. critically assess how EPR affects marine plastic (packaging) litter generation,
- ii. and how EPR schemes can be adapted to increase their respective mitigation effect in the future.

To answer both questions, the second chapter will explain in depth how EPR can finance waste management as means to prevent marine litter while the third chapter is complementing the analysis through assessing practices from various countries with different status of EPR implementation. Finally, by combining the insights from the two previous chapters, the role of EPR for marine litter prevention is summarized alongside associated challenges and barriers. The report closes with recommendations for developing a global standard on EPR reflecting on these lessons learned.



Financing waste management via
EPR to prevent marine litter

2



An understanding of how EPR can and has impacted marine plastic litter generation requires a deeper understanding of the overall waste management structures and policies, within which EPR is embedded and its peculiar characteristics, which are presented in section 2.1.

This is complemented with an analysis of the factors impacting marine plastic litter (section 2.2) while section 2.3 elaborates on how EPR can be applied as a means to direct funding into adequate measures for preventing marine litter.

2.1 Waste management policies

In most countries, the waste sector is governed by national regulation, supervision and respective policy development. However, the operational responsibility for solid waste management is typically assigned to local government units (LGU). Particularly in LMIC, the LGUs in charge often struggle with their responsibilities to adequately managing solid waste and universal collection services – as a prerequisite for any further management – are often missing. These deficiencies are carried through all subsequent steps after collection, with lacking options for transfer, treatment or safe disposal. Alternatives to proper waste management – like open burning and ultimately littering into the environment – are estimated to cause long-term costs that may be five to ten times higher than the required current waste management expenditure (UNEP/ ISWA, 2015). Waste management costs can directly be recovered through service fees or other mechanisms that apply the ‘polluter pays’ principle. On the contrary, environmental and social long-term costs are rather externalised and hence borne by the society as a whole (Defra, 2011).

Proper waste management poses a financial burden for LGUs all over the world, often representing the single highest budget component. Rough estimations assume the costs in low-income countries at nearly 20% of municipal budgets; 10% in middle-income countries and 4% in high-income countries. This is to be understood as an average, with much higher costs occurring particularly in countries with challenging geographies. Specifically, LMIC face significant difficulty in recovering these costs through user fees. As a result of a set of municipalities’ responsibilities – including clean water, electricity, education, healthcare – the investment and costly operations of adequate (plastic) waste management is often neglected in

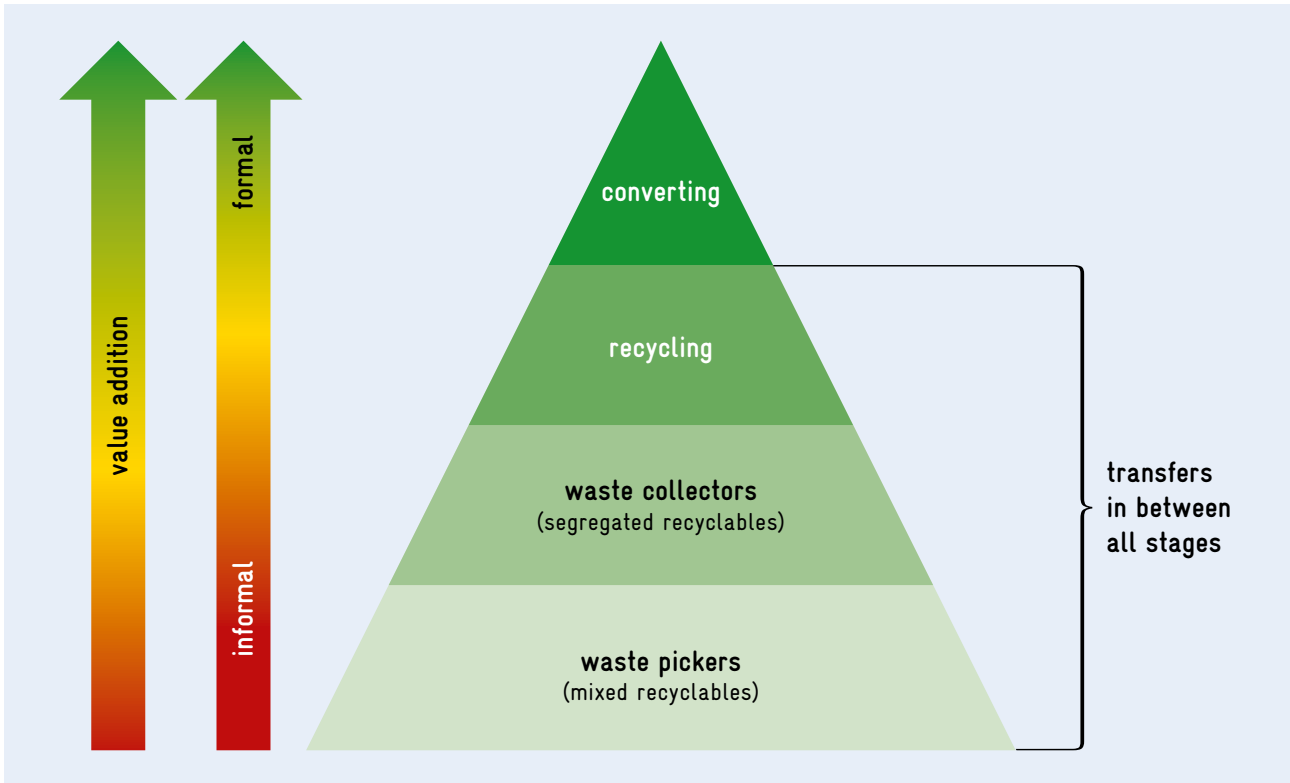
light of limited resources and limited financial and organisational capacity (World Bank, 2018).

Lacking provision of formal waste management services in particularly LMIC leaves a gap that is to a certain extent filled by the informal sector. Informal stakeholders operate on almost all stages within waste management, but most dominantly at the collection stage. Clearly distinguishing informal parts of the waste management sector from formal ones is by and large impossible (Figure 2).

The informal sector’s possibilities for the development of a sustainable plastic waste management are severely limited due to the nature of the activities that only focus on valuable waste fractions. Low-value items, on the other hand, remain in the environment. It is also difficult to assess the informal sector’s contribution to waste management targets, as informal workers often avoid contact with researchers and regulators, and numbers and activities usually fluctuate (GA Circular, 2019). The contribution of the informal sector is generally insufficient to solve waste management challenges. Yet, if the informal sector concentrates on extraction activities that may otherwise be neglected even further, it may still play a role in mitigating some of the effects of waste mismanagement (Löhle et al., 2021).

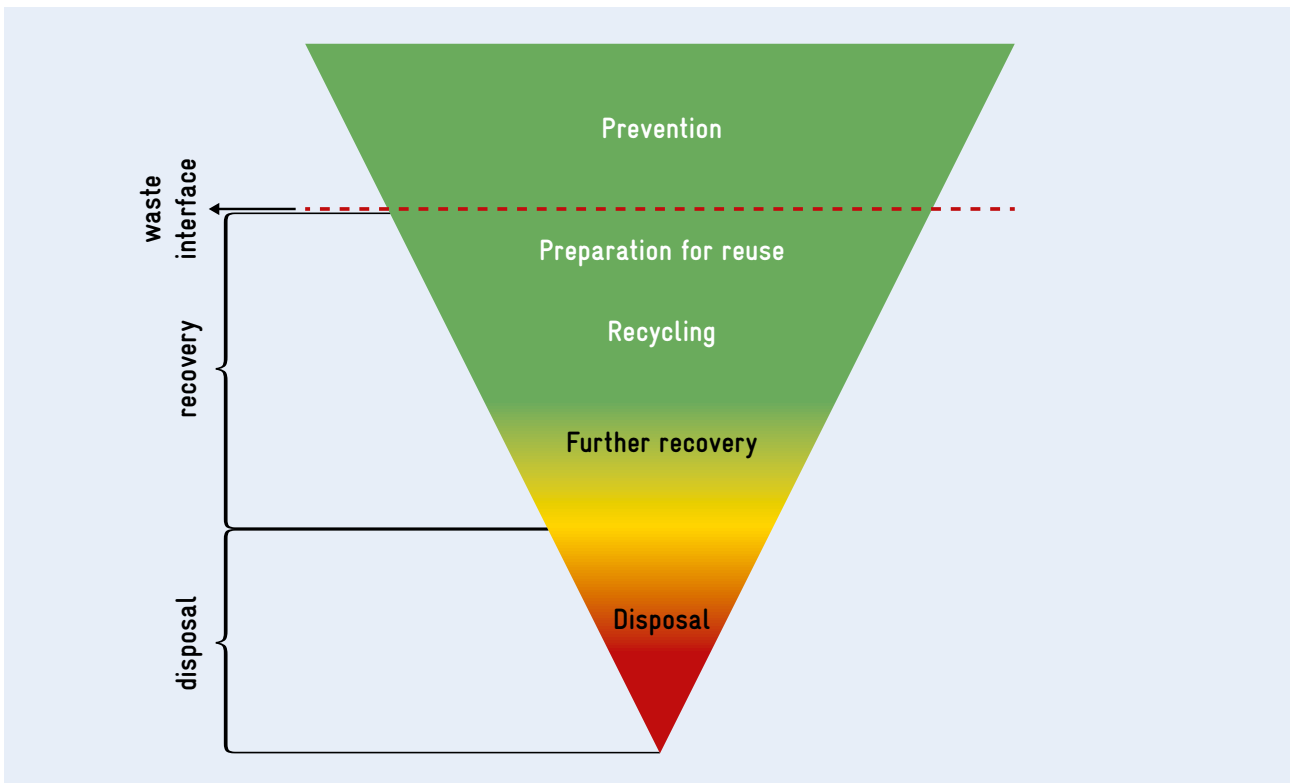
Addressing inappropriate (plastic) waste management practices in LMIC calls for effective policies, particularly those that allow to bridge the financial gap for waste management. Common principles like the waste hierarchy (Figure 3) or the principle of ‘reduce, reuse, recycle’ (‘3R’) guide efficient and effective plastic waste management policies, including EPR (UNEP / ISWA, 2015; European Commission, 2022; Basel Convention, 2018).

Figure 2: Informal activities in waste management



Source: cyclos

Figure 3: The waste hierarchy according to the European Waste Framework Directive



Source: cyclos figure based on (European Commission, 2022)

Any policy approach that considers the waste hierarchy, aims at mitigating the costs at all phases of adequate waste management, i.e., for collection, transfer, sorting, treatment and (safe) disposal. In light of the apparent cost recovery challenges particularly in LMIC, further policies are required to bridge the remaining financial gap, i.e., to internalise the costs of waste management and hence, to a certain extent, release the burden from the LGUs.

There are various policy instruments and approaches to finance waste management and enable effective plastic waste management. Their suitability depends on the product to which they apply and the objective they are intended to achieve. Consequently, several policy instruments and approaches are discussed globally by governments and decision makers to find the best approach varying in their ability to provide dedicated, ongoing and sufficient funding while enabling both effective waste management and upstream effects. Yet, a **comprehensive and multi-faceted legal and regulatory approach**

to enable adequate waste management ideally consists of various, complementary instruments and approaches – EPR being one of them. Other financing instruments in waste management include e.g., taxes and municipal fees (PREVENT Waste Alliance, 2022, *forthcoming*).

EPR has been acknowledged as a successful approach that allows to integrate the producers in the management of their products' waste. Since its first operationalisation in Germany at the beginning of the 1990s, EPR has been widely adopted in Europe, Asia and the Americas, facilitating a much more diversified understanding and a highly context-specific adaptation of the EPR system. More recently, it is also discussed as an approach to address littering and thus curb the negative ecological, economic and social externalities associated to plastic mismanagement (PREVENT Waste Alliance, 2020a; EMF, 2021). In order to understand how EPR in particular can address marine litter, it is first necessary to elaborate on the factors responsible for marine litter and its generation.

2.2 Marine plastic litter – impacting factors and composition

As defined in EC (2010), marine litter consists of items that have been deliberately discarded, unintentionally lost, or transported by winds and rivers, into the sea and on beaches. While this highlights that there are multiple ways how marine plastic litter is generated, it can nevertheless be argued that – at least in theory – the vast majority of marine litter could have been prevented at some point as it has been originally caused by human action.

Looking at the waste management flow, litter can be generated at various points starting directly at the consumer level if a product after consumption is not properly disposed of but directly littered into the environment. Other possibilities how waste becomes litter is when waste escapes proper waste management, which can happen at all stages of the waste management system, for instance when waste bins are overflowing or fall over, in

case of improper handling of waste during treatment or also through leaking landfills. Once waste has leaked, it is further transported by wind and water and can only be removed from the environment through clean-up activities. **Looking at the ways how waste becomes litter highlights why a thorough waste management, including clean-up activities, is expedient for preventing and reducing marine (plastic) litter.**

Once waste has leaked into the environment and become litter, its further transport is shaped by geographic factors as well as properties of the litter plastic items, such as weight and buoyancy. Geographic factors have a major impact on litter transport and distribution, as for instance the distance from settlements to rivers and coasts, land-use and the presence of barriers acting as traps for plastic litter – both natural as well as artificial ones (González-Fernández et al., 2021;

Hardesty et al., 2021; Meijer et al., 2021). As an illustrative example, highest plastic littering into the environment happens in coastal cities with urban drainage and paved surfaces, exacerbated by environmental factors like high precipitation (Meijer et al., 2021).

Another factor that determines which type of plastic item ends up in the marine environment is its shape and physical properties: Items which due to their size, form and weight are more likely to entangle, are less likely to be transported across long-distances – in contrast to buoyant items, which can be transported via wind and water over long distances even to remote places (Hardesty et al., 2021). As estimated by Meijer et al. (2021) 98.5% of all littered plastics remain entrapped in the terrestrial environment where they accumulate and progressively pollute the inlands.

Due to its possibility of being transported, plastic litter has become a transboundary issue. Tracing plastic litter and related waste management deficiencies to a rather small number of cities or countries or river systems is an outdated

approach. In contrast, addressing plastic litter as a transboundary, global issue inevitably requires a combination of multinational, national, and local actions given the many factors that impact on the mismanagement and ultimate generation of waste (Hardesty et al., 2021).

Taking one step back and focusing on the point where plastic waste leaks and actually becomes litter, recent studies reveal that leakages and littering are shaped by various socio-economic and cultural factors and thus vary significantly (e.g., Hardesty et al., 2021). The interplay of factors such as the national income (i.e., a country's wealth), value of built infrastructure, population density in proximity to rivers and coasts and the overall waste management system as well as cultural factors all impact which and how much plastic waste is eventually generated. Previous assumptions that the plastic litter density is proportional with higher number of people (as for instance in Jambeck et al., 2015) are based on simplifications as they largely ignore local heterogeneity that determines litter density and composition.

Table 1: Ten most abundant plastic litter items worldwide

	Ten most abundant items 'on land'	Ten most abundant items 'on seafloor'
1	cigarette butts	fishing line
2	food wrappers	plastic pieces
3	plastic beverage bottles	glass bottles
4	plastic bottle caps	plastic beverage bottles
5	plastic bags	food wrappers
6	plastic straws	metal cans
7	plastic take-away containers	plastic bags
8	plastic lids	fishing gear
9	foam take-away containers	plastic cutlery
10	plastic pieces (fragments)	rope

Source: Hardesty et al., 2021

This means there is a strong difference in littering between cities and regions, which is 'simply' rooted in their socio-economic differences.

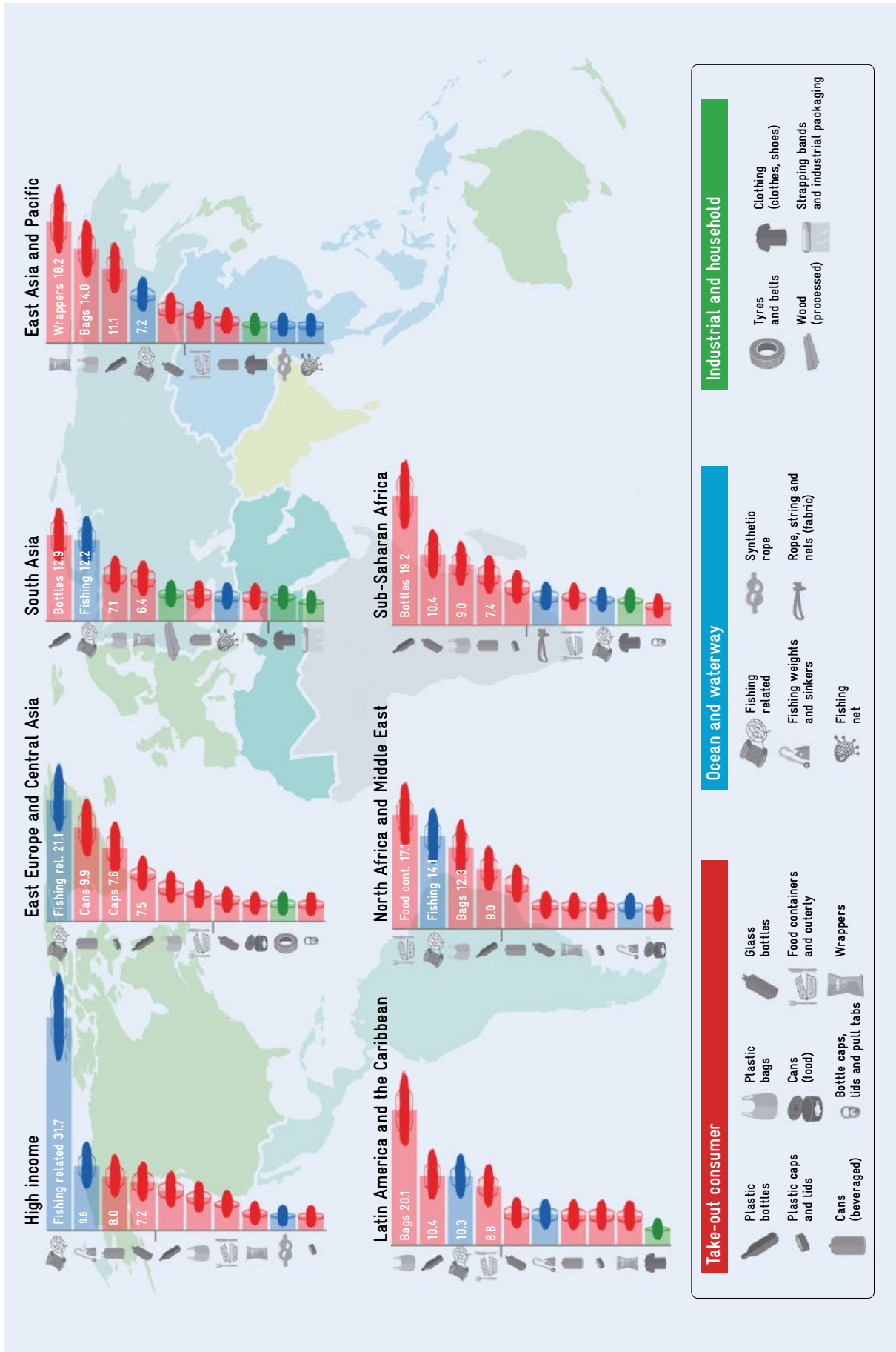
Notably, cities and regions which are characterised by an overall low wealth but high value of built infrastructure show the highest amounts of littering. Areas with extensive infrastructure, such as urban hubs, cities and larger towns, differ in regard to their amount of plastic litter according to national wealth. Predictably, wealthier countries / states / governments are generally better able to finance overall costly waste management compared to cities in countries with lower wealth. This, in turn, leads to higher amounts of mismanaged waste and thus also plastic litter generation (Hardesty et al., 2021). Since clean-up activities of litter are very cumbersome and cost-intensive, intervening at the 'root cause' and improving the actual waste management provided is crucial – particularly in countries / states / governments which overall struggle to actually finance it. Thus, waste management policies which enable the needed financing are a key tool for mitigating marine litter and preventing its generation in the first place.

Shifting the perspective from the factors shaping plastic litter generation in the marine environment to the items most commonly found in (marine) environment helps to identify and prioritise which

waste management policies are most suitable to close the financing gap. According to Hardesty et al. (2021), the ten most abundant items littered (by number) globally are shown in Table 1. These include the ones found 'on land' – such as beaches, riversides, lakesides and other terrestrial environments – as well as 'on the seafloor' – meaning seafloors, reefs, inland seas and lake bottoms:

As shown in Table 1, the vast majority of litter on land consists of plastic packaging and other, non-packaging Single-use Plastics (SUP). Also, for seafloor litter, packaging is a key polluter. However, as previously analysed, plastic litter generation depends on multiple factors and their interactions and thus varies significantly between countries, as shown in Figure 4: While packaging, and particularly plastic packaging, supplemented by non-packaging SUPs are found in marine litter in all regions worldwide, there is, however, stark difference between the high-income and LMICs regions in regards to how strongly the waste is dominated by plastic packaging and non-packaging SUPs. This corresponds with and reflects the previously identified key issue of sufficient financing of waste management, which is usually lacking in LMICs.

Figure 4: Litter composition in different regions worldwide



Source: Morales-Caselles et al., 2021

Considering the causes and factors shaping marine plastic litter as well as its most abundantly items, waste management policies to effectively reduce marine litter should specifically target (plastic)

packaging and non-packaging SUP. Specifically, EPR has been identified as suitable for these products, as discussed in the next section.

2.3 Plastic waste management – the need for sufficient financing

An adequate disposal of plastics once it has become waste is crucial to prevent and reduce the generation of marine plastic waste, e.g., by proving and expanding waste collection. However, as previously explained, particularly in LMIC, funding of operations to effectively prevent plastic litter – i.e., a functional waste management system – poses a thus far unsurmountable challenge. This results in limited and fragmented waste management practices, exacerbated by poorly maintained existing infrastructure for collection, sorting and recycling. It is not possible to cover all performance-related costs solely through the material market value of the packaging waste (EMF, 2021). In the absence of effective policy instruments and tools that provide adequate (economic) incentives for reduction, reuse and recycling, the associated environmental costs are carried by the society as a whole and future generations (Renaud et al., 2018).

Therefore, a system in which discarded packaging and non-packaging SUPs are collected, sorted and recycled or treated in an environmentally sound manner, requires sufficient and sustainable financing to effectively reduce marine plastic litter generation. One of the key strategies discussed in this context is EPR. EPR is a policy approach under which producers are given a significant responsibility – financial and/or physical – for the treatment or disposal of post-consumer products by extending their responsibility to the end of the life phase (Basel Convention, 2018; OECD, 2016).² In an EPR system for packaging, every

producer has to assume organisational and/or financial responsibility, through contributing when putting a packaged good on the market. The term ‘producer’ refers to all companies that introduce packaged goods to the market and, hence, includes both importers as well as companies manufacturing packaged goods within the country concerned. As they are obliged to take responsibility, these companies are also referred to as obliged companies. The subsequent collection, sorting, recycling, information and awareness sharing and communication, as well as administration and other needs to run the system should be funded through the EPR system. In some cases, the system covers litter clean-up costs. Among other products, EPR has particularly been implemented for packaging waste streams on a global scale. Other plastics commonly found in marine litter are thus far not widely covered by EPR (OECD, 2016). This includes a number of SUP items like cigarette butts or earbuds.

Through extending the producer’s responsibility, EPR schemes have been recognised as a powerful tool to shift waste management costs for plastic packaging from municipalities to producers. It represents an important opportunity to improve waste collection and subsequent treatment through reliable funding by making the necessary funds available. According to Ocean Conservancy (2019), financial modelling shows that an EPR has the highest potential – up to 75% or more – in closing the waste management value chain financing gap and reduce pollution. Thereby, applying the EPR principle allows to bridge the financial gap as prerequisite for sufficient waste management practices that mitigate marine litter generation (e.g., EMF, 2021; EC, 2018; UNEP, 2021; WWF, 2019). In addition, the financial flows of the obliged companies within the EPR

² EPR can be applied to various waste streams, such as batteries, electrical and electronic equipment and packaging. Since this report focuses on (plastic) packaging, all further explanations are focused on EPR for packaging unless explicitly stated otherwise.

system can significantly improve business cases for the collection, sorting and recycling of packaging waste. It can also support community engagement to fight plastic pollution and leverage the economic potential of the circular economy, with all the associated implications for job creation. Applying EPR to internalize costs is therefore a complementary option to finance waste management activities for products in scope of the respective EPR system. These items are consequently prevented from ending up in the ocean (Ademe, 2021). Therefore, EPR can be characterised as a specific finance mechanism with particular effects on the products in scope. This means, effects on items that are beyond the EPR system's scope, can only be indirect – at best. Complementary measures are therefore required for problematic items outside an EPR system's scope.³

It needs to be noted that EPR can only ensure reliable financing and corresponding waste management practices, if it is introduced as mandatory system through a legal basis. While there are also voluntary schemes in several countries, their effectiveness is inherently limited. Due to the voluntary nature of the funding, these systems can only leverage finance according to the willingness or ability of the contributors and not the actual requirements to finance the waste management. This mechanism is therefore unsuitable to ensure that financial flows are reliably covered (PREVENT Waste Alliance, 2020c; EMF; 2021). It needs to be noted that there are also other financial mechanisms and policy tools besides EPR and market-based approaches, such as Plastic Credits Schemes (PCS).⁴ However, none of them has proven capable of providing reliable, dedicated and ongoing funding to a comparable extent as EPR (EMF, 2021). **Considering the importance of financing waste management to reduce marine plastic litter generation in LMIC, EPR itself is the most suitable approach.**

In contrast to other waste management policies and approaches, EPR can also induce upstream effects in packaging and product design, thereby supporting the shift towards circular economy (PREVENT Waste Alliance, 2020b). The circular economy is an economic model that promotes a more efficient use of resources to create a more circular value chain. Contrary to the traditional and linear model, the circular economy aims to maintain the value of products, materials and resources for as long as possible by returning them into the product cycle at the end of their use, while minimising the generation of waste. The proper management of waste to enable actions such as closed-loop recycling to fully preserve the material's value – as envisioned in the circular economy concept systems – has therefore become a central element in waste-related discussions (PREVENT Waste Alliance, 2020a).

Factors that are important for the transition to a circular economy such as the recyclability and/or the use of recyclates in packaging can be incorporated into the EPR contributions, which are paid by the obliged companies. Increasing the recyclability, the demand for recyclates or other eco-incentives have the potential to additionally strengthen and improve waste management practices. Incentives can be introduced to use the product longer, enable reuse or increase its recyclability and thus keeping it away from landfills. Such modulation of the fees is referred to as eco-modulation and can accelerate the transition to more circular practices. Thus, if properly designed and implemented, the EPR can act as an important accelerator in the transition to a more circular economy and/or the “3Rs” principle, which have been identified by many countries as a key concept for their economies in terms of climate change mitigation, resource efficiency, and also the plastics crisis.

³ For detailed information on EPR, please refer to the EPR Toolbox - PREVENT Waste Alliance

⁴ The idea of “plastic credits” originates from the field of climate change mitigation – companies can offset their greenhouse gas emissions by buying carbon credits based on implemented certified measures that reduce CO₂ emissions. Plastic credit schemes have gained significant attention over the last years with several companies exploring whether such an approach could be an element to implement their corporate responsibility, especially in countries without established EPR systems. Nevertheless, this market is still in an early stage, so that, for example, there are no clear definitions and standards yet.

To conclude,

- i. The above-mentioned need for financing waste management of plastic packaging particularly in countries with lower national income can be best achieved through implementing EPR for these products.
- ii. Mandatory EPR offers reliable financing of effective waste management infrastructure and service, if implemented and enforced through a robust legal basis.
- iii. EPR also offers wider benefits than just mitigating marine litter as it can create upstream effects and act as accelerator towards circular economy.

The EPR concept for packaging waste has been widely taken up since the early 1990s and has since been implemented in a variety of regions worldwide (Lindhqvist, 2000). In the following chapter, the introduction of EPR for packaging in some selected countries with different levels of EPR implementation is examined. This will further explore the role of EPR in influencing the generation of marine plastic packaging waste based on actual practice. It will also assess how EPR schemes can be adapted to enhance their mitigation effect in the future.

Experiences from practice

3



3.1 Methodology and country selection

To answer the guiding research questions of how EPR affects the generation of marine plastic (packaging) litter and how EPR systems can be adapted to increase the mitigation effect in the future, a qualitative approach⁵ was used, focusing on a few selected countries from different continents bordering different oceans, and analysing them in more detail. The results show examples from countries / jurisdictions with

- **mandatory EPR system** operational since more than 5 years,
- **recently initiated EPR systems** (mandatory EPR schemes, which are operational less than 5 years),
- **emerging EPR legislation.**

The selection of countries / jurisdiction is presented in Table 2, the geographic location in Figure 5.

Table 2: Overview of selected countries

Country / region	Population	Coastline	Ocean
Mandatory & operative (since more than 5 years)			
Australia	-25.8 million inhabitants	25,760 km	Indian Ocean; Timor Sea, Arafura Sea, Coral Sea, Tasman Sea (all Pacific Ocean)
British Columbia, Canada	-5.1 million inhabitants	25,725 km (including islands & fjords)	Gulf of Alaska (North Pacific Ocean)
Europe (EU)	-748.4 million inhabitants	68,000 km	Atlantic Ocean, Mediterranean Sea, Black Sea, Baltic Sea
Korea	-51.7 million inhabitants	2,413 km	East Sea and Yellow Sea (Pacific Ocean)
Tunisia	-11.8 million inhabitants	1,148 km	Mediterranean Sea
Just started with operating mandatory system			
Chile	-18.3 million inhabitants	6,435 km	South Pacific Ocean
Columbia	-50.4 million inhabitants	3,208 km	Caribbean Sea, North Pacific Ocean
South Africa	-59.3 million inhabitants	2,798 km	Atlantic Ocean, Indian Ocean
Emerging legislation			
Kenya	-54.7 million inhabitants	536 km	Indian Ocean
Malaysia	-33.5 million inhabitants	Peninsular Malaysia 2,068 km East Malaysia 2,607 km	Andaman Sea (Indian Ocean), South China Sea (Pacific Ocean)

⁵ Due to scarcity of data as well as a lack of comparability between available datasets, no quantitative comparison of any kind could be made. In addition, as also criticised by González-Fernández et al. (2021), available data usually does not account for any temporal fluctuations (e.g. seasonal differences) and counts for data collection are overall still very limited, both spatially and temporarily.

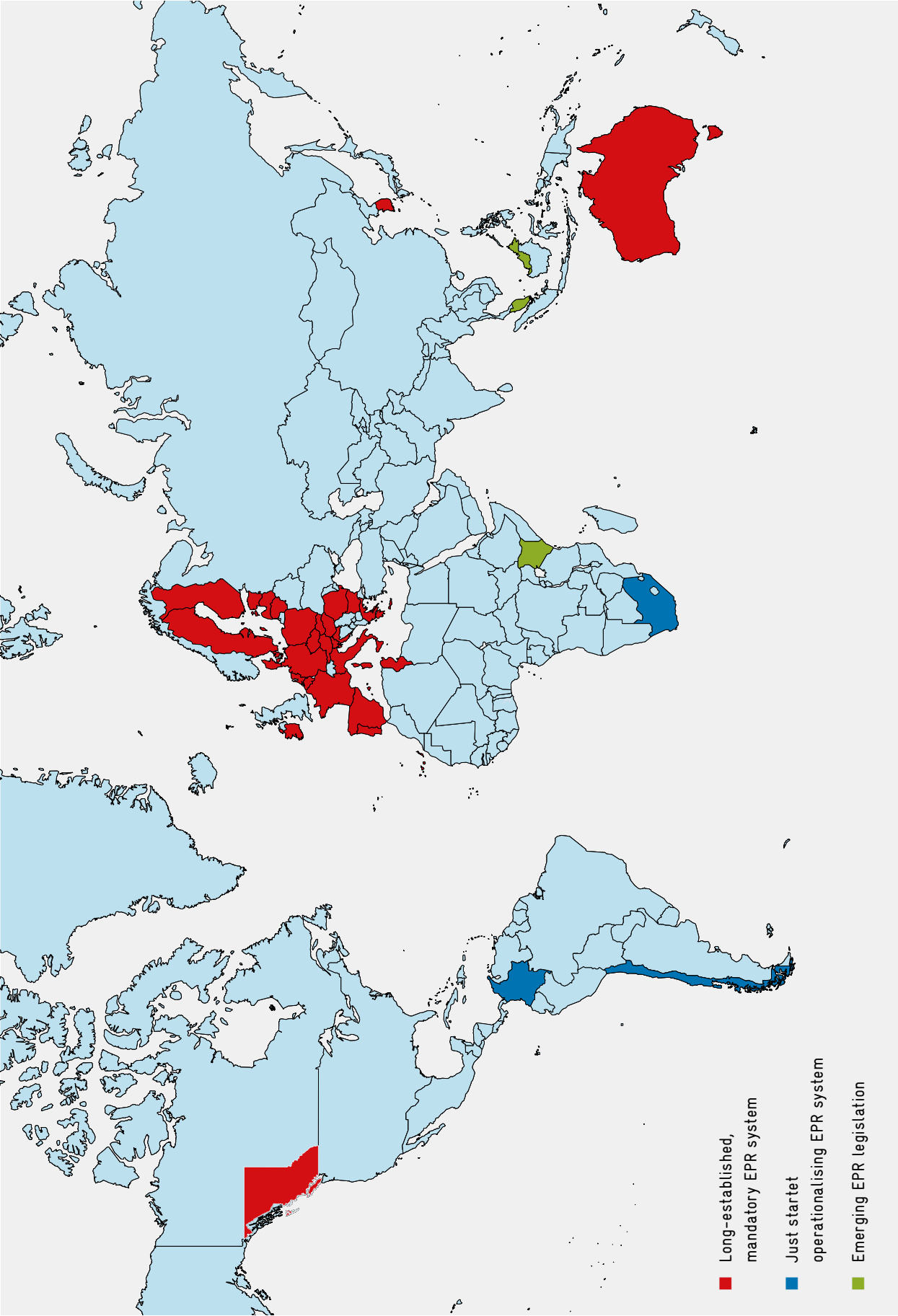
As explained in section 2.3, EPR systems need to be mandatory in order to achieve reliable financing. Furthermore, establishing an EPR system needs time and permanent adjustments as it is very likely to encounter problems and challenges, which have not yet been considered or differently anticipated beforehand – this is the usual experience in countries where the EPR system has been running for several years. Thus, once put in place, EPR systems require continuous evaluations and adaptations to meet these problems and challenges, developments and changed conditions (World Bank, 2022).

Generally, EPR implementation is best realised as a step-by-step approach, gradually expanding scope and/or targets. For this, immediate impacts in marine litter generation and composition cannot be expected directly after the start of implementation, as the establishment of the structures and their successful operation will take time, as shown in practice. Thus, the number of researched countries is limited to a few countries which actually fulfil these criteria – most of them located in the Global North. To prevent a one-sided view on this issue, the study also includes countries which just started to operate a mandatory system as well as countries with emerging legislation. This was determined by the objective to analyse how EPR is (or should be) used to reduce marine plastic litter generation and also to incorporate these insights in the overall recommendations for developing globally applicable guiding principles for EPR. Thus, the ten countries listed in Table 2 have been chosen to represent case studies from all continents bordering all major oceans.

For the countries listed above, the respective state analyses with their EPR system are briefly outlined in the following: General considerations are made concerning the waste management and its effect on marine litter. Available data on marine litter items and composition over time have been analysed. Each country analysis closes with a discussion on how the EPR systems are able to prevent marine litter. As each country is unique, deviations from this structure are made where necessary in order to fully capture the details and allow for a better analysis of each country. Thus, the full country analyses are presented in the annexes 1 to 10 while the following chapters summarises the key characteristics and findings per category of country.

Regarding the aspect of data on marine litter over time, studies and reports were examined from various sources including data from volunteer-based clean-ups, in particular data from the 'International Coastal Clean-up' from Ocean Conservancy. It has to be noted that findings from volunteer-based activities are very limited: While the data offer some insights on the type of litter found, it lacks important background information needed for an in-depth assessment. This includes, for example, how the sites for the clean-ups/data collection were selected and how representative the selected sites are. Another example is that there is no information on whether a significant increase in the amounts collected between years is actually due to an increase in the amount of waste found or to an increase in clean-up activities. While this information is irrelevant for the percentage-based litter composition and similar analyses, it is important for conclusions derived from the litter counts. Without such background information, insights gained from the data are limited.

Figure 5: Overview of selected countries



3.2 Insights from countries with implemented and operating EPR schemes

In this part of the report, EPR systems in several regions of the world are being examined, including Australia, the Canadian province British Columbia, the European Union, Korea, and Tunisia. In particular, this report focuses on the **relation between the established EPR systems in these regions and the current plastic litter situation on their coastal areas**, based on avail-

able data and beach litter monitoring results. For those countries where EPR schemes have been in place for a longer period of time, an analysis of the development of items in scope of the EPR system against the general marine litter composition is particularly informative. Full details on each country / region are provided in the annex.



AUSTRALIA [Annex 1: Country analysis Australia](#)

For managing its plastic packaging, Australia has implemented a Product Stewardship (PS) instead of EPR. PS is commonly defined in Australia as “an approach to managing the impacts of different products and materials. It acknowledges that those involved in producing, selling, using and disposing of products have a shared responsibility to ensure that those products or materials are managed in a way that reduces their impact, throughout their life-cycle, on the environment, and on human health and safety.” The PS approach has many similarities with the EPR, but also has significant differences. This is most obvious regarding the actor who is held accountable. In EPR, this is clearly the “producer”, i.e., the company that brings the packaged goods to market for consumption, whereas PS is much broader and recognizes a shared responsibility of all actors involved. Thus, in Australia, there is no specific financial responsibility of ‘the producer’ to finance waste management.

In Australia, three different types of PS are distinguished: a voluntary one, a co-regulated one together with the respective industry, and a mandatory one. Plastics is subject to a co-regulated PS, in which the government sets a legal framework and the industry is responsible for delivering the targets and requirements laid out. The Scheme Operator for plastics and packaging acting on behalf of the industry is Australian Packaging Covenant Organisation (APCO). In addition, there is a mandatory PS in the form of a deposit-refund system (DRS) for beverage containers.

In the case of co-regulated PS for packaging (except for beverage containers), producers ‘only’ have an obligation to contribute by designing their packaging a certain way to achieve targets related to such aspects, e.g., not using polystyrene packaging. However, there are no financial contributions made by the producers for waste management. Instead, all activities are financed by other policies and approaches, such as municipal fees.

Littering has been declared as unlawful activity throughout Australia and levels of littering are monitored and published through annual reports. For these reports, litter is sampled not just on beaches but in various environments, i.e., residential areas, beaches, industrial areas, car parks, shopping centres, street precincts, recreational parks, and next to highways. As revealed by the data, the total amount of litter has decreased over the last ten years. Moreover, there has been a relatively uniform decline in most waste types, i.e., the share of each category in the total waste stream has remained relatively constant, and cigarette butts continue to be the most common waste, while most waste is counted on a site-by-site basis next to highways.

Thereby, the Australian case demonstrates that litter reduction and eventually its prevention can be achieved if sufficient financing is available, however, that this financing does not necessarily need to come from an EPR system.



BRITISH COLUMBIA, Canada Annex 2: Country analysis British Columbia, Canada

In Canada, legislation for EPR and other matters concerning marine litter are made on a provincial level. The province British Columbia introduced EPR legislation in 2004. The EPR system has since evolved into a complex legal setup, covering a vast array of categories, typically through schemes for specific product categories, e.g., packaging for different hazardous goods, tires or e-waste. The EPR system for packaging covers packaging made of plastics, paper, glass, metals and composites. In addition, British Columbia also uses a wide application of DRS for beverage containers. It is of crucial relevance that practically all beverage containers – regardless of their design or material composition – are covered by two DRSs; one of them is managing beer (and cider) containers and has traditionally concentrated on the reverse logistics of reusable glass bottles.

In addition to the EPR system, there is the opportunity for municipalities to further regulate single use items through by-laws, which need to be approved by the provincial government. Municipalities can choose if they want to regulate all or some of these items: plastic checkout bags, drinking straws, polystyrene foam service ware, and plastic utensils including stirring sticks. Especially in urban areas within the two bigger metropolitan areas of Vancouver and Victoria and in touristic places, these by-laws are taking shape. Further enactments are expected in the coming years and months. Currently, all these by-laws include bans on plastic carrier bags, with most additionally covering EPS service ware.

Analyses regarding marine litter specifically in British Columbia have barely identified packaging as a contributor to marine litter. This may be due to a number of factors, including the extremely low population density of the province in general, as well as effective waste management, including beyond EPR, with generally low leakage rates. Looking at marine plastic litter in British Columbia, there is a generally low prevalence of packaging. Yet, specifically those items that the EPR systems struggle to manage, namely flexible plastics, are found within marine litter in Canada. Overall, reports from clean-up operations undertaken over the last years generally indicate a low prevalence of plastic waste from plastic packaging, with cleaning operations rather focusing on retrieving ‘abandoned and lost or otherwise discarded fishing gear’ (ALDFG).

Political action to further combat marine litter is also taken in form of a number of measures – both within and outside the EPR system. This includes, among others, a better management of flexible plastic types and a broad additional set of measures, notably bans on harmful marine litter items, highlighting again that EPR is ideally set up as one approach within a broader, multi-faceted waste management system.



EUROPEAN UNION [Annex 3: Analysis European Union](#)

Within the EU Member States, EPR schemes are set up at national level and have been established to enable public authorities and producers to meet obligations related to the recovery of packaging waste. Almost all Member States have assigned responsibility for meeting recycling targets to producers, who have set up EPR schemes for used packaging to secure compliance; notable exception being Denmark (currently implementing an EPR scheme for packaging).

Looking at existing EPR schemes across Member States, there is a wide range of EPR policies adapted. While some countries run one single scheme that organises the recovery of packaging (e.g., France, Belgium, Netherlands, Spain, Sweden, non-EU country Norway), others allow for competition within the different systems (Austria, Germany, Portugal). Especially in Northern and Western Europe, EPR has a longer history, with first systems being implemented from 1993 onwards, whereas particularly in Member States that joined around the year 2000, EPR systems are younger and are less detailed in their operationalization. The applied collection and management methods are very heterogenous, whereas recovery targets are set at the EU level, with compliance to be reached on the national level. For example, the coverage of items in the different waste streams varies from country to country. As another example, DRSS for certain beverage containers with varying scopes are implemented in a number of countries in Northern and Eastern Europe, albeit less prevalent in Southern Europe. All in all, the great variety of the EPR systems in each European country makes a uniform statement on their effectiveness and operational modalities difficult.

The EU waste legislation was amended in 2018 aiming, among other things, to stop the generation of marine litter and to strengthen the link between waste management and marine litter prevention. As baseline for action, the top 10 items in European coastal areas have been assessed with the results showing an absence of plastic bottles, which can be traced back to the different EPR systems, particularly to DRSS. Building on this, the European Commission has taken flagship initiatives to tackle marine plastic pollution as part of its 2018 'Strategy for Plastics', including the Directive (EU) 2019/904 on reducing the environmental impact of certain plastic products (SEA Directive) with a number of ambitious measures. These includes (i) a ban on certain SUPs with established and available alternatives, namely cotton bud sticks, cutlery, plates, straws, stirrers, sticks for balloons, as well as cups, food and beverage containers made of EPS and on all oxo-degradable plastics; (ii) measures to reduce consumption of food containers and beverage cups made of plastic and specifically marking and labelling of certain products; (iii) EPR schemes covering the cost to clean-up litter, applied to products such as tobacco products with filters, wet wipes, balloons and fishing gear; (iv) a 90% separate collection aim for plastic bottles by 2029 (77% by 2025) and the introduction of design requirements to connect caps to bottles, as well as targets to incorporate 25% of recycled plastic in PET bottles from 2025 and 30% in all plastic bottles from 2030.

In conclusion, the composition of waste and the amount of plastic packaging subject to EPR varies between countries, possibly due to the different levels of effectiveness of the schemes. However, overall, plastic packaging is comparably less dominant than it is in many other regions in the world, especially in LMICs. Yet, due to the importance to further reduce plastic litter overall, the EU is expanding the scope of items subject to EPR as it is recognised as an effective tool. In addition, several countries are spearheading the development by also developing new, additional EPR schemes for items which cannot be managed together with waste, such as an EPR scheme for fishing gear in France.



KOREA [↗](#) Annex 4: Country analysis Republic of Korea

Korea enacted its EPR system for packaging in 2003, following a significant economic growth since the 1980s. Urbanisation and rapid population growth increased waste generation, resulting in associated challenges for waste management. Korea has sought to minimise resource use to meet the country's high energy demand and has therefore adopted efficient resource recovery from landfills and maximised reuse and recycling. In 2003, mandatory targets for recycling through the EPR system started with four packaging items. More mandatory recycling target items have been continually added into the EPR system. It has to be noted that the Korean EPR system is primarily oriented towards packaging's filling rather than the material. Incorporating a specific category, such as beverages, into the EPR system would result in a large number of additional items being covered, such as glass bottles. Goods that are outside the scope may not be covered. As performance and targets are regularly evaluated and adapted, the scope of packaging items subject to EPR is continuously expanded and complemented by clearly defined collection and recycling targets.

The Korean EPR system is being implemented as an economic instrument to improve recycling alongside other waste management systems such as a waste charge system, voluntary agreements on a plastic waste collection recycling system and volume-based waste fees. Furthermore, several additional approaches and programs have been developed, including bans on certain SUPs and the marine litter monitoring program which is considered important to support the decision-making process and underlines the importance of adequate and sufficient monitoring. Major efforts have been made to tackle fishing gear waste and to improve the environmental education.

As revealed by the marine litter monitoring program, plastics are among the top 10 most common items found in coastal areas and on beaches. The list includes some EPR-covered items such as PET bottles and plastic bags. Furthermore, different waste indices in different cities indicate that the intensity of pollution varies from one city (municipality) to another. In other words, the level of cleanliness depends on the local collection and cleaning system and the corresponding infrastructure.



TUNISIA Annex 5: Country analysis Tunisia

Tunisia implemented its mandatory EPR scheme in 2001 referred to as ECO-Lef, the national public system for the recovery and recycling of packaging waste. As outlined in the respective legal framework, producers can choose between three options to meet their responsibilities; through (1) directly contracting with a waste management operator, (2) setting up own take-back structures (individual schemes), or (3) paying their EPR fees to the national waste management agency, known as ANGeD (Agence Nationale de Gestion des Déchets), which acts as a state-run PRO. Although the system theoretically gives companies a choice, in practice, the vast majority of companies opted for payments to the ANGeD. However, over time, the number of companies drastically reduced while free riding increased so that in 2018 only a minority of companies paid their EPR contributions. As proper monitoring is absent, no information or data is available on the number of companies using option (1) or (2).

The packaging subject to the ECO-Lef system is plastic and metal packaging (with a capacity greater than or equal to 100 ml), mainly bottles of soft drinks and water (PET), milk bottles (HDPE), plastic films and bags (made of PP) and metal boxes (aluminium). The collection and recycling sector are currently almost exclusively in hands of informal collectors, who collect recyclable fractions from containers and landfills and set up informal recycling activities that have no legal status and are not formally integrated into the system.

The lack of informal sector inclusion is not the only weakness of the system. By allowing enterprises to choose between three options, they end up undermining each other by not allowing sufficient long-term planning and hampering monitoring and control. Another crucial weakness is insufficient monitoring due to ANGeD being understaffed with too few resources, no register on the number of companies adopting EPR, and eventually no sufficient enforcement and monitoring of the system, leading to high levels of free riding.

As a response to not meeting their objectives, the ECO-Lef system is currently being modified, with focus on developing a more specific EPR scheme which involves the whole value chain, including producers. The concept focusses on ensuring a sustainable financing and organisation of the system to ensure a better packaging waste management. In particular, it is discussed to only set up one industry-led PRO which collectively implements the system. However, due to regular changes within the ANGeD no final decision has been made yet [dated June 2022].

As the EPR system did not achieve its original objectives of reducing packaging waste pollution, ensuring a clean environment and coastal areas, and supporting the creation of new businesses and job opportunities, marine litter continues to be a problem and many plastic packaging items continue to be part of it. Institutionally, the cost for beach cleanings is the responsibility of municipalities and the Coastal Protection and Planning Agency, and financing remains insufficient and uncertain. In addition, the collection is the responsibility of municipalities, and consumers are not obliged to follow a specific separate collection system. There are two central reasons for not reaching the original goals: Firstly, the ECO-Lef only designates certain materials with value (positive market price) such as HDPE, foils, bags and PET-beverage bottles. Secondly, the system is only relevant for collectors if the prices offered by private companies operating outside the system decrease.

Considered as a popular tourism destination, “cleaning” is particularly highlighted as an important measure to prevent marine litter and ensure clean destinations. Thus, in the draft of the new “EPR for packaging” decree, Tunisia has considered “cleaning costs” in the EPR contribution to be paid.

As shown in the case of Tunisia, no positive impact from the EPR system on marine plastic litter can be identified, but it rather highlights that EPR can only be effective if well designed, effectively enforced and constantly developed. EPR itself is no guarantor for an effective waste management system. Particularly, if context-specific conditions are not properly addressed, such as the strong role of the informal sector in Tunisia, they will undermine the success of the EPR system.

Drawing from above country cases and their specific insights, the overall points can be concluded.

CONCLUSION – insights into countries with operative EPR schemes

EPR can help reduce marine litter – however, only over a longer period and only if the EPR system is setup appropriately. This means that the EPR is not a guarantor of an effective waste management system. It is only effective if EPR is properly designed, enforced and continuously developed. Insights from the presented cases particularly highlight the importance of monitoring.

If suitable in the country's context, DRS can be particularly effective reducing marine litter from packaging items such as beverage containers.

Another important prerequisite for enabling that EPR has a preventive effect on marine litter generation is that **the system sufficiently addresses context-specific conditions.** For instance, the lack of inclusion of the informal sector in Tunisia, despite its importance, was found to undermine the overall success of EPR in the long run, which in turn also affects EPR's ability to prevent marine plastic litter generation.

As the specific systems and their functioning vary from case to case and also within EU Member States, this shows that there is no single most appropriate solution for EPR to prevent marine litter litter. Rather, what matters is to have a system that is applicable and effective to the country in question and that adequately considers the country's specific conditions.

Considering that plastic litter is carried from other places towards the coastal and marine environment, a more holistic approach is to focus not only on the coastal and marine environment, but also on appropriate measures to reduce waste in general. Regular, standardised litter monitoring in different environments offers the possibility to reflect developments over long periods of time and to enable assessments from a long-term perspective.

At the same, it also needs to be acknowledged that financing of waste management through an EPR system to eventually reduce plastic packaging litter generation is not necessarily needed if sufficient funding through other approaches is ensured.

The observation that EPR can have an impact on marine plastic packaging litter generation is limited to only the types of waste which are subject to it. In order to impact the generation of marine plastic waste that is not covered by the EPR, it is possible to extend the scope of the EPR (as in Korea) or to manage it using other approaches (as in British Columbia).

Lastly, all cases highlight that EPR is eventually just one tool within a broader framework. Thus, the experiences from the countries underline the importance to also use other approaches and policy instruments.

The presented cases are EPR schemes which have been implemented before marine litter has been perceived as a global threat. So, the development and implementation of these schemes did not occur because of the urgent need for action on marine litter, which became important at a later

stage. This is in contrast to many countries, where EPR is currently in the process of implementation or has been recently implemented. Thus, the following chapter focuses on insights from countries, where the interplay between EPR and marine litter has been considered already at earlier stages.

3.3 Insights from countries which are in the process of implementing EPR

In view of the increasing amounts of waste and the resulting challenges of waste management, governments/countries have explored EPR as an option to address these issues. Thus, EPR measures are increasingly adopted worldwide to better finance the management of packaging waste. The selected cases of Chile, Colombia and South Africa are among those countries which just passed their EPR legislation and are currently

in the process of implementing and operating it. In this section, these three countries have been analysed in terms of the background of their waste management practices and how they are incorporating EPR to address any apparent shortcomings. If apparent, specific approaches to addressing marine litter are also discussed. Full details on each country / region are provided in the annex.



CHILE [Annex 6: Country analysis Chile](#)

Chile's EPR law, came into force in March 2021 after a multi-year process: In 2013, a waste management law was introduced to congress in Chile and officially published in 2016 as the Waste Management, Extended Producer Responsibility and Recycling Incentives Bill, which establishes the framework for EPR systems for six priority product categories, including packaging. The law makes producers of these priority products responsible for the organisation and financing of waste management for the products they market in the country. In May 2019, the draft packaging regulation for the EPR law was published, outlining the details such as the materials included (beverage cartons, metal, paper and carton, plastic and glass).

Specific focus is set on improving and increasing waste separation at source, sorting and recycling of packaging waste. This is enabled through specific targets focusing on the number of households with access to waste collection for separated packaging waste by expanding the number gradually from 10 % up to 85 % of the inhabitants, or through requirements that each district/municipality can only be served by one PRO. If there is more than one PRO, the national territory will be split. Furthermore, the EPR law stresses the importance of formalising the activity of the waste pickers which could have a strong impact on the collection of recyclables and consequently on reducing marine litter on beaches and coastal areas in Chile. Eventually, the mandatory EPR for packaging came into force in March 2021.

In addition to its EPR system, Chile has developed a national Marine Litter and Microplastics Management Strategy (2020 – 2030). The overall objective of this strategy is to articulate a national public policy around the management of marine litter and microplastics, providing national guidance to align management and promote coordination and coherence among the actions of the different relevant sectors in order to reduce, recycle and prevent the intrusion of litter into aquatic ecosystems and their impacts.

However, even though marine litter is addressed through several approaches, including an EPR system for packaging, there is no data to confirm that the situation of marine litter on Chilean coasts has already been impacted by the development of the EPR system. In fact, the system is just starting to operate and will need several years to bring about change in terms of sorting recyclable materials at source, collection, recycling as well as ensuring clean coastal areas.



COLOMBIA [↗](#) Annex 7: Country analysis Colombia

In 2018, the EPR system set up by Resolution 1407/2018 introduces EPR for packaging from paper, cardboard, plastic, glass and metal. Packaging made from wood or textiles is not included. In 2020, Resolution 1342/2020 added considerations of composite materials. The introduction of a mandatory EPR has been anchored in the National Policy for the Integrated Management of Solid Waste (CONPES 3874/2016) calling for the transition from linear towards circular economic practices. One of the strategies to support this goal is the internalization of environmental and sanitary costs from waste management practices, particularly referring to the adaptation of EPR for packaging.

Previously in Colombia, certain waste streams whose particular characteristics require a separate handling infrastructure, have been addressed through a set of policies that also incorporate EPR elements; this is the case, for example, for medical waste or e-waste. Following the strategic pillars outlined in CONPES, the Resolution 1407/2018 outlines the detailed requirements to set up an EPR system for packaging. A first amendment, derived from the need to further detail a number of aspects required for effective operationalisation, was added through Resolution 1342/2020.

The EPR system requires the company that puts packaged goods on the market to collect and process the resulting waste; thus, local producers and importers are equally obliged. The main responsibilities are assigned to these producers, whereas other actors like packaging producers, waste management operators, citizen, municipalities and end consumers/citizen are also assigned a set of responsibilities; this is, for example, in respect to the mandatory separation at source and other support to the manufacturers to achieve the EPR system's goals.

The main tasks for producers are the introduction of separate collection and the obligation to achieve certain waste treatment goals for the waste fractions subject to EPR (see above). Currently, the aim is to target all recovery mechanisms, including re-use, recycling, energetic recovery and co-processing. Other duties like regular reporting, awareness building, etc. are included as well. From 2022 onwards, system coverage must include the Archipelago of San Andrés, Providencia and Santa Catalina as the area farthest away from the Colombian mainland. Six other areas – all outside Colombia's main metropolitan areas and some of them close to the marine environment – are added progressively each year until 2028.

The EPR system has so far focused on a small amount of waste being collected and recycled; the initial rate for 2021 is set at 10% of the quantities placed on the market. These volumes can, up to this point in time, mainly be achieved from post-industrial waste. So far, the EPR system lacks specific focus on post-consumer waste streams that need to be targeted to tackle the littering issues and the deficient collection rates. It can be disputed if this relates to a dysfunctional system setup including insufficient monitoring and enforcement mechanisms or is related to the initially low targets.

Looking at (plastic) packaging found within marine litter, the clear majority of the identified litter can be attributed to packaging thus falls within the scope of the future EPR system. Therefore, also in the case of Colombia, an evaluation of the effect of EPR for packaging on marine litter is premature.



SOUTH AFRICA [↗](#) Annex 8: Country analysis South Africa

South Africa introduced its mandatory EPR schemes only recently in Nov. 2021, after several years of development. The process started in 2017 when stakeholders from the public and private sectors, civil society and academia worked together with the Department of Environmental Affairs and the Department of Planning, Monitoring and Evaluation to draw up a number of targets and initiatives for waste management. Later that year, first plans to introduce a mandatory EPR system were published. The so-called ‘Section 28 Notice’, which included plans for an EPR system funded by a tax collected from producers and managed by the government, was withdrawn in December 2019.

It was replaced by the Section 18 Notice – Extended Producer Responsibility Scheme. This new Notice provides for a more co-operative relationship between industry and government. However, it calls for the full implementation of EPRs for the paper and packaging sectors and some single use products, electrical and electronic equipment and lighting by 05 November 2021.

Long before EPR was implemented as mandatory concept, a lot of voluntary structures have already been set up by industry initiatives. Multiple voluntary EPR schemes, managed through voluntary PROs for different packaging waste streams have emerged since the early 2000s, leading to an increase in separate collections and recycling rates for the materials covered. Hence, EPR in South Africa needs to be considered in the context of the EPR schemes developed by the respective PROs on behalf of their producer members.

Prior to the adaptation of the mandatory EPR Regulation, these PROs operated voluntarily based on contribution payments from their members. After transforming into a mandatory one, these PROs collect mandatory EPR fees from their members. The PROs use the revenue they generate, among other regulatory requirements, to support the collection, sorting, and recycling of recyclables towards established goals that apply for a period of five years from the date of implementation of the EPR system.

Despite this long experience, a lot of plastic packaging subject to EPR and also previously managed on voluntary basis, can be found in marine litter and overall, plastic leakage in urban areas is rather high. As voluntary EPR initiatives are limited regarding their finances and the services they provide, in comparison to mandatory schemes, it still needs to be determined in the future how the mandatory EPR system will impact marine plastic litter generation. So far, no effects can be evaluated.

Drawing from the above country cases and their specific insights, the following overall conclusions can be drawn.

CONCLUSION – insights into countries which are in the process of implementing EPR schemes

Currently, there is **no measurable impact of EPR on marine plastic litter prevention** as the presented EPR schemes are still in their infancy. Nevertheless, there are several insights which can serve as important suggestions for other countries.

Compared to the majority of established systems, the recent EPR schemes are more focused on marine litter prevention and circular economy. Even in lean EPR policy setups, specific provisions catering to the need to reduce marine litter generation are included (as in Colombia). **Moreover, it has also been recognised that in order to achieve the outlined objectives via EPR, informal sector integration is crucial.**

Since **voluntary actions failed so far in delivering noticeable results in preventing marine litter generation**, this also emphasises the need to implement mandatory EPR systems. Nevertheless, voluntary systems can facilitate the transition to a mandatory one.

Complementary to countries, which have already passed the legal framework for EPR and are in the stage of implementing it, countries that are

currently drafting their legislation can provide insights to countries which are also developing their legislation or will be doing so soon.

3.4 Insights from countries with emerging legislation

In addition to the EPR systems that have been in operation for some time or have recently been introduced in Europe, the Americas or the Pacific, also other countries are aiming at applying EPR mechanisms, that contribute, among other things, to marine litter prevention. As they are generally at an earlier stage of potential implementation, the

respective policies and institutional frameworks are currently being developed without having set up legally binding systems. Yet, voluntary EPR initiatives that also address marine litter, are occurring. Of these countries, Kenya and Malaysia are discussed here. Full details on each country / region are provided in the annex.



KENYA to Annex 9: Country analysis Kenya

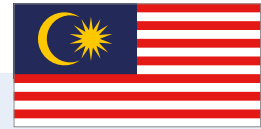
After several attempts to establish EPR regulations since 2011, the Ministry of Environment and Forestry in 2021 finalised the draft for Extended Producer Responsibility (EPR) Regulations. The aim of the regulation is to provide a framework for the introduction of mandatory EPR schemes to improve resource use efficiency, promote innovation, encourage recycling and reduce the amount of waste that needs to be disposed of. To achieve this, companies that manufacture, import or sell a wide range of consumer products will be required to implement “a mechanism to control banned or hazardous substances in products”. This applies to plastics and rubber as well as aluminium, glass, paper and cardboard. The regulation would require companies to establish, either independently or jointly, an EPR system that includes minimum targets for reuse, recycling or recovery, as well as logistics for collection and guidelines for product design. Companies would have to register their EPR system in advance with the competent authority. The regulations would apply to all products and packaging at all stages of their life cycle.⁶

Despite being developed iteratively, there are still some key legal steps to be fulfilled before the draft regulations can be regarded as law. The draft regulations seek to establish mandatory EPR schemes for a wide array of products and packaging materials.

There are currently some initiatives by producers, particularly those that use plastic packaging, to establish voluntary EPR schemes in Kenya. Thus far, two voluntary PROs have been set up, mainly focusing on PET and flexible plastic packaging, as used for bread bags. This section discusses the development and current status of these two EPR initiatives. The currently available data has thus far not shown any measurable effect on the reduction of PET bottles within marine litter. Expecting a measurable success beyond the volumes additionally fed into recycling paths by the two PROs KEPRO and PETCO, is premature at the given point in time.

Given the limited application so far, no statement can yet be made about the effectiveness of Kenya’s future EPR system for combating marine litter. The Kenyan government has repeatedly demonstrated its will to target specific (plastic) items that are considered to generate littering. The Kenyan government has adopted various policy approaches over time, and as a result Kenya has taken further steps to transition from a linear to a circular economy as of 2019. The latest policy and legislative interventions in this regard are meant not only to strengthen the overall waste management in the country but also to tackle the growing problem of plastic waste. The latest effort the introduction of a mandatory EPR system that covers various products and packaging, with a particular focus on items made of plastics.

⁶ Justin Boucer (February 2021): Kenya revises draft EPR regulation. <https://www.foodpackagingforum.org/news/kenya-revises-draft-epr-regulation>



MALAYSIA [↗](#) Annex 10: Country analysis Malaysia

Malaysia has recognised EPR as an important element for its sustainable development and green growth. Accordingly, EPR is mentioned in different national strategies and development plans. The 12th Five-Year Plan 2021-2025 for a “prosperous, inclusive and sustainable Malaysia” announces that the EPR approach will be introduced and applied to different waste streams, particularly packaging materials and single-use plastics. Relevant regulations, economic instruments and monitoring mechanisms shall be put in place to enable manufacturers and retailers to implement this. The introduction of the EPR system is also mentioned in the “Malaysia Plastic Sustainability Roadmap, 2021-2030” published by the Ministry of Environment and Water Resources in December 2021, which includes strategies and concrete action plans to achieve the circularity of plastics. According to this, companies subject to the EPR system will have to pay an ecologically modulated fee based on the type of plastic, its recyclability, as well as production volume and turnover, to finance after life management of plastics, including sorting, recycling and disposal. The EPR scheme is expected to become mandatory in 2026 after introducing and implementing it on a voluntary basis from 2023 to 2025. Currently, the types of plastics and the companies that will be subject to the EPR scheme are unknown.⁷

In Malaysia, a voluntary PRO called the Malaysian Recycling Alliance (MAREA) has been operating since 2021. MAREA is the first voluntary and non-profit EPR platform led by 10 fast moving consumer goods companies. Led by industry, it cooperates with the Malaysian government and other stakeholders to increase the rate of collection and recycling in order to create a greener and cleaner Malaysia. For this, MAREA will initially focus on collecting, separating and recycling used packaging materials, including polyethylene terephthalate (PET) bottles, used beverage cartons and flexible plastic packaging.⁸ The impact of the EPR through MAREA activities and the future EPR system still needs to be monitored.

Drawing from above country cases and their specific insights, the following overall points can be concluded.

CONCLUSION – insights into countries with emerging EPR legislation

Not only in countries that are currently implementing EPR, but also in countries with emerging legislation, EPR has no measurable impact on marine litter generation. Still, the planned introduction of a mandatory EPR policy can result in private sector’s action, including the setup of PROs, thus allowing for a smoother transition from voluntary to mandatory EPR system. Although voluntary action does not seem to be sufficient to measurably reduce marine litter generation, a smooth transition can facilitate successful implementation and thereby support the effect of a mandatory EPR on litter prevention.

The summary of findings and their contextualization considering the initial research questions will be evaluated in the following conclusion section.

⁷ AOKI Kenji (March 2022): Malaysia sets plastic roadmap with sustainability targets up to 2030. https://enviliance.com/regions/southeast-asia/my/report_5716

⁸ MalayMail (January 2021): Implementation of extended producer responsibility initiative among solutions to post-consumer waste issues, says minister. <https://www.malaymail.com/news/malaysia/2022/01/21/implementation-of-extended-producer-responsibility-initiative-among-solutio/2036717>

Conclusion:
furthering EPR to fight marine litter

4



Marine litter is a growing global problem which represents an increasingly serious threat to the environment, the economy and human health.

Decision-makers and governments are becoming increasingly aware that reducing marine litter requires a holistic approach and a functioning waste management which includes reliable financing. For many countries, this poses a challenge. Introducing EPR systems is widely discussed as a key approach to closing this funding gap, as they are able to provide agreed, continuous and suffi-

cient funding, which is crucial for ensuring proper waste management and reducing the generation of marine plastic litter.

Against this background, the report's objective has been to, firstly, critically assess how EPR affects marine plastic (packaging) litter generation, and secondly, give recommendations on how EPR schemes can be adapted to increase a respective mitigation effect, which will be answered in the two sections below.

4.1 Assessing the impact of EPR on marine plastic packaging generation

When analyzing countries with mandatory EPR systems that have been in operation for at least five years, it was found that EPR systems for plastic packaging can indeed establish effective management leading to a lower amount of waste of these items on beaches *if* the EPR system is well established, enforced and monitored. If the latter was not the case, no significant impacts were found. This means that EPR is no guarantor of an effective waste management system. At the same, it also needs to be acknowledged that financing of waste management through an EPR system to eventually reduce (marine) plastic litter generation is not necessarily needed if sufficient funding from other approaches is ensured. However, experience shows, that this is not to be expected from LMICs.

An effective monitoring has been identified as a key element for the successful implementation of EPR in general and, in particular, evaluating the impact on marine plastic litter generation through regular, standardised procedures. If applicable to the country, DRS can be particularly effective in reducing marine litter generation from packaging items such as beverage containers. Another important prerequisite for EPR to have a preventive effect on marine litter generation is that the system sufficiently addresses context-specific conditions, such as the inclusion of the informal sector where relevant.

Moreover, as the specific setups and the way systems are used vary in all selected cases and also within EU Member States, this shows that there is no one single, most effective set-up for EPRs to prevent marine litter. Rather, what matters is having a setup that is suitable and effective for the country in question and that adequately addresses the country's specific context.

The finding that EPR can have an impact on marine plastic litter generation is limited to the type of waste which is subject to it. Impacting marine plastic litter generation that is not subject to EPR may involve expanding the scope of EPR (as it is done in Korea) or managing it by using other approaches (as it is done in British Columbia). Lastly, all cases highlight that EPR is eventually one tool within a broader framework. Thus, experiences from the countries underline the importance to also use other approaches and policy instruments (like bans or DRS).

For both the countries currently implementing their EPR system for (plastic) packaging and the countries currently developing a mandatory EPR system, there is currently no measurable impact of the EPR on the prevention of marine plastic litter, as the systems are still in their early stages. Nevertheless, the presented cases highlight that EPR is often directly related to the objective of reducing marine plastic litter generation and steps are being taken to achieve this goal. Whether this will be successful needs to be assessed in the

future. In addition, in all cases, the importance of sufficiently involving the informal sector due to its importance in the respective countries was recognised.

Moreover, the cases also show that **voluntary actions failed so far in delivering noticeable results in preventing marine litter generation**, which also emphasises the need to implement mandatory EPR systems. However, this does not

mean that voluntary schemes have no benefit, but instead that they can facilitate the transition to a mandatory scheme and thus ultimately support the impact of a mandatory EPR on prevention.

Based on these findings on the impact of EPRs on marine plastic litter generation, the following recommendations can be derived on how EPR systems can be adapted to increase their respective mitigation impact.

4.2 Recommendations adapting EPR schemes to increase their mitigation effect

As general recommendations for improving marine litter mitigation and developing globally applicable guiding principles for EPR which effectively contribute to marine litter prevention, the selected cases highlight the following guiding principles.

**Guiding principle 1:
Mandatory EPR to create a measurable impact**

In line with insights from research, reliable financing for waste management is expedient and can only be enabled by mandatory policy tools such as mandatory EPR. However, as developing and implementing an effective EPR scheme requires time and is a rather complex process. Voluntary schemes are still valuable as they can build first structures and experiences for the later mandatory system and can therefore be important facilitators.

**Guiding principle 2:
Effective monitoring is key**

For successfully operating and evaluating if the scheme is achieving its targets and actually positively impacting marine plastic litter generation, **extensive and regular monitoring efforts supported by a solid data base are essential**. Regular data collection should reflect seasonal changes

(e.g., differences between monsoon season and dry seasons) and should not only focus on coastal and marine environments but cover all environments (similar to Australia). It is also recommended to **document and disclose more data on littering to better assess the impact**. This helps to also better identify the factors that cause local littering, e.g., an increase of litter on the beach but a decrease in all other areas may indicate that a local increase is related to tourism. In this case, it makes sense to take tourism-specific measures.

**Guiding principle 3:
Incorporate marine litter reduction into targets**

Many countries that have just implemented their EPR system (as for instance Colombia) have recognized the importance to connect EPR and marine plastic litter. Following the guiding principle on monitoring, marine plastic litter related targets could be incorporated into the EPR scheme. Such targets could, for example, provide for the reduction of items subject to EPR that are found as litter throughout the country. While such objectives increase the responsibility of stakeholders to achieve them, it is crucial to emphasize that set targets have to be verifiable, which requires intensive monitoring and corresponding data bases.

**Guiding principle 4:
Integrate the informal sector**

A functional and effective EPR requires the involvement of all relevant stakeholders – especially the informal sector in countries where this sector plays a strong role. If this is not the case, there is a risk that the informal sector will undermine the EPR system and prevent that effective prevention of marine plastic litter generation is achieved.

**Guiding principle 5:
Setting up a nation-wide system**

EPR must cover the entire country and not just a few places easy-to-service, such as cities. As argued, litter generation is not driven by a few places, but it is transboundary and can be moved for instance by wind and water to various places within the country and even beyond. Thus, EPR coverage and actions financed by it should cover the entire territory to ensure a larger impact.

**Guiding principle 6:
Implementing EPR for all packaging materials**

An EPR system can only manage and improve the waste management of items covered by it. Waste that falls outside the scope of the EPR system benefits - if at all - from indirect effects, e.g., reducing residual waste by separating packaging waste from others during collection. Thus, to tackle marine litter, EPR should not only cover plastic packaging but all packaging materials. Analyses showed that also glass bottles and metal cans are regularly found in litter. Generally, there is no big difference in effort to design an EPR system for plastic packaging or for all packaging. Non-packaging SUPs can be included in this as well. At the same time, it is also important to stress that not all waste streams can be covered by an EPR scheme, which re-emphasises the need to always consider EPR as one tool within a waste management consisting of many, complementary approaches, such as taxes, municipal fees or bans.

**Additional action:
Implementing specific measures
for specific items**

EPR alone is not capable of ensuring clean beaches and reducing and preventing marine litter. It should be supported by other adapted measures to tackle the main identified plastic litter according to priorities. For example, EPR can have a greater impact on the dumping of certain materials through DRS, as it has the potential to rapidly increase the collection rate of PET and cans by developing a market in close proximity to the point of generation. Similarly, banning some single use and problematic items can be crucial to avoid their littering. In fact, some SUPs are difficult to collect after being littered and may be more likely to end up in the marine environment.

**Additional action:
Implementing additional schemes**

It is also possible to implement new EPR schemes, such as an EPR system for fishing gear, as discussed in some countries around the world, such as in Korea and France. This is particularly relevant for waste, which has very different requirements in its waste management compared to plastic packaging and therefore cannot be treated within the same system as plastic packaging.

**Additional action:
More investments into clean-up activities**

As some waste is likely to leak out of waste management, it is also recommended to invest more in clean-up activities, such as mechanical beach cleanings or manual cleanings of rocky coastal areas to retrieve waste from the environment, as there is still a significant amount of litter found in the marine and coastal environments. This can be done either through expanding the EPR activities to incorporate clean-up activities or cover the clean-up costs through other tools depending on the context of the country. In many countries with established EPR systems, it is covered through other measures simply due to the fact that when the system was established, marine litter was generally not recognised as a major concern.

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Please note: Country specific bibliography is presented in the respective annexes.

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Annexes

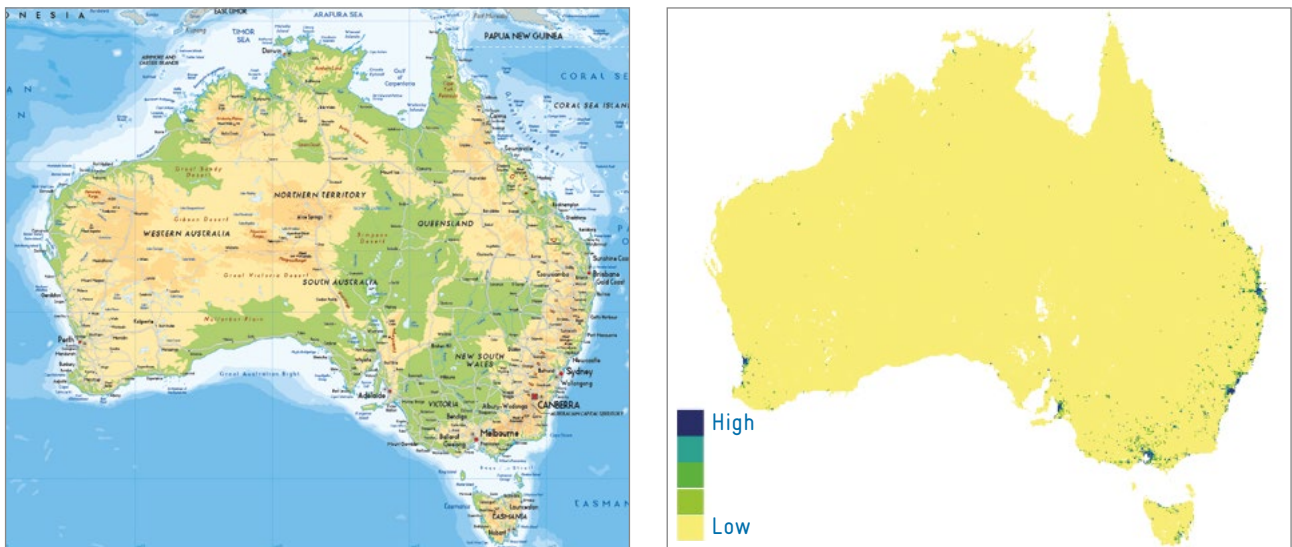


Annex 1: Country analysis Australia

Australia (Figure 6) is a country and continent in the region of Oceania between the Indian Ocean and the South Pacific Ocean. It does not share any land borders with other countries and covers a total coastline of 25,760 km. Its total land mass amounts up to 7,682,300 km² (including Lord Howe Island and Macquarie Island) and is inhabited by approx. 25.8 million inhabitants, making it an overall rather sparsely populated country. The majority of the population is located on the periphery close to the sea and is overall highly urbanised (> 80%). The highest concentration is residing in the east and southeast. The interior, or “outback”, is very sparsely populated (CIA, 2022).

Administratively, Australia consists of six states, i.e., New South Wales, Queensland, South Australia, Tasmania, Victoria, and Western Australia and two mainland territories – the Australian Capital Territory and the Northern Territory. The states are sovereign entities, although subject to certain powers of the Commonwealth (federal) Parliament as defined by the Constitution (CIA, 2022).

Figure 6: Australia physical map of distribution and density of population 2020



Source: Worldometers/Geoatlas 2018 and Worldpop/Bill & Melinda Gates Foundation, 2020

EPR Policy

Reflecting Australia's constitutional set up, responsibilities in waste management are organised as follows:

- ▶ **Local governments are most directly involved in the management of waste and recycling** through arrangements for its collection, processing and disposal.
- ▶ **State and territory governments have primary responsibility** for regulating domestic waste management. Matters that the states and territories regulate include conditions for operating a landfill facility and the imposition of landfill levies.
- ▶ **The Australian Government is responsible for providing national leadership and coordination** and ensuring that Australia's international obligations regarding waste are met.

Thus, there is no uniform waste management throughout Australia as the primary responsibility lies with states and territories and not the national government (PoA, 2018). Looking at the current practices, noticeable differences between the states and territories already exist. For instance, the national resource recovery rate in 2018-19 amounted up to 63% and the overall recycling rate up to 60%. However, looking at the individual states and territories, it becomes evident that the rates range between 80% recycling in South Australia to 39% in Tasmania and even 19% recycling in the Northern Territory (Blue Environment, 2020).

Based on the allocation of responsibilities, the financial responsibility lies primarily with the states and territories. However, many projects are co-founded with the Australian government (DAWE, n.y.a).

As an overall trend, it has been recognised in Australia that its existing waste management

and recycling practices needed major revision:

Although waste generation per capita has continuously decreased for over a decade, the overall waste generation increased as a result of a growing population. In addition, the waste generation per capita is significantly higher than in the average western economy while waste recycling per capita is significantly lower. The overall linear practices were complemented through a dominant practice of landfilling or exporting its waste (National Waste Policy, 2018).

Since 2018, Australia has taken tangible steps to accelerate its transition to a more circular approach, setting new, more ambitious targets as well as launching the 'National Waste Policy Action Plan 2019' outlining seven targets. Specifically, relevant for packaging are:

- ▶ Target 1: Ban on export of waste plastic, paper, glass and tyres
- ▶ Target 4: Significantly increase the use of recycled content by government and industry
- ▶ Target 5: Phase out problematic and unnecessary plastics (National Waste Policy Action Plan, 2019)

Each state and territory are further specifying on how to implement and achieve the goals, leading to differences between the States and Territories.

Looking at product responsibility, Australia does not have an EPR system, but a Product Stewardship (PS) Scheme. PS is commonly defined in Australia as *"an approach to managing the impacts of different products and materials. It acknowledges that those involved in producing, selling, using and disposing of products have a shared responsibility to ensure that those products or materials are managed in a way that reduces their impact, throughout their lifecycle, on the environment, and on human health and safety."* (DAWE, n.y.b).

The PS approach has many similarities with EPR, but also has significant differences. This is most obvious with regard to the actor who is held accountable. In EPR, this is clearly the “producer”, i.e., the company that brings the packaged goods to the market for consumption, whereas PS is much broader and recognizes a shared responsibility of all actors involved. Thus, in Australia, there is no specific financial responsibility of ‘the producer’ to finance waste management.

PS has been introduced in a legal framework through the ‘Product Stewardship Act’ (PS Act) in 2011 allowing for 3 types of PS: a voluntary one, a co-regulated one together with the respective industry, and a mandatory one. **Plastics is subject to a co-regulated PS, in which the government sets the legal framework and the industry is responsible for delivering the targets and requirements laid out.** The Scheme Operator for plastics and packaging acting on behalf of the industry is the Australian Packaging Covenant Organisation (APCO). APCO defines how the governmental requirements are achieved.

Based on the target to ban waste exports, the Australian government passed the ‘Recycling and Waste Reduction Bill’, which prohibits the export of unprocessed waste. This bill also reforms the PS regulations and will replace the PS Act in order to broaden its reach and impact, in particular to promote product design and reparability within the objects of the Act. This will expand the product stewardship schemes to a broader range of products (including materials).

Within the Australian PS, the packaging industry focuses on sustainable package design, increasing recycling rates and reducing litter (DAWE, n.y.b). In particular, this should be achieved through improving the packaging design in a more sustainable way to reduce the packaging’s environmental impact facilitated through clear guidance by APCO (if they become a member of APCO). So far, APCO has over 2,000 Australian business members across the packaging supply chain, ranging from large multinational corporations to small local businesses (DAWE, n.y.c).

In line with Australia’s transition to a more circular approach, a key outcome of this development is the ‘2025 National Packaging Targets’, which outline that by 2025 (DAWE, n.y.c):

- ▶ 100% of packaging is to be reusable, recyclable or compostable
- ▶ 70% of plastic packaging is to be recycled or composted
- ▶ 50% on average recycled content is to be included in packaging
- ▶ And that there is a phase out of problematic and unnecessary single-use plastic packaging

The National Packaging Targets apply to all packaging that is made, used and sold in Australia. APCO is tasked with achieving the industry-led targets. Governments and APCO are working together to actively track and review the industry’s progress towards the 2025 Targets (DAWE, n.y.c).

From the perspective of litter prevention, achievements are indirectly made by providing more incentives for reuse, increasing recyclability and increasing the demand for recyclates so that waste is not disposed of at landfills but recycled, phased-out or banned. No funds are provided through the PS system but are instead financed through the broader waste management system.

In addition, a deposit-refund system (DRS) for beverage container has been introduced as mandatory form of product stewardship across all Australian states (see Table 3).⁹ The system comprises all drink cans, cartons, and bottles and is called the container deposit-system (CDS) (Vic. Gov, 2022).

The schemes will run by a coordinator and one or more network operators and funded by the beverage suppliers. Collection through the CDS is possible in various forms (see Table 3). CDSs enable increased recycling of the collected packaging while also significantly reducing beverage packaging litter (Vic. Gov, 2022).

Table 3: CDS in the Australian States

State and start date of CDS	Containers returned	Number and types of places to return containers	Return points run by charity, community and sports groups
South Australia (1977)	77%	126 (1 per 14,040 people): 100% waste management depots	15
New South Wales (Dec 2017)	68%	630 (1 per 12,959 people): 49% reverse vending machines, 43% over the counter at shops, 4% depots, 4% donation stations	145
Queensland (Nov 2018)	60%	307 (1 per 16,835 people): 43% depots, 39% bag drop-offs, 22% pop-up points, 5% reverse vending machines	19
Western Australia (Oct 2020)	Not applicable	214 (1 per 12,439 people): 43% depots, 30% bag drop-offs, 25% Pop-ups points, 2% reverse vending machines	78
Tasmania - starting 2022			
Victoria - starting 2023			

Source: Vic. Gov, 2022

⁹ In the 'traditional' EPR approach, DRS are also considered to be form of EPR albeit a specific one requiring its own structure and operationalisation (PRE-VENT Waste Alliance, 2020).

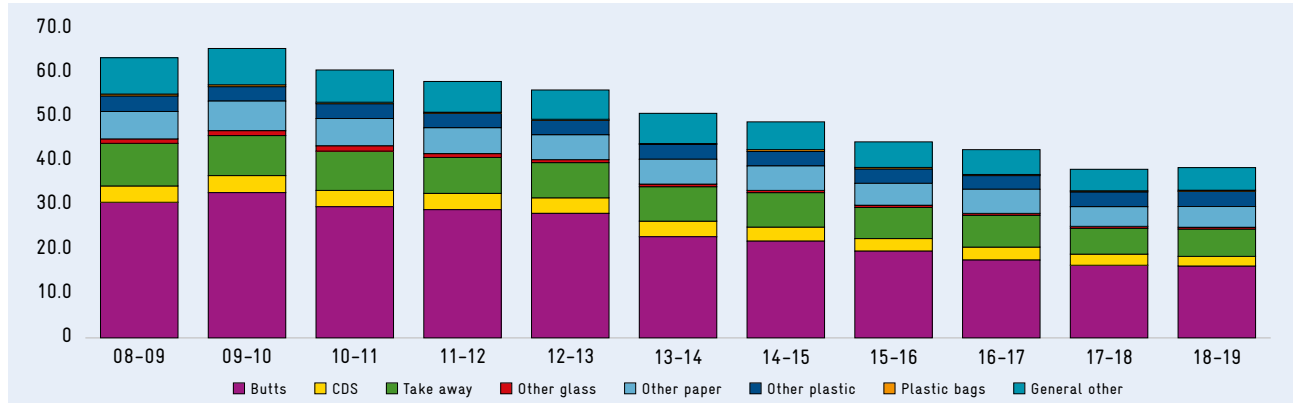
Marine litter

Littering has been declared as unlawful activity throughout Australia. The specific legislation is passed on a state or territory level. On a legislative basis, jurisdictions tackle litter in different ways. Some jurisdictions have specific litter legislations while others have repealed specific legislation and inserted clauses into other acts, such as local government acts, and police acts (for enforcement). The Australian national government does not have any direct responsibility for managing litter. However, it did provide funding to non-government organisations such as 'Keep Australia Beautiful' for conducting the National Litter Index (NEPC, 2008).

The National Litter Index reports in detail on litter found in Australia. Litter samples are collected not only from beaches, but from a variety of environments including residential areas, beaches, industrial areas, car parks, shopping centres, street precincts, recreational parks, and next to highways. The sampling and categorisation of litter follows a set protocol and standards, and the on-site and recorded counts are verified. As the Litter Index has been used for more than 10 years and follows certain guidelines and standards, data is comparable and reflects the development of litter over time (KAB NLI, 2019).

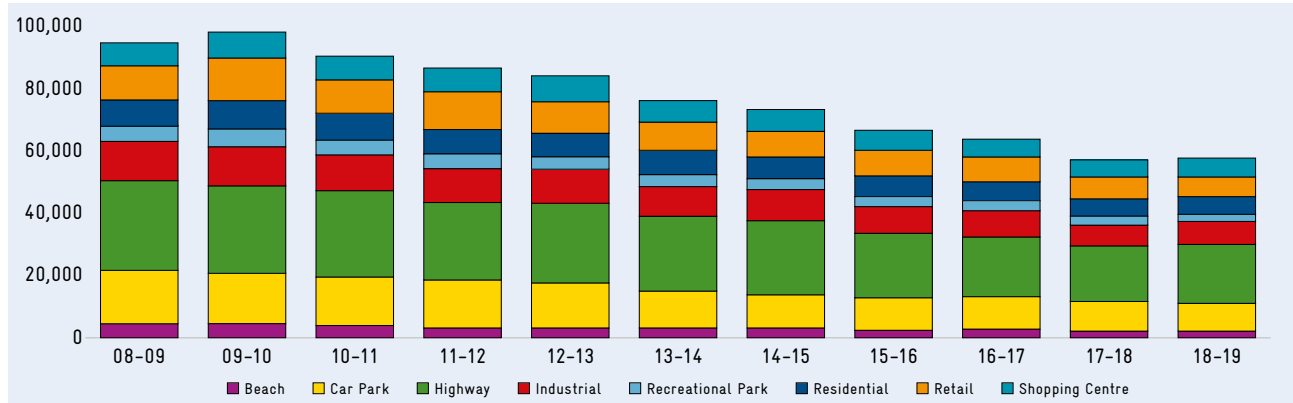
As revealed from the National Litter Index 2018/19, the following overall trends in littering can be observed (see Figure 7 and Figure 8):

Figure 7: Development of litter items per 1,000 m² over time in Australia



Source: KAB NLI, 2019

Figure 8: Development of litter items count by site type in Australia

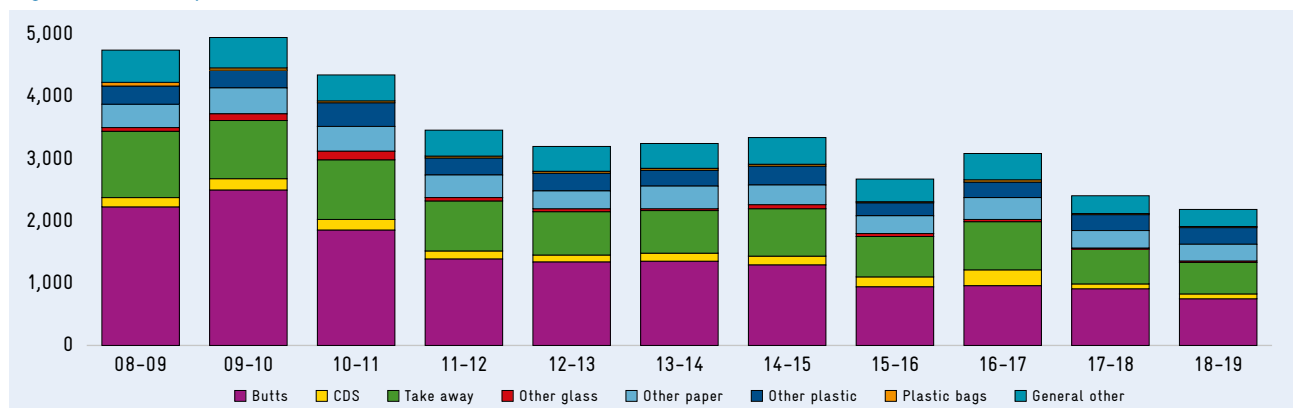


Source: KAB NLI, 2019

The total amount of litter has decreased over the last ten years. Moreover, the decline has been relatively uniform for most waste types, i.e., each category's share of the total litter stream has remained relatively constant, and cigarette butts continue to be the most common type of waste, while most waste is counted on a site-by-site basis next to highways. Looking at the area surveyed, there was an average of 39 litter items per 1000 m² statewide in 2018/2019. Retail zones recorded the highest litter rate with an average of 79 items per 1000 m² while recreational parks had the lowest litter with an average of 16 items per 1000 m².

Beaches in particular recorded 9.1% less waste nationally in 2018/2019 than in the 2017/18 monitoring. Several categories recorded a decrease in waste, with the largest decreases recorded in cigarette-related waste at 16.5%, takeaway food and beverage containers at 9.5%, other paper waste at 8.9% and CDL beverage containers at 8.8% (see Figure 9). Looking at the trend over a ten-year period, the total amount of litter on beaches was reduced from 72.5 items per 1,000 m² to 33.3 items per 1,000 m².

Figure 9: Development of litter count on beaches over time in Australia



Conclusion

There has been a measurable decrease in litter in general and on beaches in particular over a ten-year time course in Australia (from 2008/09 to 2018/19). Although there are no direct funding streams for waste management from the packaging PS, with the CDS being a clear exception, waste management measures have been successful in reducing littering. Due to a general lack of data on a global scale, it cannot be assessed whether Australia's litter counts are – compared to other countries – rather low or high.

Australia's approach of monitoring litter not just on beaches but at multiple sites also allows a better evaluation of causes and corresponding suitable intervention. For instance, an increase of litter at all sites requires different interventions than an increase at only one site while others continue to decrease. As more ambitious targets and legislation has been passed in Australia, such as the 2025 National Packaging Targets, an impact on litter generation is foreseeable. So far, it is too early to assess any specific impacts.

The case of Australia highlights the following

- If sufficient funding for waste management activities is ensured, funding through an EPR system of waste management to reduce leakage and the generation of (marine) plastic waste is not essential
- Considering that plastic waste is transported from other places, such as amusement parks or places of mass transport, into the coastal and marine environment, a more holistic approach is to not only focus on these environments, but to take measures to reduce plastic waste in general
- Regular, standardised litter monitoring in various environments offers the possibility to reflect developments over long periods of time and enables assessments from a long-term perspective

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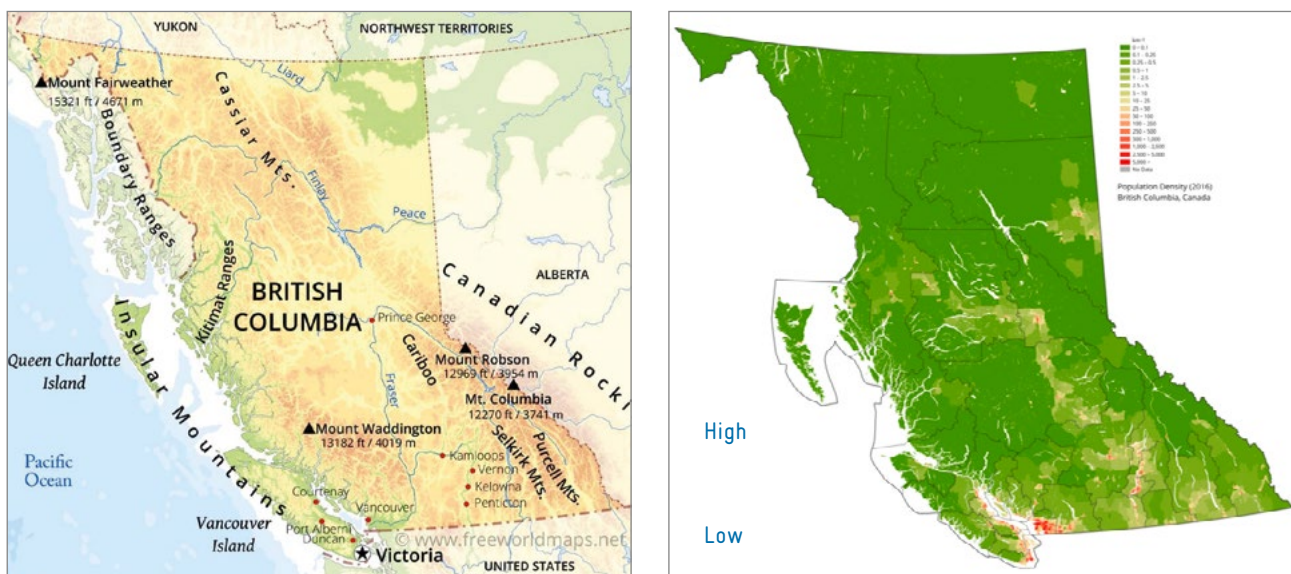
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Annex 2: Country analysis British Columbia, Canada

British Columbia (Figure 10) is a Canadian province, with a Pacific coastline stretching for more than 26,000 km. This comparatively long coastline consists of diverse landforms, including a number of fjords and thousands of smaller islands. British Columbia's population of just over 5 million inhabitants is highly concentrated in the coastal region on and adjacent to Vancouver island, including the capital Victoria and the

much larger metropolitan area around Vancouver City on the mainland. With a total surface area of almost 1 million km², large parts of the mainland and the north coast are sparsely populated. In the context of this study, British Columbia was selected against the background of its location by the Pacific Ocean on the one hand and the operating EPR system on the other.

Figure 10: British Columbia map and distribution of population 2016



Source: Freeworldmaps.info, WWF HydroLAKES database

EPR policy

In Canada, legislation for EPR and other matters concerning marine litter are made on a provincial level. The province British Columbia introduced an EPR legislation in 2004. The EPR system has since evolved into a complex legal setup, covering a vast array of categories, commonly through schemes for specific product categories, e.g., packaging for different hazardous goods, tires or e-waste. With packaging being a versatile category, it is covered by more than one scheme. Most importantly, two different operationalization systems need to be distinguished, one for beverage packaging in the form of a DRS, the second for

other packaging made of glass, steel and plastics (British Columbia province government, 2022a).

It is of crucial relevance that practically all beverage containers – regardless of their design or material composition – are covered by two DRSs; one of them is managing beer (and cider) containers and has traditionally concentrated on the reverse logistics of reusable glass bottles. Today, single-use metal cans for beer (and cider) are also managed and make up the majority of the items covered. The other collective scheme is in charge for all other beverage containers. There is a certain

overlap for aluminium cans. With the latest amendments, the deposit refund fee has been standardised at 0.1 CAD per beverage container – no matter the content, material or packaging design. Beverage containers to which the DRS applies range from single-use glass and plastic bottles over metal cans, composite boxes ('tetra pak'), bag-in-box containers to plastic cups and plastic pouches. The coverage of packaging categories has been significantly expanded over the last years, with the most recent changes affecting a wider coverage of dairy and plant-based drinks coming into force in February 2022. Despite some confusion between the different returning points of the two systems, the access to the service is generally high; beverage containers can be returned at shop-fronts and in special depots (Encorp Pacific, 2021; British Columbia province government 2022a).

Table 4 shows the quantities of beverage containers placed on the market and recovered for the years 2019 and 2020. As the COVID-19 pandemic is reported to have had a negative impact on the system, the two years are listed, with the first year showing higher rates. The table shows that a number of items that are commonly found within marine litter, namely plastic beverage bottles, achieve high return rates through the applied DRS. Nevertheless, the return rate for other items is considerably lower, most notably for drink pouches. In this case, the DRS is proving itself unable to provide for collection mechanisms with high recovery rates.

Table 4: Return rates of items covered by DRSs in British Columbia

Packaging item	Containers sold		Containers recovered		Recovery rate	
	2020	2019	2020	2019	2020	2019
Aluminium cans	526,169,333	504,502,096	435,488,789	407,845,669	82.8%	80.8%
Aluminium cans beer/ cider	763,598,028	662,530,800	586,349,664	598,801,428	76.8%	90.4%
Bi-metal can/ tinplate	3,230,886	3,794,610	2,565,186	3,187,644	79.4%	84.0%
Plastic bottles ¹	507,921,921	511,224,224	357,253,917	381,462,151	70.3%	74.6%
Glass single use	214,475,869	215,052,962	186,442,174	196,909,028	86.9%	91.6%
Glass multi use	34,500,096	46,415,640	29,029,092	44,615,436	84.1%	96.1%
Drink box ²	87,773,489	91,402,170	46,542,567	52,939,629	86.9%	57.9%
Gable top ²	9,583,034	10,179,965	5,393,629	6,951,325	56.3%	68.3%
Bag-in-Box (commonly > 3 l)	4,970,904	3,990,418	2,251,483	2,077,558	45.3%	52.1%
Pouches (commonly < 0,5 l)	8,809,609	8,774,917	2,242,527	2,311,962	25.5%	26.3%

¹ also includes plastic beverage containers not considered as 'bottles', likely a rather negligible category in BC.

² common understanding 'tetra pak' / liquid packaging board

Source: own calculations based on BRCCC, 2020; BRCCC 2021; Encorp Pacific (Canada), 2021

Common packaging fractions apart from beverage containers – including plastic packaging – are managed by another system called RecycleBC, formerly called ‘multi-material BC’. This organisation manages waste from paper, metal and plastic packaging. Unlike in the case of beverage containers, there is no deposit refund in this case. The waste is generally collected from the kerbside via a bring system. 99.2% of all households have access to the system’s collection infrastructure, through either kerbside collection, multi-household collection or, in rural areas, depot collection. The recovery rate of 85.7% by weight of packaging placed on the market can be considered as generally high (note: the EPR systems for beverages count quantities, not weight). However, the recovery rates for different material fractions vary. Whereas paper, metal and glass are all in the upper range with 90%, 85% and 97% respectively, specifically plastics rank lower with an overall rate of 52%. Rigid plastics reach 64% and flexible plastics only 24% (Recycle BC, 2021).

In addition to the EPR system, there is the opportunity for municipalities to further regulate single use items through by-laws. The 162 municipalities are generally free to enact respective by-laws, with guidance given by the provincial government. Municipalities can choose if they want to regulate all or some of these items:

- › Plastic checkout bags
- › Drinking straws
- › Polystyrene foam service ware
- › Plastic utensils including stir sticks

The provincial government approves the by-laws. Since 2019, a growing number of municipalities in British Columbia are enacting these by-laws. Especially in urban areas within the two bigger metropolitan areas of Vancouver and Victoria and in touristic places, these by-laws are taking shape, with further enactments expected in the coming years and months. Currently, all these by-laws include bans on plastic carrier bags, with most additionally covering EPS service ware (British Columbia province government, 2022b; Retail council of Canada, 2022).

Marine litter

Specific data on marine litter from packaging has not been identified for British Columbia. If looked at Ocean Conservancy data for the whole of Canada (Ocean Conservancy 2019, 2020) as well as other respective reports (Ocean Wise, 2021), the specific system setup in British Columbia can only be taken into account to a limited extent when assessing marine litter prevalence.

Each year, data collected by citizens through clean-up activities is used to determine the so-called “Dirty Dozen”, a list of the most-found litter across Canada (Table 5). Despite the generally low prevalence of packaging, marine litter in Canada includes litter that is difficult for EPR systems to handle, namely flexible plastics. Overall, reports from clean-up operations undertaken in British Columbia over the last years generally indicate a low prevalence of plastic waste from plastic packaging, with cleaning operations rather focusing on retrieving ALDFG. In British Colum-

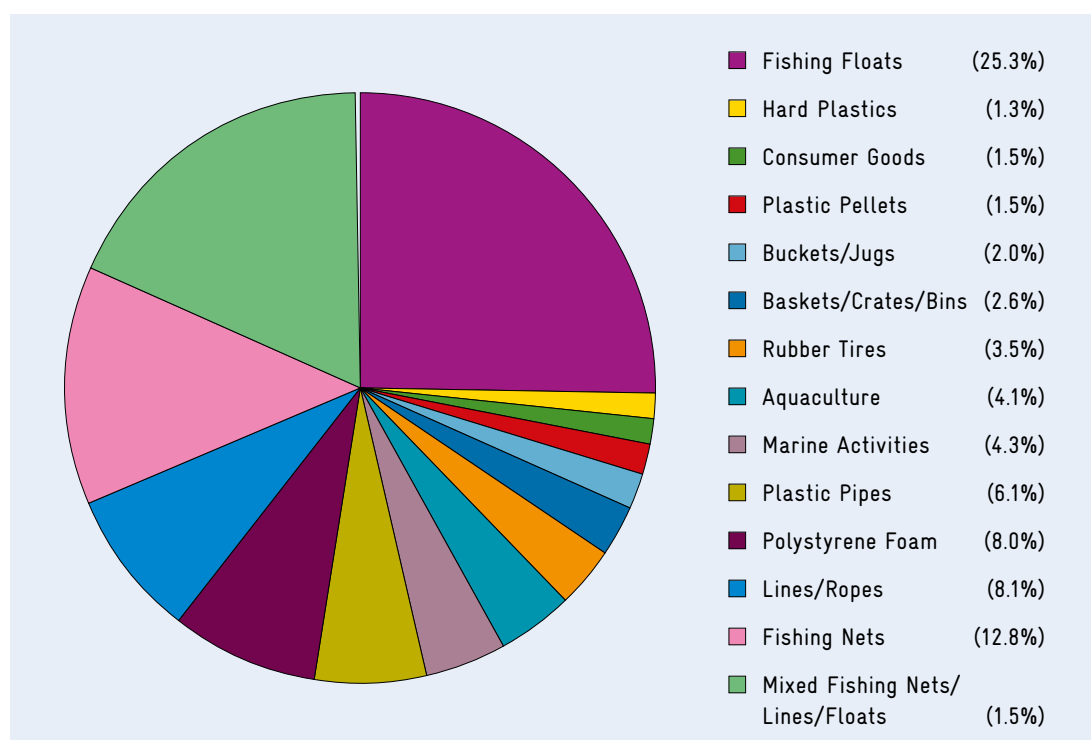
bia, the vast majority of marine litter cleaned up is polystyrene and ALDFG (Figure 11) and comes from blue economic activities.¹⁰ Expanded polystyrene has been used as flotation for docks, floats, aquaculture facilities, and other marine infrastructure and is easily breaking into tiny pieces in the marine environment. Expanded polystyrene is the most common form of garbage found during the Great Canadian Shoreline clean-ups. Marine litter from the blue economy was found to be widespread and even more prevalent in more rural areas. In addition, a number of the packaging recovered was found to originate outside of British Columbia, with labels coming from as far away as Japan or the Philippines.

¹⁰ Blue Economy in this report follows the definition of the EU as all sectoral and cross-sectoral economic activities related to the oceans, seas and coasts (EC, 2021).

Table 5: 12 most commonly found marine plastic items in Canada – ‘the dirty dozen’

Items	Number found	Percentage among dirty dozen
Cigarette butts	83,693	31.9%
Tiny plastics or foam	77,705	29.6%
Food wrappers	21,800	8.3%
Paper	17,534	6.7%
Bottle caps	13,285	5.1%
Beverage cans	10,631	4.0%
Plastic bottles	8,216	3.1%
Plastic bags	8,052	3.1%
Other packaging	6,511	2.5%
Coffee cups	5,426	2.1%
Straws	5,289	2.0%
Foam	4,663	1.8%
Total dirty dozen	262,751	100.0%

Source: Ocean Wise, 2021

Figure 11: Proportions of the weight of marine debris categories relative to the total weight

Source: MDRI, 2020

Conclusion

The EPR system in British Columbia can be characterised as one of the more elaborate ones in the world, covering many material categories, such as plastics, paper, glass, metals and composites, with a particularly broad application of DRS for beverage containers. The EPR system is also characterised by a high degree of transparency, with operational data, including recovery rates, openly available for many items.

In the EPR systems for packaging, high recovery recycling rates are generally achieved, yet large differences are evident depending on the material category. **Whereas recovery for metal and glass is high, plastics in particular, and even more so flexible plastics, are only recovered at significantly lower rates.** This points to organizational challenges to effectively collecting these fractions. However, the rates of uncollected items do not necessarily imply leakage into the marine environment – disposal through other collection and management pathways, such as the disposal of deposit items in kerbside collection or the disposal of items subject to EPR in residual waste in general, is also likely.

Analyses of marine litter specifically for British Columbia have barely identified packaging as a contributor to marine litter. This may be induced by a number of factors; including the extremely low population density of the province in general, as well as effective waste management also beyond EPR, with generally low leakage rates. Nevertheless, political action to further combat marine litter is also taken in form of a number of measures – both within and outside the EPR system. Within EPR, the most significant aspect is the extension of DRS to include nearly all beverage packaging. As part of this expansion, certain elements of the system are also being revised, including more uniform fees and a less ambiguous scope. This revision could lead to higher recycling rates overall. As these changes will not come into effect until 2022, their impact cannot be predicted. However, it is anticipated that return rates will tend to increase as a result of the simplification of the system.

Outside of EPR, British Columbia is also enacting a number of ambitious measures to ban certain product categories, including those that are not

packaging and therefore not covered by EPR. British Columbia generally supports its municipalities in enacting such regulations, but the final decisions are made at the local level. The general acceptance of these policies indicates a supportive environment.

The entirety of the measures is synthesised in British Columbia's Plastic Action Plan (CleanBC, 2020) that defines four areas of action in order to combat marine litter. This includes

- ▶ **Bans on single use plastics**, driven by the ability of municipalities to enact bylaws. These target specific SUPs that are commonly not considered packaging. A high number of municipalities, specifically in the urban areas have already enacted such bylaws, and more are expected in the coming months and years.
- ▶ **Recycling more plastics**, with direct referral to the EPR system and its kerbside collection model. Additional categories – some of them partly covered by bans – are currently discussed to be included in the EPR scheme which needs to be created for packaging.
- ▶ **Increasing DRS return rates of beverage containers**, with direct referral to EPR, this time to the specific DRS.
- ▶ **Reduction of overall plastics**, including behavioural changes as well as interventions in the value chain, e.g., through recycling content standards. Indirect links can be made to the EPR system, e.g., when it comes to modulating charges for better recyclability.

In that regard, it should also be noted that British Columbia follows the waste hierarchy and focuses less on clean-ups and rather more on adequate waste management – with two out of four measures clearly in connection to EPR and one with a less direct link. Nevertheless, as certain items are either not subject to the current EPR scope or have proven to be particularly challenging for managing, policy action beyond EPR – in the form of SUP bans – have also been considered necessary to further combat marine litter. In British Columbia, EPR (incl. the DRSs) has – despite its apparent weaknesses in managing certain, specifically flexible plastic categories – been recognised as the most effective approach for a better plastic waste management and mitigation of marine litter.

The case of British Columbia highlights the following

- Due to the versatile nature of different waste streams, the EPR system needs to set up equally versatile management strategies; kerbside collection and DRS can be set up as complementary elements
- Categories outside the EPR system with significance to marine litter are tackled by an additional set of measures, notably bans on notorious marine litter items
- A better management of flexible plastic categories has been recognised as the most effective approach for better plastic waste management and mitigation of marine litter

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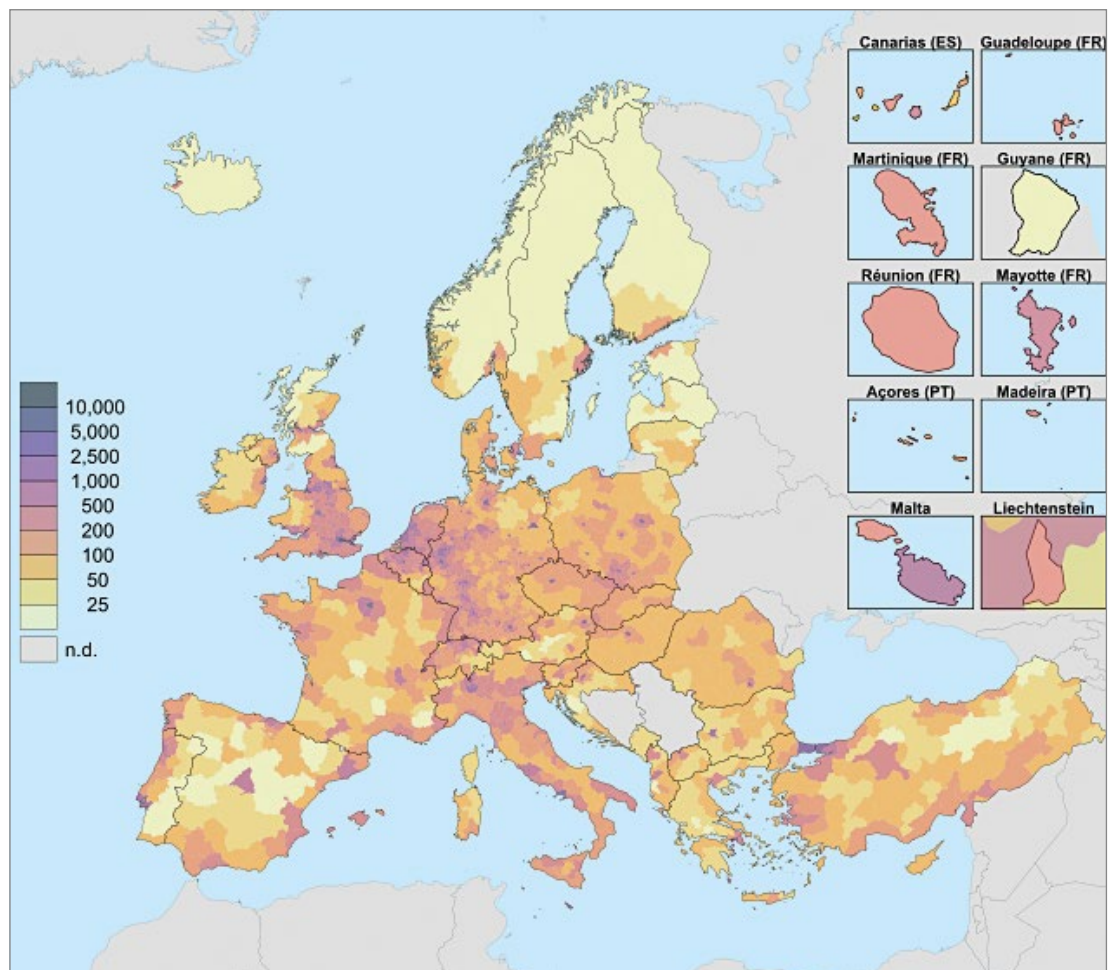
Annex 3: Analysis European Union

The European Union (EU, Figure 12) borders the Atlantic, the Arctic Ocean, the Black Sea and the Mediterranean. The Baltic Sea is entirely within Europe. The EU coastline is 68,000 km long – more than three times longer than that of the United States and almost twice that of Russia. Across Europe's 24 coastal countries, there are 560,000 km² of coastal zones, equivalent to 13% of the total land mass (European Environmental Agency, 2020). In the EU, almost half of the population lives less than 50 km from the sea; the majority is concentrated in urban areas along the coast (European Environmental Agency, 2020). The EU includes the vast majority of Western Europe's population and its coastlines. Nevertheless, particularly Norway and the United Kingdom (UK) are missing as relevant countries. As

the UK has only recently left the EU, opposing policies on marine litter may only emerge over time. Norway, despite not being a member, shares a broad congruence of policy with the EU. It is noteworthy that both the Mediterranean Sea and the Black Sea are inland seas, with large shares of the coasts by non-EU member states.

The seaside is Europe's most popular holiday destination. Employing over 3.2 million people, this sector generates EUR 183 billion in gross value added and counts for more than a third of the maritime economy. As much as 51% of hotel bed capacity in across Europe is concentrated in coastal regions (European Environmental Agency, 2020).

Figure 12: Population density in Europe 2017



Source: Dieghernan84 based on Eurostat/ national data (free licence)

EPR policy

Within the EU Member States, **EPR schemes are set up at national level and have been established to enable public authorities and producers to meet obligations relating to the recovery of packaging waste.** Almost all Member States have assigned responsibility for meeting recycling targets to producers, who have set up EPR schemes for used packaging to secure compliance. A notable exception is Denmark (currently implementing an EPR scheme for packaging).

The Plastic Packaging Waste Directive (PPWD; 94/62/EC) requires Member States to set up systems for the return and/or collection and reuse or recovery, including recycling, of used packaging from the consumer or other final users in order to meet the PPWD's targets. Thus, the PPWD imposes the legal obligation on Member States to meet the legal targets for recovery and recycling. Since the PPWD does not specify how EPR should be implemented by Member States, practices differ in terms of how responsibilities and costs for packaging waste collection and sorting are divided between the involved actors (e.g., producers, local authorities, private or public waste management companies or consumers) and the requirements that EPR schemes have to meet to obtain a licence to operate (EUROPEN, 2021).

In reality, there is a wide range of EPR policies adapted in the different Member States. While some countries run one single scheme that organises the recovery of packaging (e.g., France, Belgium, Netherlands, Spain, Sweden, non-EU country Norway), others allow for competition within the different systems (Austria, Germany, Portugal). Especially in Northern and Western Europe, EPR has a longer history, with first systems being implemented from 1993 onwards. Whereas particularly in Member States that joined since around the year 2000, EPR systems are younger and less detailed in their operationalization. The applied collection and management methods are very heterogenous. While recovery

targets are set at EU level, compliance has to be achieved at national level. For example, the collection of items in the different waste streams varies from country to country. Another example is that in a number of countries in Northern and Eastern Europe, DRSs are introduced for certain beverage packaging with different scopes, while they are less common in Southern Europe. All in all, **the great variety of the EPR systems in each European country makes a uniform statement on their effectiveness and operational modalities difficult.** Varieties include amongst others:

- › single system vs. competing PROs
- › different scopes of covered items and materials defined individually in each country
- › fundamentally different collection systems
- › DRSs with different scopes of covered contents and packaging
- › private-led vs. state-led

Facing the problem of marine litter and the plastic crisis and driven by the aim to achieve a good environmental status¹¹ of its seas, the EU builds its related coastal and marine policies on eleven pillars, one of them relating to marine litter (European Commission, n.y.). Within this framework, the Marine Strategy Framework Directive (MSFD) obliges the Member States to ensure that, by 2020, “properties and quantities of marine litter do not cause harm to the coastal and marine environment”. The MSFD is the first EU legal instrument to explicitly address marine litter. The assessment of the status, target setting, monitoring, reporting and implementation of measures related to marine litter are carried out in accordance with relevant MSFD provisions, which have been further specified through the Commission Decision (2017/848/EU). This also includes a joint list of litter categories, to ensure harmonised data collection within the EU.

¹¹ As per MSFD (https://ec.europa.eu/environment/marine/good-environmental-status/index_en.htm)

Within its Strategy for Plastics, adopted by the Commission in 2018, flagship initiatives against plastic pollution in the oceans include the Directive (EU) 2019/904 on the reduction of the impact of certain plastic products on the environment (SUP Directive) with a set of ambitious measures:

- ▶ a ban on certain SUPs with established and available alternatives, namely cotton bud sticks, cutlery, plates, straws, stirrers, sticks for balloons, as well as cups, food and beverage containers made of EPS and all oxo-degradable plastic applications;
- ▶ measures to reduce consumption of food containers and beverage cups made of plastic, and specific marking and labelling of certain products;
- ▶ EPR schemes covering the cost to clean up litter, applied to products such as tobacco with filters, wet wipes, balloons and fishing gear;
- ▶ a 90% target for separate collection of plastic bottles by 2029 (77% by 2025) and the introduction of design requirements to connect caps to bottles, as well as target to incorporate 25% of recycled plastic in PET bottles as from 2025 and 30% in all plastic bottles as from 2030.

Marine litter

The EU waste legislation was amended in 2018 aiming to, among other things, stop the generation of marine litter and to strengthen the link between waste management and marine litter prevention. The amended Waste Framework Directive acknowledges that, since marine litter, in particular plastic, stems to a large extent from land-based activities, specific measures should be established in waste prevention programmes and waste management plans (see in particular Article 28 paragraph 3 (iii)(f) and Article 28 paragraph 5). These measures should be coordinated with those required under MSFD and the EU Water Framework Directive (Directive 2000/60/EC).

In the EU, the MSFD is the main legal instrument to protect the EU's marine environment. Marine litter is one of the eleven qualitative descriptors listed in Annex I of the MSFD that the Directive addresses in order to achieve a Good Environmental Status (GES). The European Commission is proposing new EU-wide rules targeting the ten most common single-use plastic products found on Europe's beaches and seas, as well as lost and abandoned fishing gear (ALDFG). These products are considered to contribute the most to the marine litter issue, together they account for 70% of all marine litter (European commission, 2018). Table 6 represents the marine litter situation in different European coastal seas and areas.

Table 6: Marine litter situation in different European coastal areas

Coastal Seas	Description of marine litter situation
North-East Atlantic	Litter is abundant on beaches along the North East Atlantic Coast, including the North Sea. Plastic fragments, fishing-related litter and packaging are the most common types of litter found. Plastics comprise over 90% of items in some areas. Higher amounts of litter are found in the Eastern Bay of Biscay, Southern Celtic Seas and English Channel than in the northern Greater North Sea and Celtic Seas (OSPAR Commission, 2017).
Baltic Sea	The average amount of beach litter items on reference beaches of the Baltic Sea ranges from 47 to 280 per hundred meters of shoreline. High concentrations were found on urban beaches, plastics being the most common litter material. The 4 most common litter items found at Baltic Sea were drinking related items (such as cups, caps, lids), plastic and polystyrene pieces, food related items (such as wrappers and packets), and cigarette butts and remains. Plastic was the most common category of waste at the Baltic Sea, accounting for an average of around 30 % of the number of items and 16% of the weight (HELCOM, 2018).
Mediterranean Sea	Plastics are the major component of marine litter in the Mediterranean Sea , with cigarette butts, food wrappers and plastic bags at the top of the list of marine litter items. Land-based sources are predominant. Tourism is directly affecting marine litter generation on beaches. During the summer months, population is almost doubled in the coastal areas of the Mediterranean Sea, with a corresponding increase in waste generation, reaching up to 75% of the annual waste production in some areas. Plastic is the main component of marine litter, found widespread in the continental shelf of the Mediterranean, ranging up to 80% and 90% of the recorded marine litter items (UNEP-MAP, 2018).
Black sea	The proportion of plastic found on both the Black sea's seafloor and coastal environments amounts up to 90%. Regarding the density of marine litter, the Kerch Strait and Azov Sea show a significant marine litter density compared to the rest of the Black Sea (BSC, 2019).

Source: OSPAR commission, 2017; HELCOM, 2018; UNEP-MAP, 2018; BSC 2019

Given that regional seas are transboundary, Regional Sea Conventions were established in Europe several decades ago to jointly monitor and manage these seas: the **OSPAR Convention** for the Protection of the Marine Environment in the North-East Atlantic, the **Helsinki Convention (HELCOM)** on the Protection of the Marine Environment in the Baltic Sea area, and the **Barcelona Convention** for the Protection of Marine Environment and the Coastal Region of the Mediterranean. These conventions play a key role in the implementation of the European strategies.

Within the North-East Atlantic, plastic fragments, fishing-related litter and packaging are the most common types of litter found. Plastics make up over 90% of the items in some areas (OSPAR Commission, 2017). In the Baltic Sea, high concentrations of marine litter were found on urban beaches, plastics being the most common litter material, averaging around 30 % of the number of

items and 16% of the weight. The 4 most frequent litter item groups at Baltic Sea found were drinking related items (such as cups, caps, lids), plastic and polystyrene pieces, food related items (such as wrappers and packets), and cigarette butts and remains (HELCOM, 2018).

The marine litter situation on the beaches of the Mediterranean is still fragmented and geographically limited to the northern part. Plastics are the major components with cigarette butts, food wrappers and plastic bags at the top of the marine litter item list. Land-based sources are predominant, but they have to be further specified. Tourism is directly affecting marine litter generation on beaches. During the summer period, population almost doubles in the coastal areas of the Mediterranean Sea, with a corresponding increase in waste generation, reaching up to 75% of the annual waste production for some areas (UNEP MAP, 2017).

The EU has identified several items that are being addressed by the directive (European Commission, 2018). Table 7 shows the top 10 items and the related measures according to the European Commission. EPR is one of the most prominent solutions to tackle these problematic items, while

additional measures are also useful. Including cleaning costs within EPR is currently under intensive – and oftentimes controversial – discussions as it is argued that litter results from issues (improper disposal by consumers) that cannot be controlled by producers (EUROPEN, 2021).

Table 7: Top 10 items addressed by the EU measures

Items	Names of TOP 10 items	Covered by European measures
1	Cotton bud sticks	Market restriction
2	Cutlery, plates, straws and stirrers	Market restriction
3	Balloons and sticks for balloons*	EPR, market restriction, marking requirements, awareness raising
4	Food containers*	EPR, consumption reduction, awareness raising
5	Cups for beverages*	EPR, consumption reduction, awareness raising
6	Beverage containers	EPR, product design requirement, awareness raising, separate collection objectives
7	Cigarette butts*	EPR, awareness raising
8	Plastic bags	EPR, awareness raising
9	Packets and wrappers	EPR, awareness raising
10	Wet wipes and sanitary items	EPR, awareness raising, marking requirements

* items not yet enacted by the SUP Directive, but will do so from 2023 or 2024 onwards

Source: EC, 2018

The top 10 results for items at the European coastal areas show an **absence of plastic bottles, which are largely covered by the different EPR systems, particularly by deposit systems.** The

results of beach litter monitoring in the Baltic Sea (Table 8), where most European countries established and implemented their DRS systems for PET bottles, support this hypothesis.

Table 8: Top 15 beach litter items for the Baltic Sea

Items	Names of TOP 10 items	Share of the items
1	Plastic/polystyrene pieces 2.5 cm > < 50cm (total)	24%
2	Cigarette butts	10%
3	Caps/lids* (total)	5%
4	Foam sponge (total)	5%
5	Other ceramic/pottery items	5%
6	Bags* (e.g., shopping)	4%
7	Food incl. fast food containers*	3%
8	Bottle caps*	3%
9	Cutlery/trays/straws** (total)	2%
10	Wood Crates	2%
11	Crisp/sweet packets* and lolly sticks** (total)	2%
12	Cups*	2%
13	Rope (diameter more than 1 cm)	2%
14	Other textiles	2%
15	Other paper items	2%

* commonly covered by EPR schemes in Europe

** sometimes covered by EPR schemes in Europe

Source: European Commission DG Environment, 2014

Conclusion

European coastal areas and the marine environment are still struggling with several challenges in relation to marine litter despite the efforts of the EU countries to reduce its impact at the source. European countries have developed several and diverse EPR concepts particularly for packaging to tackle this problem, in addition to other instruments including deposit systems for beverage container. Thus, all in all, the great variety of EPR systems across European countries makes a uniform statement on their effectiveness and operational modalities difficult.

As acknowledged by the SUP Directive, marine litter has been recognised as an important issue. As response, different options to combat the littering of certain items are foreseen in Europe, acknowledging EPR as one measure in a multi-faceted approach to combat marine litter. However, as the EU only sets requirements, which are then implemented by the Member States in their own ways, the characteristics of every EPR system

are different. Therefore, a uniform assessment of the extent to which they meet their objective is difficult to justify. Nevertheless, differences in the composition of marine litter have been found between waters and countries bordering them.

The litter composition and the amount of plastic packaging subject to EPR varies between the countries, which is possibly rooted in the different levels of effectiveness of the schemes. However, overall, plastic packaging is comparably less dominant than it is in many other regions in the world, especially in LMICs. Yet, due to the importance to further reduce plastic litter overall, the EU has expanded the scope of items subject to EPR as it is recognised as an effective tool. In addition, several countries are spearheading the development by also developing new, additional EPR schemes for items which cannot be managed together with waste, such an EPR scheme for fishing gear in France.

The case of European Union highlights the following

- The freedom to choose geographically and politically suitable measures to achieve goals on marine litter reduction also reflects the apparent differences in the countries' contexts
- Different policy measures are put into place to combat the littering of certain items in Europe, acknowledging EPR as one measure in a multi-faceted approach to combat marine litter
- DRSs allow certain fractions to be prevented from entering the marine environment – but their application is limited to certain categories of packaging
- The characteristics of every EPR system are different – a uniform evaluation up to which extent they fulfil their goal is difficult to provide

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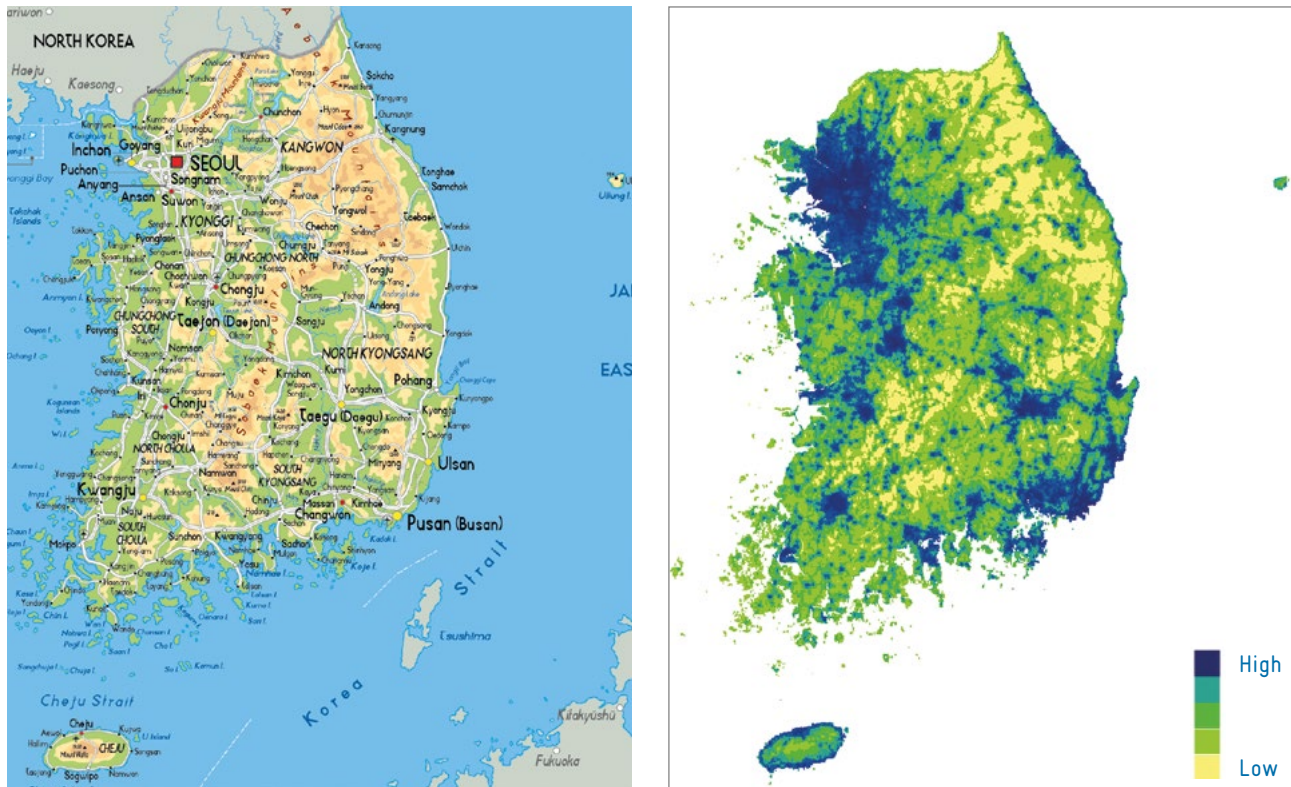
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Annex 4: Country analysis Republic of Korea

The Republic of Korea (ROK) (Figure 13) is a nation encompassing the southern part of the Korean peninsula, and its only land border is with its country neighbour North Korea. The entire coastline is over 2,400 km long and borders the Yellow Sea, the East China Sea, and the Sea of Japan. The country has a population of around

51 million heavily concentrated in urban areas in proximity to the coasts. The most relevant urban centres are Seoul in the Northwest and, much smaller, Busan in the Southeast. Along the coastline, there is a high number of islands, over 3,000 in total.

Figure 13: Republic of Korea physical map of distribution and density of population 2020



Source: Worldometers/ Geatlas 2018 and Worldpop/ Bill & Melinda Gates Foundation, 2020

EPR policy

Following a significant economic growth since the 1980s, ROK enacted its EPR system for packaging in 2003. Urbanisation and rapid population growth increased waste generation, resulting in associated challenges for effective waste management. Korea sought to minimize resource utilization to meet the country's high energy demand and therefore introduced efficient resource recovery from landfills and maximised reuse and recycling. In 2003, mandatory targets for recycling through the EPR system started with

four packaging items. More mandatory recycling target items have been continually added to the EPR system (see Table 9). It has to be noted that the Korean EPR system is primarily focused on packaging content, and less on the material. The inclusion of a specific category such as beverages in the EPR system results in a variety of additional items being covered, such as glass bottles. Goods that are outside the scope may not be covered, no matter of their (plastic) packaging material.

Table 9: Expansion of mandatory recycling target items by EPR systems in Korea

Year	Packaging items	Products
2003	Paper pack, metal cans, glass bottles, Plastic packaging (food & beverage, agricultural and livestock product, detergent, cosmetics, shampoo & conditioner for pets, drugs & quasi-drugs), Expanded polystyrene (EPS) used as shock-absorbing packaging materials for electronics (5)	Lubricating oils, tires, mercury battery, silver oxide cells, lithium battery, nickel-cadmium battery, TV, refrigerators, washing machine, air-conditioners, personal computers (11) ¹⁾
2004		Added mercury lamps (12)
2005		Added audio, mobile phones (14)
2006		Added printers, copiers, fax machines (17)
2008		Added manganese battery, alkaline/manganese dioxide battery, nickel hydrogen battery (20) *note: WEEE managed by WEEE and ELVs Recycling Act
2010	Added plastic packaging (clothes, paper products, rubber glove, disposable bag & shopping bag) (5)	
2011	Added plastic packaging (antifreeze, brake fluid & Lubricant) (5)	Added styrofoam float for aquaculture
2016		Added bale silage plastic films, seaweed plastic sheets
2020	Added Film product (air caps, plastic bags, plastic bags for dry cleaners, disposable vinyl gloves, food wrapping plastic films) (6)	
2022 ⁻		Plan to add 17 target items (fishing net, fishing rope, plastic boxes, water purifier filters, agricultural films, PVC pipes, etc.)

1) The number indicates a total number of mandatory recycling items.

Source: World Bank, 2022, *forthcoming*

The mandatory recycling (target) items in the EPR system are divided into two major types – packaging materials and products. Plastics, the target items under the EPR system, are mainly used in packaging materials. In Korea, the scope of mandatory recyclables regulated by the EPR system has been expanded since 2003, as shown in Table 10 and Figure 14.

More mandatory recycling items such as fishing nets, ropes, industrial films, plastic profiles, PE pipes, PVC pipes, construction insulation materials, water purification filters, and other plastic materials from consumer products are currently under review for EPR regulation by the Korea Ministry of Environment and expected to be included in the EPR list in 2022 and 2023 (World Bank, 2022, *forthcoming*).

Table 10: Mandatory recycling items (packaging only) classified by EPR regulation in Korea

Mandatory Recycling Items	Packaging materials classified as recycling items by EPR
Packaging materials of food products, agricultural, marine and livestock products, detergents, cosmetic products, medical and pharmaceutical products, health supplement, butane gas fuel tanks, pesticides and germicides, clothing, paper products and rubber gloves, lubricants	Paper packs (plastic or aluminium foil coated paper packs) Glass bottles Metal cans Packaging materials made of plastic (containers incl. PET bottles), film and sheet type of packing materials and trays included) Lubricants: plastic packaging materials only
Plastic packaging materials of electronic and electrical products	Film and sheet type packaging materials and shock-absorbing materials made of synthetic resin foam
Single-use disposable bags and shopping bags	Plastic bags (volume-based waste disposal bags are excluded)

Figure 14: Examples of mandatory recycling items for plastic packaging materials by EPR in Korea



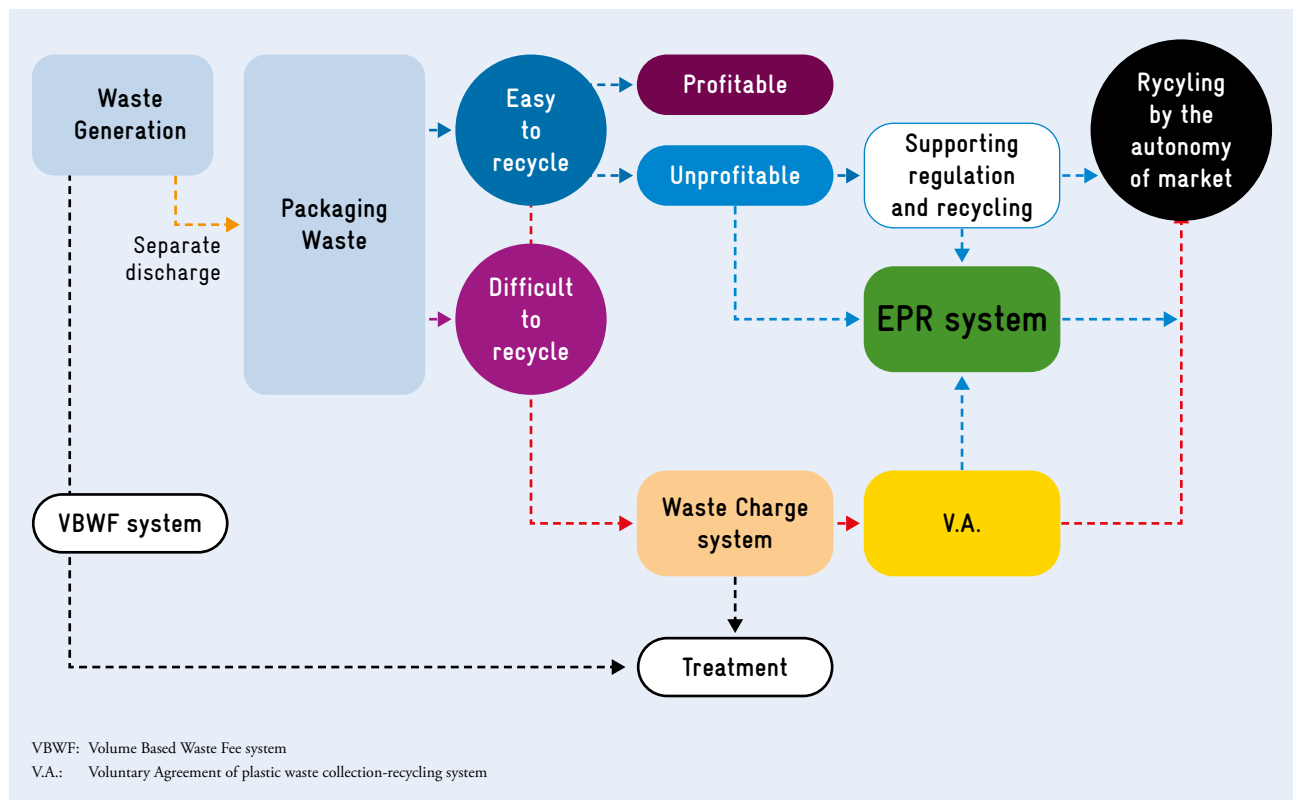
Source: KECO, EPR System in Korea, 2018

The Korean EPR system is being implemented as an economic instrument to improve recycling alongside other waste management systems such as a waste charge system (WCS), voluntary agreements (V.A.) for plastic waste collection and recycling and volume-based waste fees (VBWF). The WCS is applied to difficult-to-recycle items such as containers for pesticides or wastes to cover treatment costs, and when producers are able to recycle these wastes through voluntary agreements, no waste fees are charged for recycling waste. Accordingly, producers will gradually expand and develop recycling technology and facilities for items that are difficult to recycle in order to be exempted from waste charge system (KECO, 2021). Complementing to that, the volume-based waste fee system VBWF and the separate collection system for packaging waste

are operated by source separation at households. In order to improve recycling efficiency, consumers or households should separate discharge recyclables at source resulting in a relatively homogeneous waste that is properly sorted in the sorting and recycling processes (World Bank, 2022, forthcoming).

The flow of packaging waste controlled by various systems including economic instruments is shown in Figure 15. For packaging waste that is easy to recycle, the recycling obligation is imposed on the producers by the EPR system, with a fine for non-compliance. Packaging waste that is difficult to recycle is subject to the WCS system, and a waste fee is imposed on producers, representing waste treatment costs (World Bank, 2022, forthcoming).

Figure 15: Organisation of plastic waste management in Korea

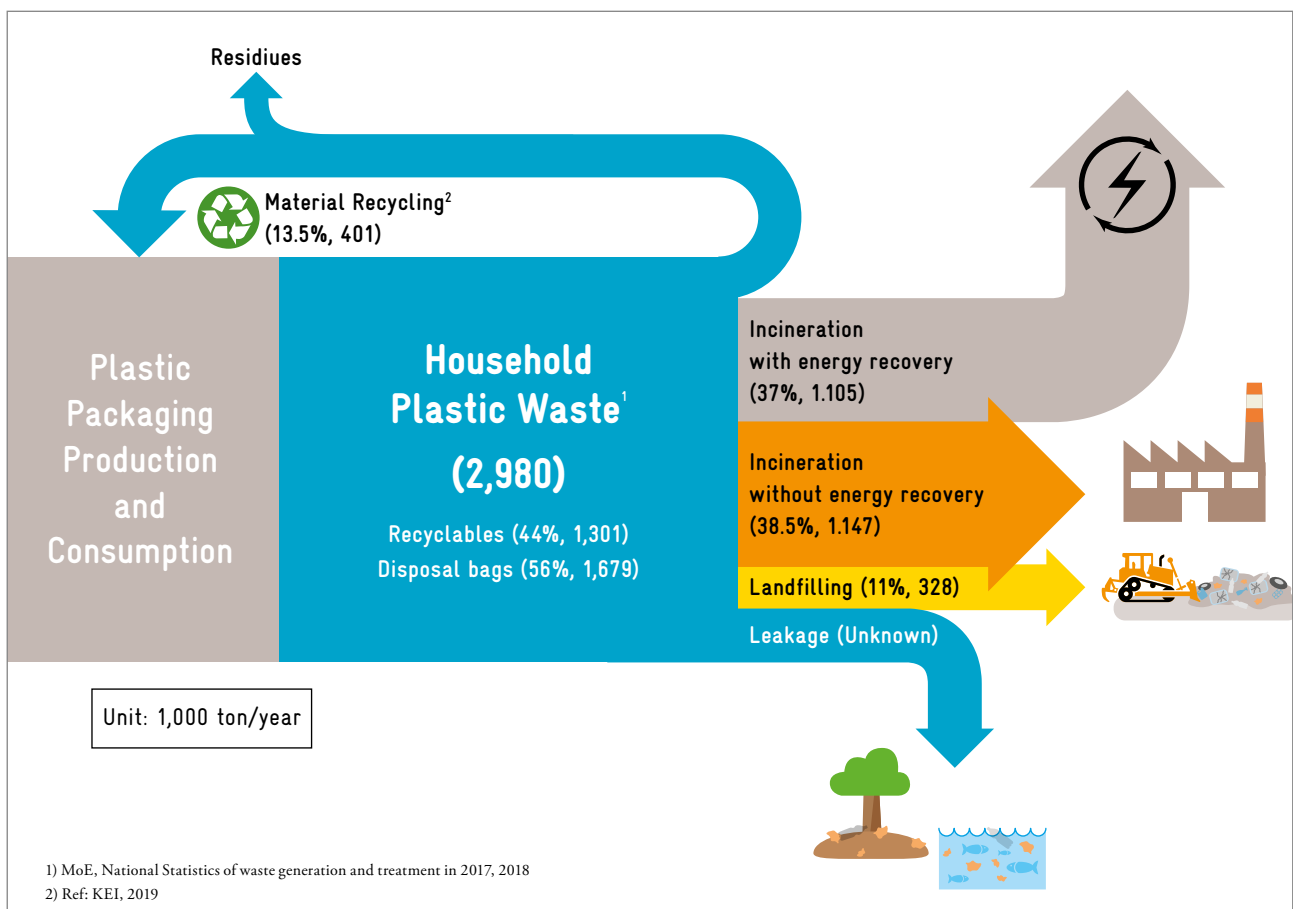


Source: KECO, Plastic waste management in Korea, 2021

The Korean EPR system can be described as a system that imposes a certain rate for the recycling of wastes from products or packaging materials (of product groups) on the producers or manufacturer of the products that use these packaging materials. The main target for the Korean EPR system is recycling, with waste diversion from landfills and more efficient use of resources being the main motivations for introduction. Other potential goals – for instance concerning collection rate or access to the system – are only indirectly targeted by the EPR policy.

In a recent study (KEI, 2019), approximately 3 million tons of plastic packaging waste were generated from households in Korea. The amount of incineration without energy recovery was the highest (1.15 million tons, 38.5%), followed by the energy recovery with solid refuse fuel (SRF) (1.1 million tons, 37.5%), material recycling (0.4 million tons, 13.5%), and landfilling (328,000 tons, 11%), as depicted in Figure 16.

Figure 16: Plastic packaging material flow



Source: adapted after Jang et al. (2016).

Marine litter

In 2018, it was estimated that 176,000 tonnes of waste are released into the marine environment annually in Korea, 57% of which are land based and 33% are sea based. The amount of marine debris amounts to 151,000 tons (12,000 tonnes shoreline, 137,000 tonnes submerged, 2,000 tonnes floating) (East Asian Sea Congress, 2018). In 2019, approximately 24.6 thousand pieces of waste were found in the coastal areas in Korea, and about 80%, which is around 2.7 tons of this was plastic waste. Marine litter collected during the international Clean-up also suggests that plastic litter accounts for the largest proportion of marine litter (Yang, 2021).

The institutional framework of the marine litter management in South Korea is mainly represented

by the ministry of Ocean and Fisheries (MOF), the Korea Marine Environment Management Cooperation (KOEM), Marine Litter Management Center, local governments, NGOs and the private sector. The legal framework is based on the Marine Environment Management Act (2007), Comprehensive Marine Environment Management Plan and the Comprehensive Marine Litter Management Plan.

The National Marine Litter Monitoring Program conducted marine litter monitoring campaigns from 2008 to 2015 to identify existing litter in coastal areas of South Korea. The programme started with 20 sites and expanded to 40 sites in 2015.

Figure 17 Marine debris monitoring sites in Korea

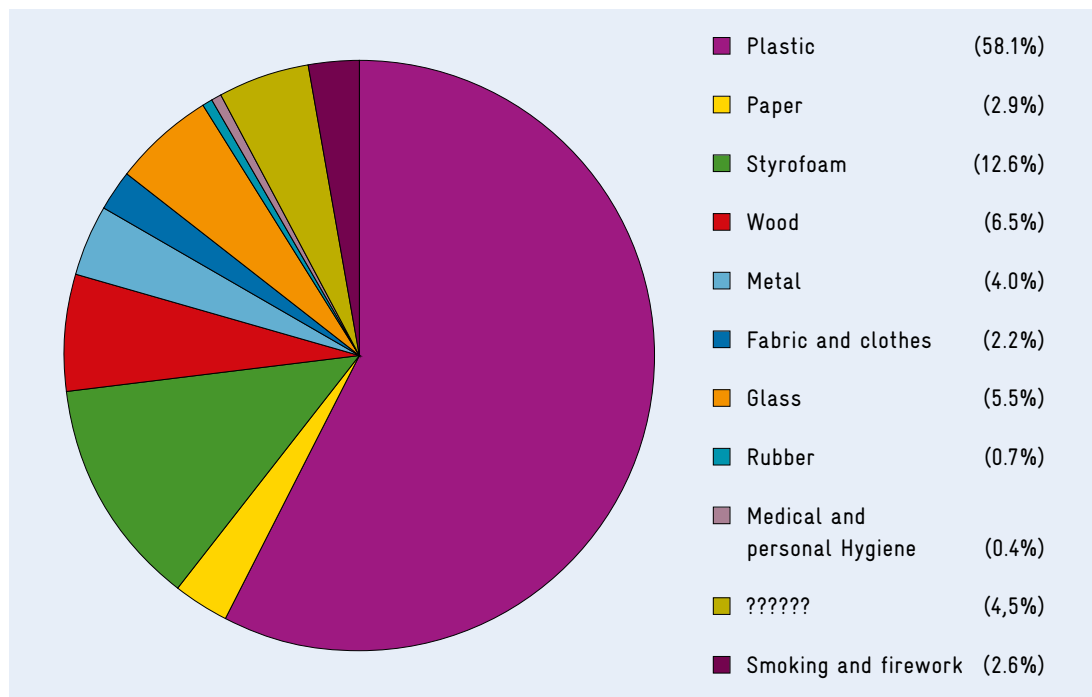


Source: KOEM, 2018

The results show that Plastic and Styrofoam account for 58.1% and 12.6% respectively (Figure 18). Among the most prominently found items are plastic bottles and its lids/caps, ranking at number

3 and 2 respectively, as well as other packaging ranking at number 9. For some other items, the origin of the respective items is less clear.

Figure 18 Material composition of marine litter in percent



Source: Adapted from KOEM, 2018

In addition, the program has also identified the top 10 items in the different sampling areas in South Korea.

Table 11: TOP 10 items of marine litter according to the National Marine Litter Monitoring Program

Item	Prevalence among top 10 in %
String/ rope	10.0
Lids/ caps	9.1
Plastic bottles	8.0
EPS buoy	6.6
Plastic bags	5.8
Other plastics	5.9
Glass bottles and glass fragments	5.2
Food packaging	4.2
Other EPS	3.1
Other	41.1

Source: Adapted from KOEM, 2018

Conclusion

Korea has developed several EPR systems for different plastic waste streams, particularly EPR for packaging waste since 2003. The implemented EPR packaging scheme is continuously expanding the scope of covered items and materials, with a clearly defined collection and recycling targets. Furthermore, several programs have been developed, including the marine litter monitoring program, which is considered important to support the decision-making process. Important efforts have been established to tackle fishing gear items and to improve the environmental education.

However, the analyses of the main top 10 littered items shows that there are several plastics and other

materials scatters in coastal areas and beaches. The list includes some items subject to EPR such as PET bottles and plastic bags. Moreover, the differences in the index of marine pollution in different cities (KOEM, 2018) indicate that the intensity of the pollution varies from one city (municipality) to another. In other words, the level of cleanliness depends on the local collection and cleaning system and related available infrastructure.

Finally, foreign littering needs to be considered when evaluating Korean circular economy schemes, as littering from neighbouring countries is very high.

The case of ROK highlights the following

- The need and relevance of expanding EPR coverage of packaging items to continuously optimise the overall system and reduce littering
- The EPR system and other similar measures need to be supported by an adequate and long-term monitoring program to evaluate the impact on marine litter
- Several options are currently being considered to reduce littering in South Korea, including EPR for different waste streams, the ban of some SUPs, DRS, etc.
- The geographic location of the country and the length of its coastal area and its specificities should be considered when designing the EPR systems

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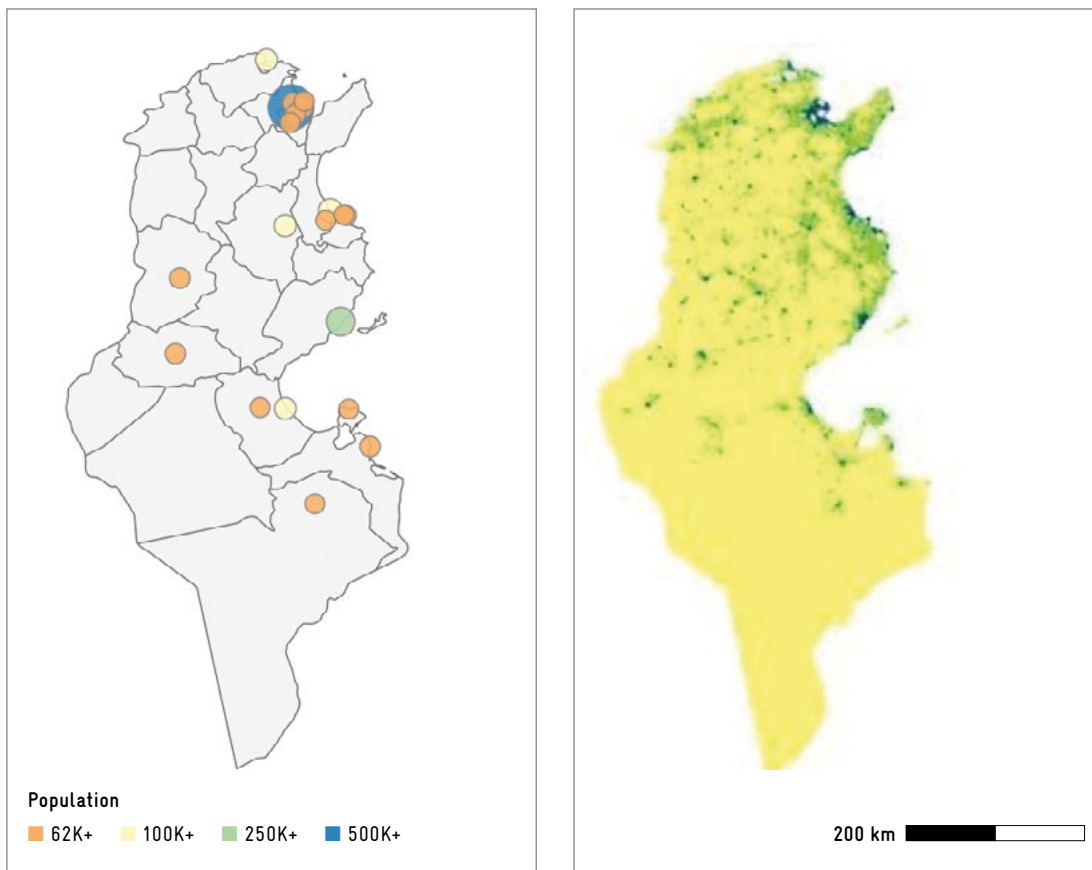
Annex 5: Country analysis Tunisia

Tunisia (Figure 19) is the northernmost country in Africa. It is part of the Maghreb region of North Africa and is bordered by Algeria to the west and southwest, Libya to the southeast, and the Mediterranean Sea to the north and east. The country covers 163,610 km², with a population of 11.8 million (World Bank, 2021).

Thirteen governorates and 130 municipalities in Tunisia are located at the coastal zone and face the

Mediterranean Sea. The rest of the governorates are inland. In terms of population, Tunisia is the ninth largest country in the Mediterranean and has 1,670 km of coastline. It is the 13th largest producer of plastic goods, producing 0.25 million tonnes annually. The report highlights that only 4% of all waste is recycled or exported for recycling (WWF, 2019).

Figure 19: Maps of the population density in Tunisia



Source: World Population Review, 2021 (left) and Worldpop/ Bill & Melinda Gates Foundation, 2020 (right)

EPR policy

The EPR system in Tunisia is a mandatory one called ECO-Lef. As outlined in the respective legal framework, producers can choose between three options to meet their responsibility:

1. Directly contract a waste management operator
2. Set up own take-back structures (individual schemes)
3. Pay their EPR fees to the national waste management agency, known as ANGeD (Agence Nationale de Gestion des Déchets), which acts as a state-run PRO.

Although the system theoretically gives companies a choice, in practice the vast majority of companies opt for payments to ANGeD as this is the easiest option from their perspective (Chaabane et al., 2019).

Since the adoption of the framework law no. 96-41 on solid waste management and related application texts, Tunisia has set up several systems for the recovery of certain waste streams, such as ECO-Lef and the national public system for recovery and recycling of packaging waste. The system has been implemented in partnership with private companies and local authorities. It consists of the collection of packaging waste under terms of conditions and agreements with the National Waste Management Agency, and the recycling of plastic waste under conditions and agreements for receiving monthly rates for these materials. The objective of the system is to reduce packaging waste pollution, ensure a clean environment and coastal areas, and to support the creation of new businesses and job opportunities (Chaabane et al., 2019).

Figure 20: ECO-Lef logo and waste collection practices in Tunisia



Source: © Chaabane (left), © ANGeD (right)

The packaging subject to the ECO-Lef system is plastic and metal packaging (with a capacity greater than or equal to 100 ml), mainly soft drinks and water bottles (PET), milk bottles (HDPE), plastic films and bags (made of PP) and metal boxes (aluminium).

The collection and recycling sector is currently almost exclusively in the hands of informal collec-

tors who collect recyclable fractions from bins and landfills and establish informal recycling activities that have no legal status and are not formally integrated into the system (Chaabane et al., 2019).

The lack of inclusion of the informal sector is not the only weakness of the system. By allowing companies to choose between three options, they eventually undermine each other as no sufficient

long-term planning can be done and monitoring and supervision is being made difficult. In 2018, only a minority of companies paid their EPR contribution while the number of free riders significantly increased. As there is no monitoring and supervision, there is no information or data on the number of companies adopting EPR through individual options (Chaabane et al., 2019).

As a response to not meeting their objectives, the ECO-Lef system is currently being revised, with a focus on developing a more specific EPR scheme which involves the whole value chain, including producers. The concept focusses on ensuring a sustainable financing and organisation of the system to ensure a better packaging waste management. In particular, it is discussed to only set up one industry-led PRO to collectively operationalise the system. Yet, no final decision has been made due to regular changes within the ANGeD [dated June 2022].

As Tunisia is an important tourism destination in the region, “cleaning” is highlighted as an important measure to prevent marine litter and ensure clean destinations. Thus, in the draft of the new decree “EPR for packaging”, Tunisia has included “cleaning costs” in the EPR contribution to be paid: “Financing of cleaning measures of littered packaging in sandy and rocky beaches of the country according to the objectives of the PRO and national authorities and after coordination with municipalities”.

The draft decree further specifies that *“the municipality is the first responsible of the cleaning in its territory, according to a contract with the PRO. The finance of the cost has to be adequate to the estimation of littered packaging. The estimation has to be done by the PRO or other competent national institutions based on reliable monitoring indicators and data.”*

Municipalities can delegate the cleaning operation to APAL or local NGOs. They should, if possible, take the opportunity to ensure monitoring of beach litter and report the results to the PRO for further cost estimation.

Despite its impacts and results related to employment and small businesses creation, the ECO-Lef system so far did not reach its objectives in terms of increasing the collection and recovery rate and ensuring the cleanliness of the coastal areas and beaches. Littering is still a relevant and visible problem that also affects the tourism sector through visual pollution, especially on beaches.

Failing the original objectives is caused by two central underlying reasons: Firstly, the ECO-Lef only receives certain materials with value (positive market price) such as HDPE, foils, bags and PET-beverage bottles. Secondly, the system is only important for the collectors when prices offered by the private companies active out of the system decrease.

In addition, waste pickers, of which there are an estimated 10,000 and 15,000 in Tunisia, collect around 80% of the total packaging without being a part of the system. They are only interested in materials with positive market value as their activities are driven by economic viability. In addition, most of informal collectors lack needed transport logistics, which in turn often leads to not collecting all available materials due to their size and weight exceeding their capacity.

Since the ECO-Lef system is failing to provide sufficient waste management, littering continues to be a problem while the costs for clean ups are not even covered by the system. Institutionally, the cost for beach cleanings are the responsibility of municipalities and the Coastal Protection and Planning Agency (APAL), but the financing remains insufficient and uncertain. In addition, the collection is the responsibility of the municipality, and consumers are not obliged to follow a specific separate collection system (Chaabane et al., 2019).

Marine litter

According to WWF (2019b), the total pollution of the Tunisian Mediterranean coast is about 3% of the total pollution of the Mediterranean coast. In addition, the daily input of plastic waste per km on these coasts is higher than the Mediterranean average, with an average of 6.8 kg of plastic per km of coast per day. The same report estimated that 8.5 KT of plastic is leaked into the sea in 2016 from the country's coastal areas, with 33% returning to the coastal areas within a year (WWF, 2019). The main source of pollution is

mismanaged waste during collection and at treatment facilities (landfills, open dumpsites).

In order to identify the Top 10 littered items in coastal areas in Tunisia, a marine litter monitoring campaign was carried out on 5 Tunisian beaches: Djerba, Sfax (Sidi Mansour and Chaffar), Hammamet and Gammarth (Chaabane & Baccar, 2019). Table 12 presents the Top 10 items identified on Tunisian beaches.

Table 12: Top 10 items identified on Tunisian beaches

Ranking	Classification	Covered items
1	Cigarette butts and filters	Not covered by ECO-Lef
2	Plastic bottle caps	Covered by ECO-Lef
3	Plastic fragments 2.5 cm > < 50 cm	Not covered by ECO-Lef
4	Plastic food packaging	Covered by ECO-Lef
5	Plastic bags	Covered by ECO-Lef
6	Plastic fragments 0 cm > < 2,5 cm	Not covered by ECO-Lef
7	Plastic cutlery	Not covered by ECO-Lef
8	Yarns and nets	Not covered by ECO-Lef
9	Plastic bottles	Covered by ECO-Lef
10	Sponges	Not covered by ECO-Lef

Source: Chaabane & Baccar, 2019

Table 12 shows that some recyclable plastics are among the Top 10 uncollected and abandoned plastic materials, but that most of the identified

items are single-use plastics resulting from coastal activities (tourism, visitors, etc.).

Figure 21: Plastic pollution in Tunisian coastal areas and ports



Source: © Chaabane (left), © Ministry of Environment, 2021 (right)

Increased plastic litter generation in the coastal areas is particularly intensified through the interplay of several factors. First of all, the concentration of population is generally higher in coastal areas, which puts even more stress on the waste treatment infrastructure, given that the main waste treatment method in Tunisia is landfilling. However, the landfills often do not meet sanitary standards and tend to release waste into the environment. Four out of thirteen of these facilities have been closed due to public opposition. In addition, various economic activities in coastal areas such as tourism, fishing, trade, and textile industries contribute to additional pollution through increased plastic consumption.

Plastic waste pollution on the Tunisian coast is very much visual, especially in terms of packaging products or non-recyclable products with no market value, as well as products that are difficult to collect. The development of viable and adequate managerial, financial, and technical solutions requires an understanding of the current situation in order to identify the aspects that should be controlled to stop the leakage of plastic waste.

Municipal solid waste generated in Tunisia reached 2.8 million tons in 2020 with an average increase of 2%. In average, waste generated per capita is about 0,65 kg/inh/day, with organic waste dominating with 63% of the total waste. Plastic waste represents 9.4% of the total waste generated in municipal areas (ANGed, 2020) while in tourism areas it ranges from 14% to 20% (Chaabane et al., 2019).

Municipal solid waste collection has an average coverage of 84% across the country (ANGed, 2021), with a higher coverage in urban and coastal areas.

In the absence of a systematic sorting system and adequate infrastructure, plastic waste is either mixed with household waste and buried in controlled landfills, or partially collected by formal and informal collectors, or in the end discarded in nature. The recycling rate is still low and far from its existing potential, despite the existence of the national system for packaging recovery (ECO-Lef).

Conclusion

Tunisia implemented its mandatory EPR scheme in 2001 as a state-led system. Despite initial success, operational performance has soon declined as only some of the “producer” companies were involved without any organisational responsibility. Moreover, important sectors were not integrated into the system, especially the informal sector, which plays an important role in collection and recycling in Tunisia.

Also, marine litter in Tunisian coastal areas still consists to a large extent of packaging material covered by the Tunisian EPR system, including PET bottles and plastic bags, and is continuously increasing. Therefore, no positive impact of the EPR system on marine plastic litter can be deduced from the available data.

It needs to be noted that the EPR system faces general challenges, not only concerning marine litter, but also in terms of collection and recycling rates, as well as financial sustainability of the system's main operations. Thus, the Tunisian

case shows that the EPR instrument in itself is insufficient for fighting marine litter: It needs to be adequately enforced, monitored and sanctioned, considering all relevant stakeholders of the products value chain and assigning clear roles and responsibilities. EPR also needs to be aligned with an also otherwise functional waste management system to ensure adequate disposal and treatment.

Looking at the number of marine plastic litter items commonly found in Tunisia, it should be discussed to expand the EPR's scope to other plastic items, which are not packaging, but can be managed together with the packaging waste stream, such as single-use service ware.

Finally, it is important to highlight the importance of regular marine litter monitoring campaigns to provide information on the effectiveness of mitigation measures and to support the decision-making process.

The case of Tunisia leads to the following learnings

- EPR can only be effective if properly implemented. If this is not the case, it will not have a positive impact on marine litter generation. Thus, an EPR policy needs to be well designed, effectively enforced and constantly developed. In itself, EPR is no guarantor of an effective waste management system
- If context-specific conditions are not properly considered, such as a strong role of the informal sector in Tunisia, this will undermine the success of the EPR system

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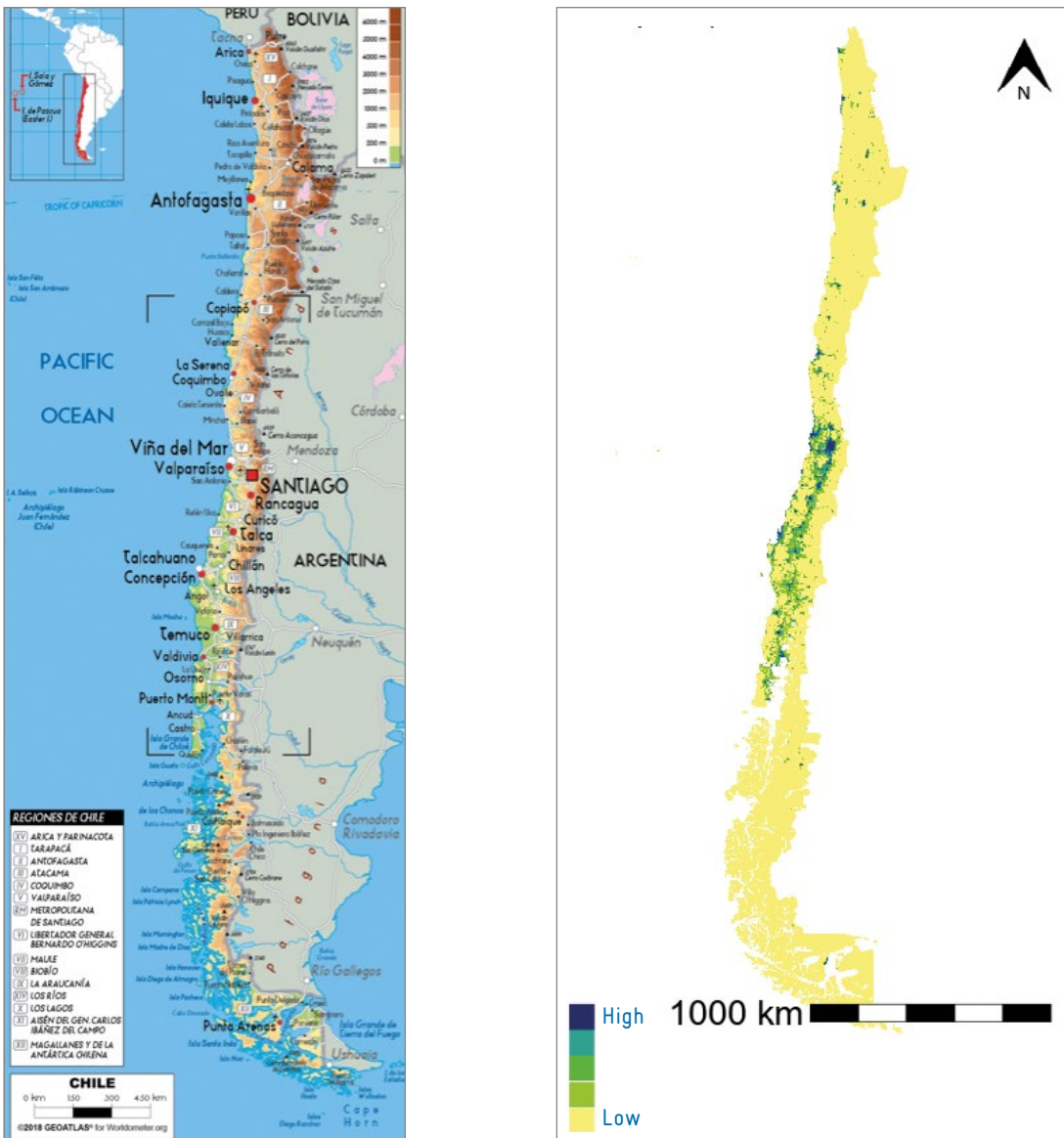
Annex 6: Country analysis Chile

Chile (Figure 22) is a South American country with a population of over 18 million inhabitants, with around 90% of the population living in urban areas, primarily in the metropolitan area of Greater Santiago. Its coastline is over 6,000 km long and the country covers a total area of approximately 756,000 km², with most of the eastern border shared with neighbouring Argentina and smaller borders with Bolivia and Peru to the north (PREVENT Waste Alliance, 2020). Along its coastal borders, the terrain is dominated

by low coastal mountains, fertile central valleys and framed by the Andes to the east. The sparsely populated southern Chile has a large number of islands, while central and northern Chile have a relatively flat coastline with only a few islands.

The country is sub-divided into 16 regions, each with its own regional government. Generally, Chile is both politically and economically (World Bank, 2021) one of the most stable countries in Latin America.

Figure 22: Chile physical map and distribution of population 2020



Source: Worldometers/ Geotlas 2018 and Worldpop/ Bill & Melinda Gates Foundation, 2020

EPR policy

In 2013, a law on waste management was introduced to Congress in Chile and officially published in 2016 as the Waste Management, Extended Producer Responsibility and Recycling Incentives Bill (Ley N°20.920). It establishes the framework for EPR systems for six priority product categories, including packaging. The law makes priority product producers responsible for organising and financing the waste management of priority products they market in the country (PREVENT Waste Alliance, 2020).

On May 2019, the draft packaging decree for EPR law N°20.920 was published. The main aspects of the decree are:

- Five material groups with separate targets: Beverage cartons, metal, paper and carton, plastic and glass.
- Different targets for industrial packaging and packaging for private consumers. Industrial packaging only has targets for metal, paper and carton and plastic.
- Increasing rates over eight years.
- Producers of industrial and commercial packaging have the possibility to take responsibility individually or collectively by participating in the PRO. In the first case, industrial consumers must report their recovered quantities directly to the Ministry's registration system (RETC). In the second case, they can make arrangements with a PRO that takes over their responsibility and acts on their behalf. There is also a third option where producers remain responsible for the recovery while registration and representation are taken over by the PRO.
- Micro-enterprises are exempt from responsibility, they are not even obliged to provide information. There are also exemptions for small producers (less than 300 kg of packaging/year) to meet the targets, but they have to provide information on the amount of packaging placed on the market.
- For household packaging, each district/municipality can only be served by one PRO. If there is more than one PRO, the national territory will be distributed.
- There must be a kerbside collection that has to be expanded from 10 % up to 85 % of the population.
- The PROs have to report annually. The report must be audited by technical entities authorised by the Superintendence of the Environment.
- Integration of the waste pickers as a mandatory task of the PRO.

On average, the announced preliminary targets will allow Chile to increase the recycling rate for household packaging from the current 12.5% to 60% in 2030. The decree sets specific targets for each material by 2030: beverage cartons (60%), metal (55%), paper and cardboard (70%), plastics (45%) and glass (65%). The collection targets are identical to the recovery targets and are to be achieved at the same time (PREVENT Waste Alliance, 2020). Moreover, incentives for the reduction of packaging waste are offered to obliged companies in case those obliged companies can present projects that demonstrate the reduction of waste generation. These obliged companies are subsidised in proportion to the effective reduction in the amount of packaging placed on the market (PREVENT Waste Alliance, 2020).

The mandatory EPR for packaging finally came into force in March 2021 (World Bank, 2022).

In addition to its EPR system, Chile has developed a National Strategy for Managing Marine Litter and Microplastics (2020-2030). The overall objective of this strategy is to articulate national public policy around the management of marine litter and microplastics, provide national guidance on management, and promote coordination and coherence of actions among the different relevant sectors to reduce, recycle and prevent the intrusion of litter into aquatic ecosystems and their impacts.

In addition, this strategy sets out an action plan for the period 2020-2030, which focuses on the following:

- to identify main stakeholders
- to establish and apply voluntary and mandatory environmental management instruments to prevent the generation of marine debris at its source and reduce its impacts
- to encourage research and innovation, to build

capacity and knowledge among stakeholders involved

- › to encourage the participation of the private sector to promote investment, trade and market creation in industries in related activities
- › to promote international cooperation, the exchange of information at a regional and global level.

In addition, the **Plastics Pact Roadmap**, an initiative led by Fundación Chile and the Ministry of Environment, was officially presented in January 2020. It sets out 18 challenges, 35 solutions and 81 concrete initiatives to promote the appropriate use of plastics in industry and reduce their impact on the environment. The pact aims to achieve the four goals by 2025 agreed upon by a group of seven founding companies in April 2019, and to initiate concrete actions to create a circular economy. The Plastics Pact in Chile has set the following four targets for 2025 (Pais Circular, 2020):

- › Act to eliminate problematic single-use plastic containers and utensils through redesign and innovation

- › 100% of plastic containers should be designed to be recyclable, reusable or compostable
- › A third of all plastic containers must be recycled, reused or composted
- › The various types of plastic containers should contain an average of at least 25% recycled material.

In August 2018, Chile published a law banning the issuance of single-use plastic bags in shops throughout the country (Library of the Chilean National Congress / BCN, 2019). In the first six months after the law came into force, a maximum of two plastic bags per purchase could be issued to customers. After six months, large businesses, including supermarkets and retailers, were banned from handing out plastic bags. Later, after two years, by August 2020, the ban on handing out plastic bags also applies to micro, small and medium-sized enterprises, so practically every business in the country will be targeted by this law. This ban also affects biodegradable plastic bags, as there are no official standards for them in Chile (Chaobolsasplasticas, 2020; PREVENT Waste Alliance, 2020).

Marine litter

In Chile, around 8 million tonnes of municipal waste are generated annually, with an upward trend, most of it in the Santiago metropolitan area. In most cases, normal household waste is collected door-to-door in plastic bags, with a collection coverage of almost 100%. For recyclable waste, there are mainly drop-off systems using container locations. Kerbside collection exists in 10 municipalities, of which only 2 have a comprehensive and widespread collection system (PREVENT Waste Alliance, 2020).

In Chile, more than 95% of the generated waste is disposed of at landfills. About 23% of the disposed waste ends up in dumpsites that do not comply with the regulations for sanitary landfills and are therefore a source of littering. In Chile, the payment of municipal household waste disposal is linked to the payment of real estate contributions. Almost 80% of properties are excluded from paying taxes, they also do not pay for the collection and final disposal of waste, which poses

a financing problem for municipalities (OECD, 2016).

Recycling in Chile is currently almost exclusively limited to the informal sector. It is estimated that only 4-10% of the municipal waste is recovered and 8.5% of all plastic waste is recycled. Only 17% of the recycled plastic waste originates from households (Ministerio del Medio Ambiente, 2019).

Although Chile has ambitious plans for reducing and mitigating marine litter, not much data is available, making an accurate assessment of these activities impossible. Table 13 showcases that many items like plastic beverage bottles, plastic bottle caps, food wrappers, plastic lids, plastic grocery bags, straws, stirrers and plastic bags decrease between 2017 and 2020. However, some others have increased slightly, such as plastic takeaway containers, plastic cups, plates and cigarette butts.

The ban on SUP bags since 2018 could be the reason behind the decrease of the identified plastic grocery bags and other plastic bags from 2017 to 2020. This impact could become even

stronger from 2020, since the ban has been expanded to cover micro, small and medium-sized companies, effectively covering every business in the country.

Table 13: Top 10 items collected during Ocean Clean-up Campaigns

Item	Percentage of items (2017)	Percentage of items (2020)
Plastic beverage bottles	9.1	2.6
Plastic bottle caps	7.7	4.2
Food wrappers	9.0	7.1
Plastic lids	4.9	2.3
Plastic grocery bags	5.1	1.7
Straws, stirrers	2.2	1.5
Plastic take away containers	1.9	2.3
Plastic cups, plates	Not among top 10	1.1
Other plastic bags	4.2	1.5
Glass beverage bottles	6.4	Not among top 10
Cigarette butts	32.1	33.0
Others	17.4	42.7

Source: The Ocean Conservancy, 2017 & 2020

Despite the challenges, some feedback on the 2020 National Beach Clean-up Programme to reduce marine litter in Chilean coastal areas has been published in Towards Osaka Blue Ocean

Vision, 2021, and shows a positive improvement in beach and lake cleanliness over the last two years as one of the outcomes of the programme (Towards Osaka Blue Ocean Vision, 2021).

Conclusion

In Chile, the problem of plastic litter in the sea is being addressed through various approaches, including an EPR system for packaging. However, there is no data to confirm that the litter situation on Chile's coasts has already been affected by the introduction of the EPR system. In fact, the system only launched in March 2021 and requires a few more years to ensure a change in terms of sorting recyclables at source, collection and recycling, and ensuring clean coastal areas.

Chile's EPR law therefore focuses on collection, sorting at source and recycling targets. It also focuses on the role of municipalities to be included in the relevant municipal regulation to improve waste sorting at source and develop recycling at the local level.

Today, it is worth highlighting some improvements in terms of the development of plastic management infrastructure in the country, especially through the construction of facilities to collect separated waste from the municipality and for the environmentally friendly management of plastic waste (RE Chile Recicla/ Ministerio del Medio Ambiente, 2021). Currently, the EPR law does not include clean-up costs in the contributions to be paid by producers or specific targets for clean-ups.

In addition, the EPR law emphasises the importance of formalising the activity of waste pickers, which could have a strong impact on the collection of recyclables and thus on reducing marine litter on Chile's beaches and coastal areas.

The case of Chile highlights the following

- ➔ The EPR system in Chile is in its infancy stage – the impact on marine litter prevention is not yet measurable
- ➔ Informal sector integration is recognised as a crucial element both for the EPR system as well as for the impacts on marine litter generation
- ➔ With initially low targets, EPR is applied as a financial mechanism to reduce the burden on municipalities and operationalising the polluter pays principle. Since these mechanisms focus on waste management and not avoidance of waste, direct noticeable effects on marine littering are not to be expected in the initial phase

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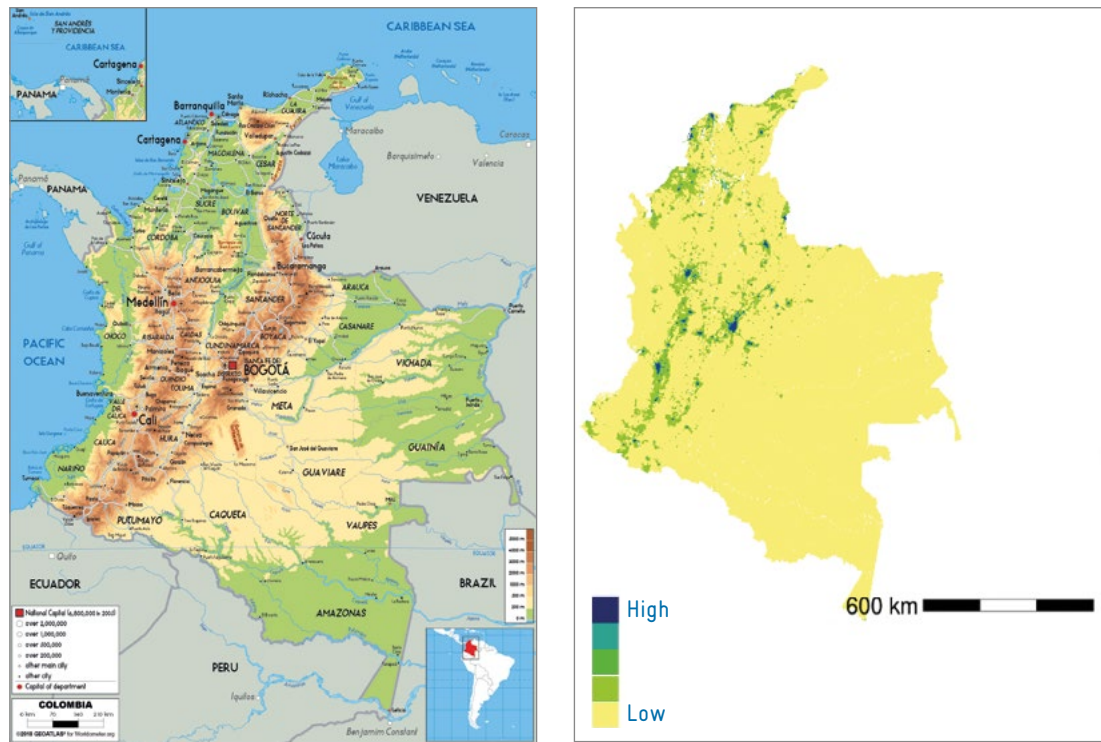
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Annex 7: Country analysis Colombia

Colombia (Figure 23) is positioned between the land bridge connecting the South and to the North American continent and offers wide access to both the Caribbean Sea and the Pacific Ocean. To the north, it has a narrow border with Panama; other neighbouring countries are Venezuela, Brazil, Peru and Ecuador. Colombia has a number of islands. Located almost 800 km from the Colombian mainland coast, the archipelago of San Andrés, Providencia and Santa Catalina in North America consists of three inhabited islands and a number of uninhabited ones. Colombia is characterised by a great diversity of landforms and a varied geography. The coastal lowlands to

the north and east are separated by the Amazon lowlands to the south and west by the Andean arc. A number of rivers flow inland into both seas, while the eastern side of the Andean Arc is part of the Amazon and the Orinoco. The population is mainly concentrated in the Andean highlands, especially around Bogotá, Medellín and Cali, as well as in a number of other cities. The Pacific coast has a low population density. Apart from a few larger cities such as Cartagena and Barranquilla, this is generally also the case on the Caribbean coast. The Amazon lowlands, which account for about half of the country's area, are very sparsely populated.

Figure 23: Colombia physical map and distribution and density of population 2020



Source: Worldometers/ Geoatlas 2018 and Worldpop/ Bill & Melinda Gates Foundation, 2020

EPR policy

As part of Colombia's efforts to join the OECD, Resolution 720 was passed in April 2016. As foreseen in this resolution, the total amount of waste generated is to be reduced and at the same time the recycling of the remaining waste is to be increased. To this end, private waste management service providers in cities with more than 5,000 inhabitants are to be obliged to give consumers monetary incentives to avoid and separate waste. In addition, competition is to be strengthened in order to achieve more investment in modern waste technologies (AHK Colombia, 2017).

The National Policy for Integrated Solid Waste Management (CONPES 3874/2016) calls for a transition from linear to circular economic practices. One of the strategies to support this objective is the internalisation of environmental and sanitary costs from waste management, particularly in relation to the adjustment of EPR for packaging. Previously in Colombia, certain waste streams, that due to their specific characteristics require a separate infrastructure for treatment, have been addressed through a series of measures that include EPR elements. This is the case, for example, for medical waste or e-waste. Following the strategic pillars outlined in CONPES, Resolution 1407/2018 describes the detailed requirements for the establishment of an EPR system for packaging (Ministry of Environment, 2018).

A first amendment, resulting from the need to further describe a number of aspects required for effective operationalisation, was added through Resolution 1342/2020 (Ministry of Environment, 2020).

The EPR system established by Resolution 1407/2018 introduces EPR for packaging made of paper, cardboard, plastic, glass and metal. Packaging made of wood or textiles is not included. Resolution 1342/2020 added the inclusion of composite materials. The EPR system obliges the company placing packaged goods on the market to collect and process the waste generated. Thus, local producers and importers are equally obliged. The main responsibility is assigned to these producers, while

other actors such as packaging producers, waste management companies, citizens, municipalities and end users/citizens are also assigned a number of responsibilities. This applies, for example, to mandatory source separation and other support for producers to achieve the goals of the EPR scheme (Ministry of Environment, 2018).

The main responsibilities for producers are the introduction of separate collection and the obligation to achieve certain waste treatment targets for waste fractions subject to EPR (see above). Currently, the target is focused on all recovery mechanisms, including reuse, recycling, energy recovery and co-processing. Other tasks such as regular reporting, awareness raising, etc. are also included. Continuously increasing target rates are defined over the period up to 2030. The first year's quota of 10% of treated waste subject to EPR increases to 30% in 2030, and if the quota is exceeded in one year, it is counted towards the quota of the following year. This mechanism will also be applied to the interim EPR systems, provided they have carried out activities within 2020. Additional targets for geographic coverage of collection services will be set, with mandatory coverage of certain areas added over time. From 2022, system coverage must include the archipelago of San Andrés, Providencia and Santa Catalina as the area furthest from the Colombian mainland. Six more areas – all outside Colombia's main metropolitan areas and some of them also close to the marine environment – will be added progressively each year until 2028.

According to studies carried out in the course of OECD accession, in particular a 2015 report, the categories of paper, cardboard, glass, plastic and metal, which are mainly used for packaging, account for around 30 % of residual waste. Due to their lack of biodegradability and detrimental impact on landfill operations, alternative management approaches were sought, leading to the introduction of EPR for packaging (Acoplásticos, 2021).

Marine litter

In Colombia, roughly 40% to 60% of the recycled solid waste is collected by informal recyclers. Solid Waste management utility companies did not used to be recycling sites, they only separated the recyclable materials and offered them to recyclers, and in a few cases, they also operated recycling plants. Low income and lack of social protection are some of the issues affecting recyclers.

During waste clean-ups in Colombia in 2020, a large number of packaging was identified as one of the most common types of plastic waste (Table 14). The vast majority of the identified items can be attributed to packaging and thus fall within the scope of the future EPR system. This is in contrast to other areas with operational EPR systems, where non-packaging often accounts for a higher proportion of the marine litter identified.

Table 14: Top 10 items plastic items collected during clean-up campaign 2020

Item	Assumed primary category	Percentage retrieved during clean-up
Plastic beverage bottles	Packaging	10.1%
Plastic bottle caps	Packaging	7.7%
Food wrappers	Packaging	6.6%
Plastic grocery bags	Non-packaging	5.4%
Plastic lids	Packaging	4.4%
Other plastic bags	Non-packaging	3.6%
Straws, stirrers	Non-packaging	3.3%
Plastic take-out containers	Packaging	3.3%
Plastic cups, plates	Non-packaging	2.7%
Cigarette butts	Non-packaging	2.3%
Others	Mixed	50.6%
Total		100.0%

Source: Ocean Conservancy, 2020

Conclusion

In general, the EPR system established in Colombia is still in the early stages of implementation, so only a preliminary assessment is possible for now. Certain aspects of how regulatory compliance can be achieved certainly require innovative approaches, notably the calculation bases that take into account the coverage of specific areas, including those particularly affected by marine litter. Given the difficult situation in terms of geographical coverage, the applied schemes that allow for a gradual expansion could also yield results, while reflecting the limited coverage so far. Whether the

monitoring mechanisms and overall complexity of the system will allow for effective enforcement remains to be seen.

Based on the first months of operations in 2021, a wide range of criticisms have been raised about the EPR system, particularly related to several aspects of its overall set up, such as the monitoring.

The EPR system has so far focused on a small amount of waste being collected and recovered. The initial quota for 2021 is set at 10% of the

quantities placed on the market. Up until now, these quantities can be obtained mainly from production processes. So far, the EPR system has not specifically targeted post-consumer waste streams, which need to be targeted to tackle the problem of litter and insufficient collection rates. It is debatable whether this is due to a dysfunctional system design, including inadequate monitoring and enforcement mechanisms, or related to the original low targets.

Nevertheless, the system is designed to gradually cover a larger percentage of waste streams and to expand geographical coverage – with particular attention to areas vulnerable to marine litter pollution. Therefore, initial weaknesses in the

system can be effectively mitigated over time – which is also envisaged by the gradual increase in ambition. Another discussion may revolve around whether the targets reflect a sufficient level of ambition. 30% of material being placed on the market by 2030 – with some deductions due to the mechanisms outlined – is a figure that is too low compared to global experience in the long run.

Nevertheless, due to the lean setup of the system, simple definitions may better serve the main goal of managing a higher fraction of waste than a more complex system setup that can hardly be monitored.

The case of Colombia highlights the following

- The EPR system in Colombia is still at an early stage – the impact on marine litter is not yet measurable
- Even in lean EPR policy setups – like in Colombia – specific regulations that address the need to reduce marine litter can be integrated into the EPR system
- Where EPR systems do not specifically target post-consumer waste streams, their targeting is needed to address the problem of littering and insufficient collection rates

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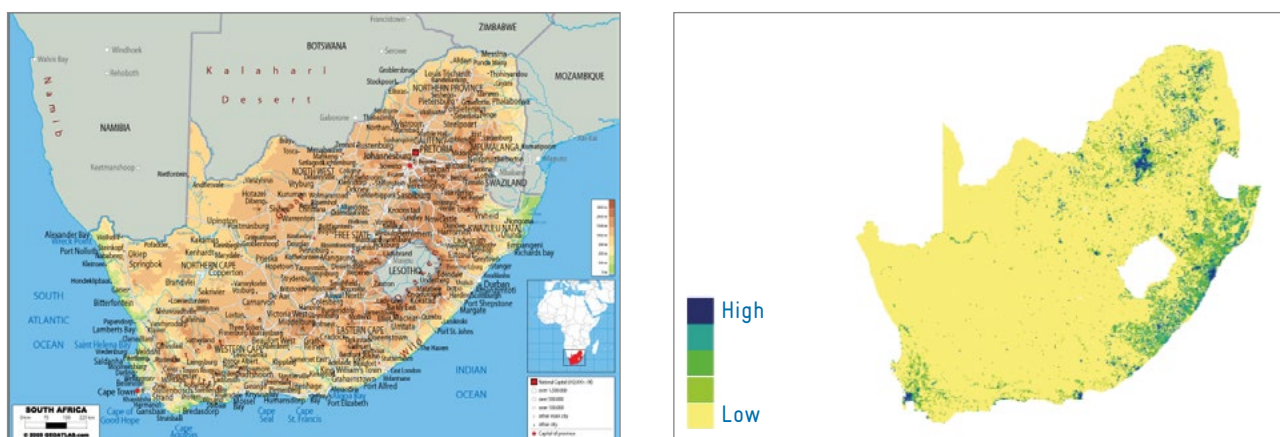
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Annex 8: Country analysis South Africa

South Africa (Figure 24) is located at the southernmost tip of Africa with a 3,000 km coastline stretching from the desert border with Namibia on the Atlantic coast south around the tip of Africa and then north to the border of subtropical Mozambique along the Indian Ocean. The country covers an area of 1,221,000 km² (Nations Online, 2021) and has a population of 57.7

million in 2019 (World Economic Forum, 2019), which is heavily concentrated in urban centres along the south and south-east coasts and around Johannesburg (see Figure 24). The strong population growth combined with an increasing rate of urbanisation (World Economic Forum, 2019) has led to a sharp increase in waste generation rates.

Figure 24: South Africa physical map and distribution of population 2020



Source: Worldometers/ Geoatlas 2018 and Worldpop/ Bill & Melinda Gates Foundation, 2020

EPR policy

South Africa moved recently from a voluntary to a compulsory EPR scheme in November 2021. The Waste Act 2008 (Act no. 59 of 2008) as the overarching waste management law provides the basic legal framework. It emphasises the prevention and minimisation of waste generation through reduction, reuse, recycling and recovery of waste, treatment and safe disposal of waste as a last resort, and prevention of environmental pollution and degradation. To achieve these goals, the latest National Waste Management Strategy (NWMS) from 2021 onwards focuses on waste prevention and reducing landfill by strengthening the CE concept. The circular economy concept also aims to promote sustainable, inclusive economic growth and development of the waste sector while reducing social and environmental impacts. The strategy implementation plan was developed to create employment opportunities in the waste

sector and raise awareness of waste management practices (PREVENT Waste Alliance, 2021).

In 2017, stakeholders from the public and private sectors, civil society and academia worked together with the Department of Environmental Affairs and the Department of Planning, Monitoring and Evaluation to draw up a number of targets and initiatives for waste management. Later the same year, first plans to introduce a mandatory EPR system were published. The so-called 'Section 28 Notice', which set out plans for an EPR system funded by a tax collected from producers and managed by the government, was withdrawn in December 2019 (PREVENT Waste Alliance, 2021).

It was replaced by the Section 18 Notice – Extended Producer Responsibility Scheme. This

new Notice provides for a more co-operative relationship between industry and government. It requires, however, full EPR implementation for the sectors paper and packaging and some single use products, electrical and electronic equipment and lighting by 05 November 2021.

Long before EPR was implemented as a mandatory concept, a lot of voluntary structures have already been set up by industry initiatives. Multiple voluntary EPR schemes, managed through voluntary PROs, for different packaging waste streams have emerged since the early 2000s, leading to an increase in separate collection and recycling rates for the materials covered. Hence, EPR in South Africa needs to be considered in the context of the EPR schemes that are developed by the respective PROs on behalf of their producer members (PREVENT Waste Alliance, 2021).

Prior to the adaptation of the mandatory EPR Regulation, these PROs operated voluntarily based on contribution payments from their members. After changing to a mandatory system, these PROs collect mandatory EPR fees from their members. The

PROs use the revenue they generate, among other regulatory requirements, to support the collection, sorting and recycling of recyclables towards set targets that apply for a period of five years from the date of implementation of the EPR system (PREVENT Waste Alliance, 2021).

Until recently, the South African EPR scheme covered PET, polyolefins (PP, HDPE, LDPE and LLDPE), polystyrene, vinyl, glass, paper and metals. Since the implementation of the mandatory EPR, the following packaging and plastic items are subject to the legislation:

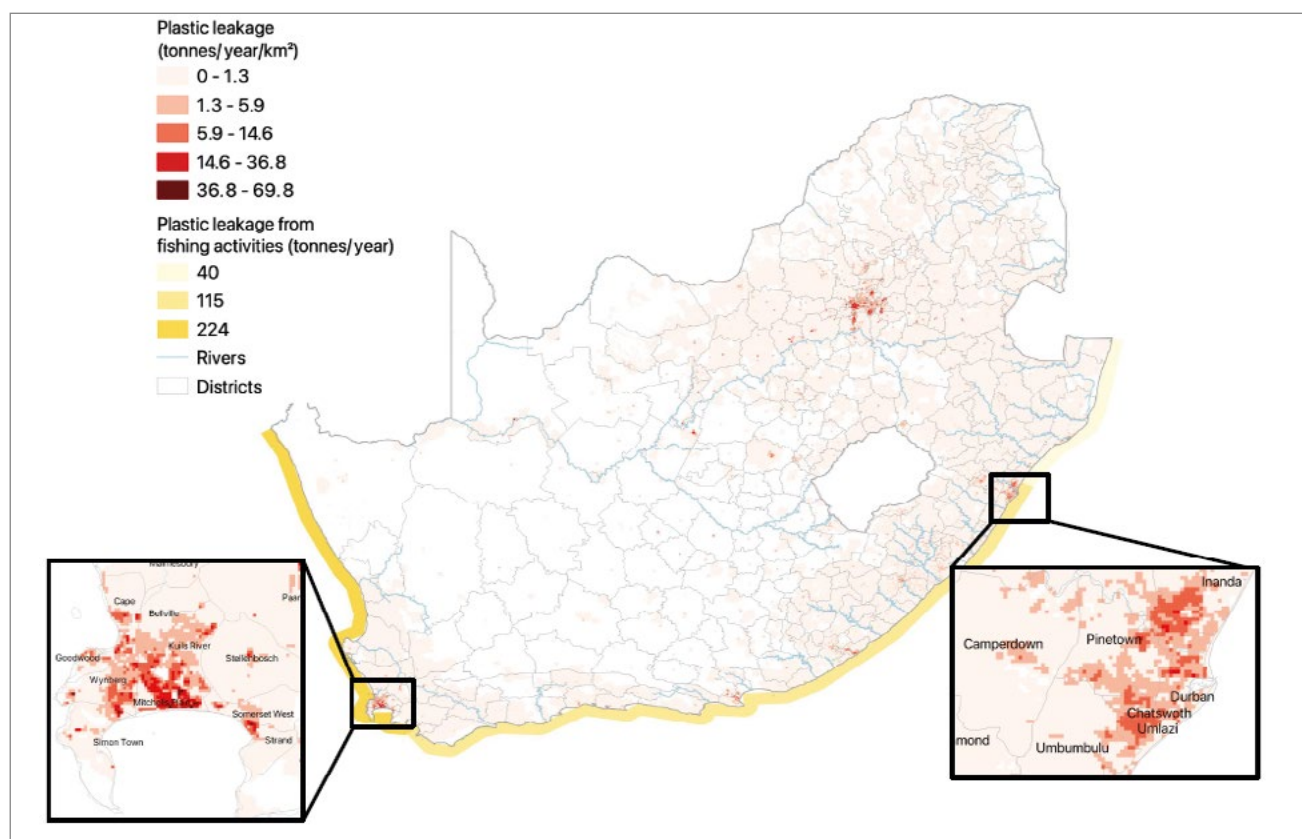
- › Paper & paper packaging material including office paper
- › Plastic packaging
- › Biodegradable and compostable packaging
- › Single-use products
- › Single-use compostable products
- › Single-use biodegradable products
- › Glass packaging
- › Metal packaging containers; but excludes
- › Plastic carrier bags and plastic flat bags

Marine litter

The total generation of household waste in South Africa is estimated at 12.7 million tonnes per year, and about 3.67 million tonnes (representing about 29 %) of this waste is not collected and disposed of through formal waste collection systems, resulting in large amounts being illegally dumped (Rodseth et al., 2020). The generation of plastic

waste is concentrated in the urban centres of Pretoria, Johannesburg, Durban and Cape Town, where population densities are higher. As these areas generate more plastic waste, they are also the main sources of plastic entering the environment and oceans (see Figure 25).

Figure 25: Map of plastic waste generation in South Africa



Source: IUCN/ UNEP/Life cycle initiative, 2021

According to the IUCN / UNEP guideline, the packaging sector contributes to almost 60% of the total plastic leakage in South Africa with 63,000 tons of packaging waste leaking into oceans and waterways each year. The recycled plastic products made in South Africa can be estimated at around 16%. The rest of the plastic ends up at landfills or in the environment (WWF, 2018). The same report indicates that much of the plastic waste is reaching the sea due to littering, inadequate waste management and overflowing landfills. Another recent report indicates that 107,000 tonnes of plastic leak to the ocean and main rivers, every year. This leakage corresponds to 5% the quantity of plastic waste generated in the country per year (IUCN/UNEP/Life cycle initiative, 2021).

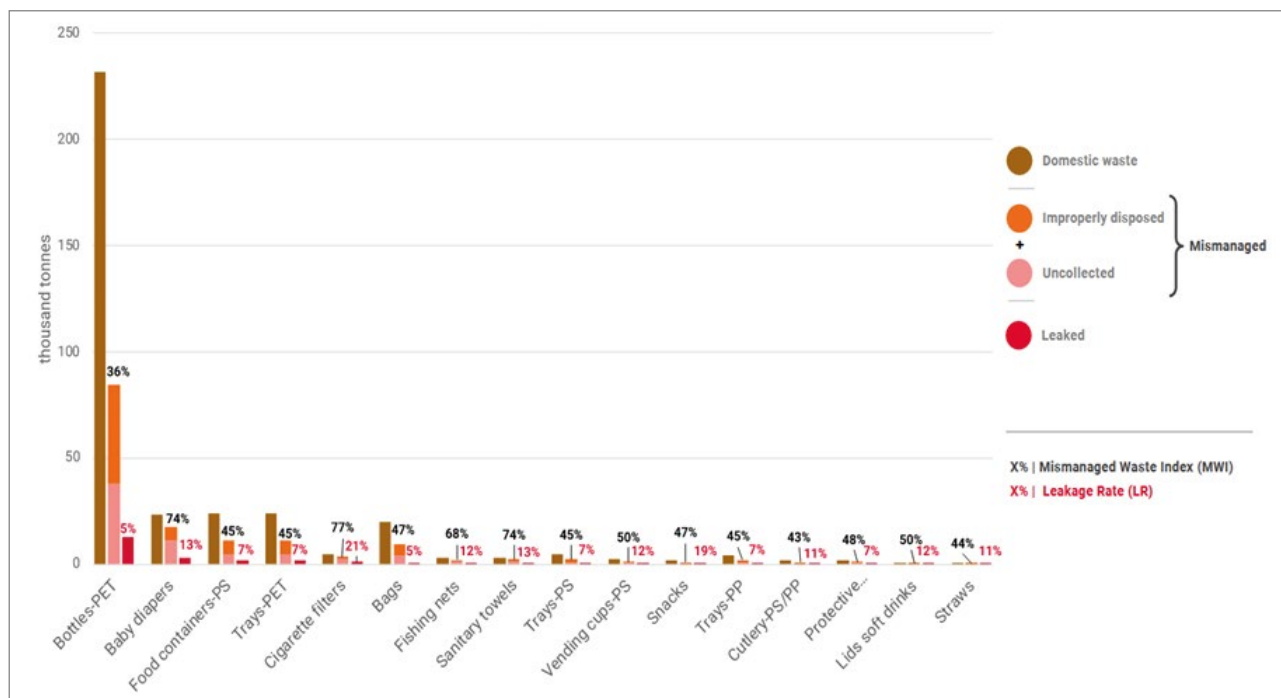
Nevertheless, waste sorting and recycling rates for various packaging and recyclable and valuable types of waste have been increasing, enabled to a significant extent by workers from the informal sector. In total, the number of people working in the informal waste sector is estimated at 60,000. Their efforts collecting waste and keeping it out

of landfill is estimated to save municipalities 700 million RAD (approx. 46 USD) a year (PREVENT Waste Alliance, 2021).

Recently, as a result of a marine litter monitoring campaign, a national guide for plastic litter hotspots and intervention was published by IUCN and UNEP, which includes a list of the top 16 items found in South African coastal areas (see Figure 26) (IUCN/UNEP, 2021). According to this list, PET bottles are (based on weight) – by far the most common litter items found across South Africa (not limited to the coastal areas). It is worth noting that PET (bottles and trays) is subject to high levels of leakage, despite their high market value. The rest of the identified top 10 items have a relatively low market value and are primarily related to tourism, commerce and fishing.

In terms of littered items found in coastal areas, Table 15 showcases that cigarette butts represent the main item identified in South Africa's coastal zones and beaches, both in 2017 and 2020. This is followed by food wrappers and plastic bottle caps.

Figure 26: Mismanaged waste and leakage by application



Source: IUCN/UNEP/Life cycle initiative, 2021

The table also shows the decrease of identified plastic beverage bottles, but an increase in straws and stirrers and single use plastic items. Thus, the data seems to be in contradiction to the data of IUCN/UNEP (2021). It should be noted, however, that

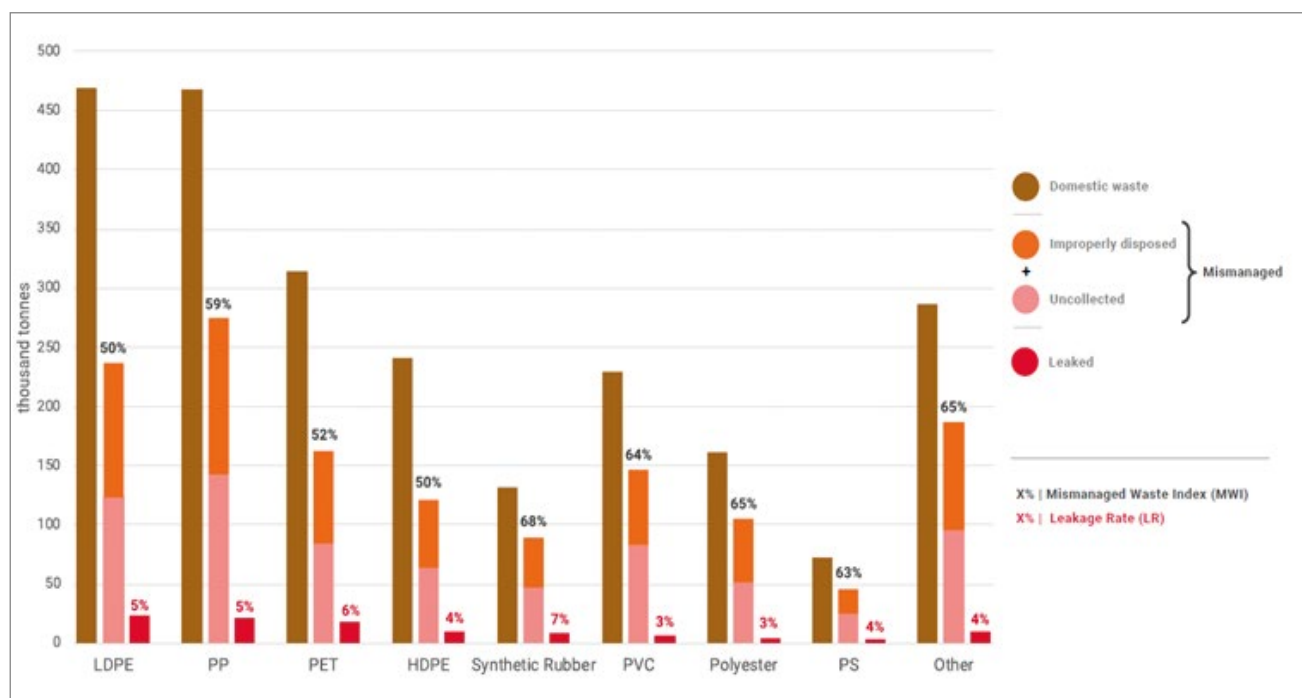
the data presented in Table 15 is based on the number of items and does not take weight into account, which makes comparison with the IUCN/UNEP (2021) data difficult and again highlights the need for more and better data overall.

Table 15: Top 10 items collected in South Africa during Ocean Clean-up Campaigns

Item	Percentage of items (2017)	Percentage of items (2020)
Plastic beverage bottles	5.0	3.3
Plastic bottle caps	7.0	7.2
Food wrappers	7.5	8.2
Plastic lids	1.0	1.3
Plastic grocery bags	1.7	2.7
Straws, stirrers	3.0	7.5
Plastic take away containers	1.0	1.0
Plastic cups, plates	Not among top 10	0.2
Other plastic bags	2.9	0.6
Glass beverage bottles	2.3	Not among top 10
Cigarette butts	8.3	9.2

Source: The Ocean Conservancy, 2017 & 2020

Figure 27: Mismanaged waste according to polymer type



Source: IUCN/UNEP/Life cycle initiative, 2021

Complementary, Figure 27 analyses the plastic litter composition in terms of its polymers. While PP, LDPE and PET are generally the polymers most found within waste, they have – together with HDPE – the lowest rates of mismanagement in comparison. Nevertheless, all mismanaged rates are 50% or higher, which emphasises the insufficiency of the existing waste management system.

According to the IUCN / UNEP guideline, the packaging sector contributes to almost 60% of the total plastic leakage with 63 kt of packaging waste leaking into oceans and waterways. Much of the plastic waste is reaching the sea due to littering, inadequate waste management and overflowing landfills.

Conclusion

South Africa has recently moved from a voluntary EPR approach to a mandatory system, which came into force in November 2021. Although the mandatory system has only been in place for a few months, there is already extensive experience with EPR, as many voluntary PROs have been in place for several years. It should be noted that the PROs were not in direct competition with each other as they each had a specific material focus.

Despite this long experience, much of the plastic packaging subject to EPR and also previously managed on a voluntary basis is found in marine litter, and overall plastic pollution in urban areas is quite high.

This indicates that voluntary EPR initiatives are limited regarding their finances and the services, which they can provide, compared to mandatory schemes. It still needs to be determined in the future how the mandatory EPR will impact marine plastic litter generation. So far, no effects can be evaluated.

The case of South Africa leads to the following learnings

- Evaluating the South African EPR system's effect on marine litter is too early, given its recent introduction
- While voluntary structures do have their value and can have an impact, they have not been sufficient to positively impact marine litter generation

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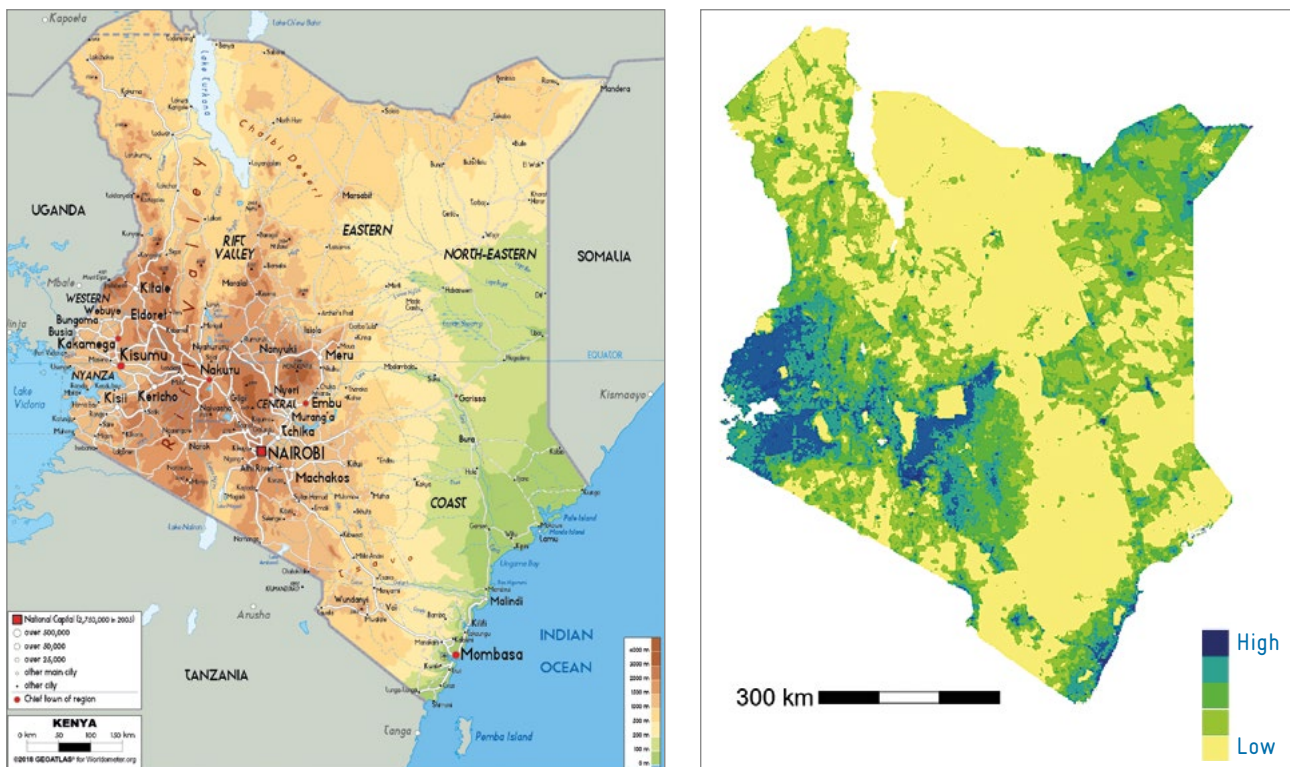
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Annex 9: Country analysis Kenya

Kenya (Figure 28) is an African country stretching from the shores of Lake Victoria in the west to the Indian Ocean in the east. Neighbouring countries are Uganda, South Sudan, Ethiopia, Somalia and Tanzania, which border the Indian Ocean coast to the north and south respectively. Kenya's terrestrial territory is 580,000 km², with a population of slightly less than 50 million in 2022 (based on the latest census projection, KNBS 2019a). Both land mass and population are heavily concentrated in the central and western parts of the country. Only about one-tenth of the total population lives near the coastline, which is just over 1,400 km long. The vast majority of this coastal population lives in the immediate surroundings of Kenya's second largest city, Mombasa.

Kenya is also characterized by the absence of bigger riverine systems that could transport land based marine litter over larger distances. All rivers that flow into the Indian Ocean originate in Kenya. The largest river - Tana - is regulated upstream by a series of dams that retain most marine litter. Both the Tana and the Galana - the second largest river - flow mostly through sparsely populated and economically insignificant areas, partly in nature reserves. The sources of marine litter must therefore be sought mainly from the direct coastal population.

Figure 28: Kenya physical map and distribution of population 2020



Source: Worldometers/ Geoatlas 2018 and Worldpop/ Bill & Melinda Gates Foundation, 2020

EPR policy

Kenya's path to the establishment of an EPR scheme for different post-consumer products began more than a decade ago. The first attempt was made in 2011, followed by other initiatives covering broader waste streams. None of these proposals, however, ever passed into law. The most recent attempt to address Kenya's waste management crisis through the introduction of EPR began in 2020, under which the draft **Environmental Management and Co-ordination (Extended Producer Responsibility) Regulations** was developed in 2021. Despite the iterative development, there are still some important legal steps to be fulfilled before the draft regulations can be considered as law. The draft regulations aim to introduce mandatory EPR systems for a wide range of products and packaging materials in order to, among other things, reduce environmental pollution and degradation, promote the sustainable use of natural resources, support a circular economy and promote environmentally friendly product design and packaging and cleaner production processes (UNIDO, 2021; Opondo, 2020a).

In light of increased attention on the development of a governance framework for EPR, there have been some initiatives among producers, particularly those that use plastic packaging, to establish voluntary EPR schemes in Kenya. Thus far, **two voluntary PROs have been set up, mainly focusing on PET and flexible plastic packaging.** This section discusses the development and current status of these two EPR initiatives.

Following the **ban on plastic carrier bags and flat bags** in 2017, it became clear that the Kenyan government would take further steps to ban other plastic items in the future. This prompted the plastics industry to start thinking about possible industry solutions to the problem. To avert an imminent ban in the country, PET bottle manufacturers approached the government and proposed to develop a strategy for collecting PET bottles in the environment. In 2018, Kenyan PET bottle manufacturers incorporated the Kenya PET Recycling Company (PETCO Kenya) as a voluntary organization to support its members to collectively self-regulate management and recycling of post-consumer PET bottles in the Kenyan environment in the spirit of EPR. PETCO is Kenya's

first voluntary PRO and was modelled after South Africa's PETCO, which was launched in 2004 by the South African bottling industry as a voluntary PRO. PETCO works through contracted recyclers and subsidises the collection of PET bottles dropped off at recyclers. In the absence of a formal collection system, PETCO uses the informal sector to prevent PET bottles from being dumped in the environment.

The other notable EPR initiative is led by the **Kenya Extended Producer Responsibility Organization (KEPRO)**, which was established in January 2021. KEPRO aims to accelerate the growth of Kenya's recycling ecosystem towards a circular economy by introducing an EPR model embedded in Kenya's environmental laws and legal framework. KEPRO was launched without a specific focus and targets a broader range of packaging and product streams. Originally launched in response to the Kenyan government's push for better management of plastic waste, this initiative was taken forward from 2019 and is aligned with the Kenya Plastic Action Plan (KPAP) as a roadmap for the introduction of a PRO for a wide range of waste categories (KAM, 2019). KEPRO's EPR model emerged from extensive discussions with stakeholders and global and local research. KEPRO's aim is to collectively manage the waste of all its members who comply with the EPR regulations. KEPRO has so far contracted two recyclers to recycle flexible plastic waste, with a focus on processing bread bags into granules.

Marine litter

It should be noted that comprehensive **up-to-date and reliable data and information on marine litter is still lacking in Kenya**. Most studies conducted in Kenya have focused on a limited geographic area. Particularly, all studies undertaken nationwide are only based on secondary analyses of existing datasets with limited to no representative waste sampling, particularly from marine sources. Assessing the real status of Kenya's marine litter situation can only limitedly be undertaken given the current availability of data (Opondo, 2020b).

Sustainable waste management remains a challenge in Kenya. As this task has been assigned to the 47 local county governments, there is a **large lack of capacity and adequate systems for waste collection, transport, recycling and disposal**. According to the 2019 census (KNBS, 2019b), only 1.5% and 54.6% of solid waste generated is collected at household level in rural and urban

areas respectively, despite the fact that a clear majority of Kenyans live in rural areas.

The 2019 census categorizes waste disposal practices in terms of waste collected (by County government, by community associations or private sector), dumped onsite (i.e., within the own compound or through the latrine), littered (disposed of in the environment), incinerated (i.e., openly burnt at home or in close vicinity) and composted (i.e., home composting). Table 16 shows the main types of solid waste disposal at household level for the whole of Kenya, for the capital Nairobi, the coastal city of Mombasa, and the adjacent coastal counties of Kwale, Kilifi, Tana River and Lamu, which together cover the entire Kenyan coastline. As initially stated, the majority of the coastal population is located within the metropolitan area of Mombasa, spread throughout Mombasa County itself as well as Kwale and Kilifi Counties.

Table 16: Main mode of solid waste disposal at household level in percentage

	No. of households	Collected	Dumped on site	Littered	Open burning	Composted
Nairobi (capital area – not at coast)	1,494,676	80.8%	2.6%	7.8%	6.5%	2.0%
Mombasa	376,295	61.8%	6.5%	5.2%	21%	4.9%
Kwale	172,802	7.5%	28.0%	2.2%	49.9%	12.4%
Kilifi	297,990	12.9%	18.9%	1.9%	54.2%	12.0%
Tana River	66,984	1.8%	24.9%	2.7%	63.0%	7.5%
Lamu	34,231	7.1%	23.8%	6.4%	52.9%	9.7%
Total Kenya	12,043,016	22.0%	15.3%	2.4%	42.0%	18.4%

Source: KNBS, 2019a/ 2019b

Other studies for Mombasa show that about 52% of the waste volume is collected for disposal in the municipal landfills, while the rest is burned, buried or dumped into the environment (Palfreman and Clark, 2015). Due to Mombasa's location directly at the coast, it can be assumed that a significant part of the waste ends up in the marine environment.

IUCN (2020) reports that 92% of all plastic waste can be considered as mismanaged, through open

burning or burial, improper disposal practices or direct littering. The mismanaged waste fractions can become problematic if released into the environment. It is estimated that 7% of the total plastic waste leaks into lakes, rivers or the sea. These findings reflect the 2019 census figures (KNBS, 2019a/ 2019b) which show that only 22% of Kenyans dispose of their solid waste through waste collection. Accordingly, the amount of plastic waste leaked into the environment (waterways and sea) due to poor waste management can be

estimated at between 35,000 and 63,000 tonnes per year.

Plastic waste pollution on the Kenyan coast is very much visual, especially when it comes to complex packaging products or non-recyclable products with no market value, as well as products that are difficult to collect. Developing viable and appropriate management, financial and technical solutions require an understanding of the current situation to identify the aspects that should be controlled to stop plastic waste leakage.

So far, the legal framework for EPR in Kenya – most prominently through the draft EPR regulations – is emerging without having formally passed the required governmental approvals to come into force. Therefore, legal provisions concerning EPR only exist in theory. It is unclear when and in what exact form the draft EPR regulations or other EPR related legislation will come into force. On the other hand, private initiatives anticipating the dynamics of a forthcoming binding framework have initiated activities. In anticipation of the upcoming legislation and therefore currently on a voluntary basis, two PROs - KEPRO

and PETCO - have each individually started operationalising EPR systems. This allows companies to put EPR schemes in place, with their activities going beyond the currently non-binding legislative framework.

As there is currently no mandatory EPR system, analyses on the effectiveness of EPR can only take into account the results of the voluntary initiatives to measure whether they are suitable to address the presence of marine litter. PETCO was set up in 2018 and has exclusively focused on managing PET drinking bottles. This category is well represented in the international Coastal Clean Up Reports published annually by Ocean Conservancy. To assess any potential impact of PETCO's activities, two sets of data were compared: one from 2017, before PETCO was officially established, and the current one from 2020.

Below Table 17 showcases that the portion of PET bottles retrieved during ocean clean-up campaigns has not reduced from 2017 to 2020; on the contrary, the number of both categories (plastic bottles and plastic bottle caps) that can be attributed to PET bottles has increased.

Table 17: Top 10 items collected during Ocean Clean-up Campaigns

Item	Percentage collected 2017	Number collected 2020	Percentage collected 2020
Plastic beverage bottles	10.2%	34,061	13.3%
Plastic bottle caps	6.2%	26,987	10.5%
Food wrappers	5.1%	18,359	7.1%
Plastic lids	0.8%	11,033	4.3%
Plastic grocery bags	7.2%	9,522	3.7%
Straws, stirrers	8.2%	8,168	3.2%
Plastic take away containers	0.5%	7,814	3.0%
Plastic cups, plates		6,213	2.4%
Other plastic bags	2.8%	4,396	1.7%
Cigarette butts	8.7%	3,816	1.4%
Other	50.1%	126,424	49.2%
Total	100.0%	256,793	100.0%

Source: The Ocean Conservancy, 2017 & 2020

Conclusion

The unsustainable production, use and disposal of plastic products and packaging waste is a major challenge for waste management in Kenya. To curb the ever-increasing input of plastics into the environment, the Kenyan government has adopted various policy approaches over the years. As of 2019, the Kenyan government has taken additional and bolder steps to move from a linear to a CE approach. The latest approach is to introduce a mandatory EPR scheme covering various products and packaging, with a particular focus on items made of plastic.

The draft EPR regulation aims to create a system that legally obliges manufacturers to take responsibility for managing the post-consumer stage of their products' life cycle. Given the limited application to date, it is not yet possible to comment on the effectiveness of Kenya's future EPR system in addressing marine litter. The Kenyan government has repeatedly shown that it is willing to target specific (plastic) items that are considered to contribute to littering. Private sector EPR initi-

atives have responded to these efforts by targeting specific items, in the case of PETCO, PET bottles, in the case of KEPRO, flexible packaging (mainly from bread wrappers).

The currently available data has not yet shown any measurable impact on the reduction of PET bottles in marine litter. However, against the backdrop of the inadequacies of Kenya's waste management system as a whole, EPR is still at an early stage. Expecting measurable success beyond the quantities additionally fed into the recycling pathways by the two PROs may be premature at this point of time.

Due to their nascent character, the current EPR initiatives have not yet reached a critical scale: Due to the limited membership base, the lack of a legal foundation and the small scope of covered materials (PET bottles on the one, bread bags on the other hand), no actual impact on marine litter in Kenya has been detected so far.

The case of Kenya highlights the following

- Even the planned introduction of a mandatory EPR policy may lead to private sector action, including the establishment of PROs, which will allow for a smoother transition from voluntary to mandatory EPR
- Also in Kenya, EPR is considered as one instrument in a multi-faceted approach for a better plastic waste management
- At the same time, limitations in private sector engagement also become apparent. So far, appropriate management of items falling within the scope has not led to a noticeable reduction in marine pollution
- An evaluation of a potential impact of a mandatory EPR system on marine litter in Kenya is premature

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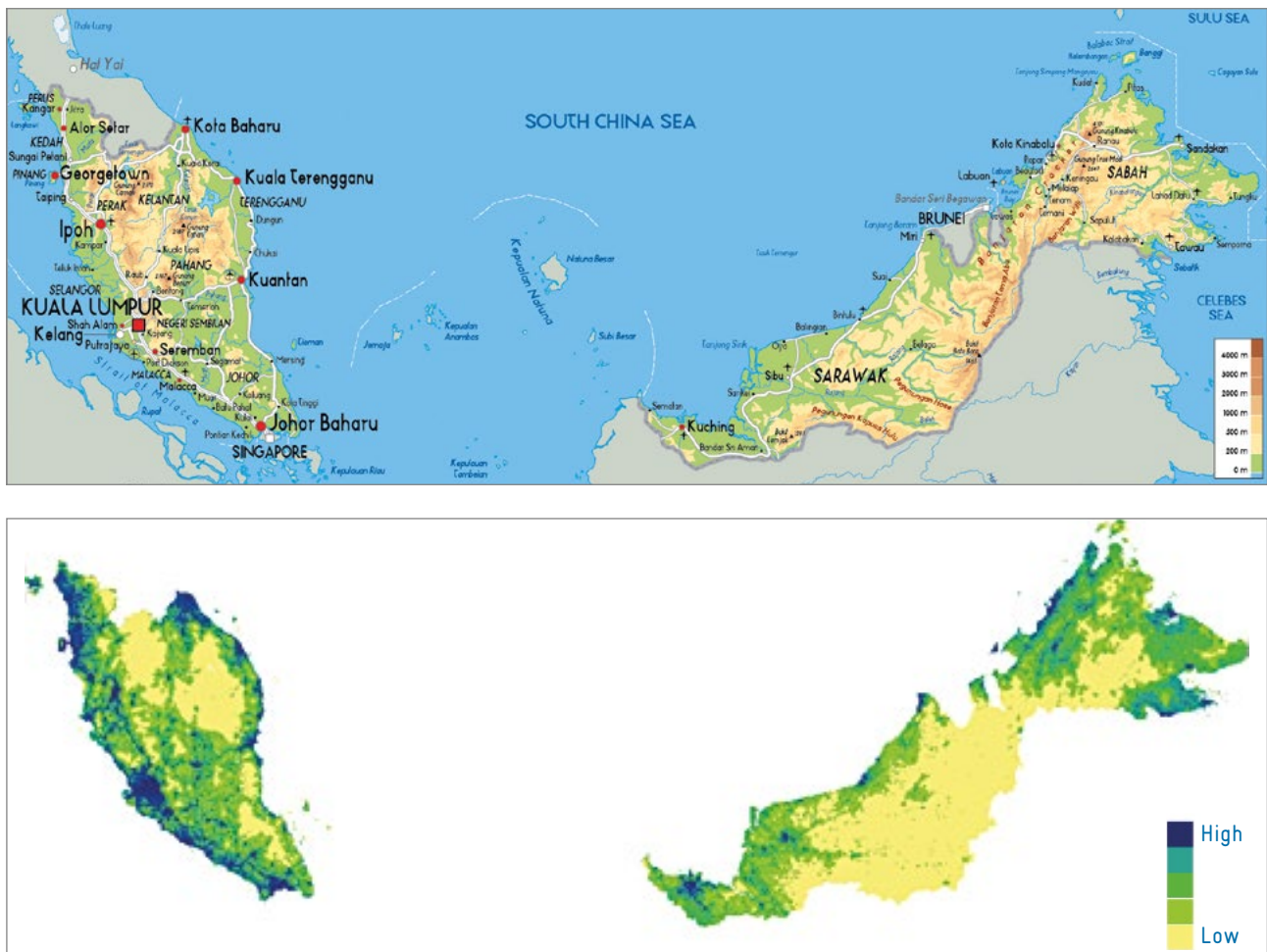
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Annex 10: Country analysis Malaysia

Malaysia (Figure 29) is an upper-middle income country in South-East Asia with strong integration into global industrial value chains – not least, it is considered as one of the biggest importers of plastic waste (Rethink Plastic Waste Alliance, 2021). Malaysia's population is approximately 32.6 million people (2019) with 76.2% of the population living in urban areas, with a strong urbanization trend and decreasing population in rural areas (Sea Circular, 2020). The surface area of Malaysia is approximately 330,800 km² with a population density of 95 individuals per km² (in 2016) and a strong concentration around coastal areas (World Population Review, 2021).

Malaysia is located in the Indo-Pacific region with its coastlines bordering the Andaman Sea, the Straits of Malacca and Singapore, the Gulf of Thailand, the South China Sea, the Sulu Sea and Sulawesi Sea. The length of the coastline is 8,840 km (Department of Statistics, 2019). Compared to neighbouring countries, Malaysia has a manageable number of less than 100 inhabited islands. The larger islands often have a more advanced waste management infrastructure – to which about 80 percent of the total Malaysian island's population has access – enabling them to deal with plastic waste more effectively and at scale.

Figure 29: Malaysia physical map and distribution of population 2020



Source: Worldometers/ Geatlas 2018 and Worldpop/ Bill & Melinda Gates Foundation, 2020

EPR policy

Malaysia, in its 12th Five Year Plan (2021 – 2025, 12th Plan) as well as in the “Malaysia Plastic Sustainability Roadmap, 2021-2030”, has recognized the introduction of CE principles in production and trade along the waste hierarchy as an essential solution, although the focus on prevention strategies has only recently become a political focus. Approaches to accelerate the CE introduction focus on various components, such as stimulating recycling market development (e.g., reducing barriers and stimulating post-consumer recycling content in products), phasing in EPR, and banning certain single-use products.

So far, the EPR concept has not yet been developed and implemented as a separate policy to tackle the packaging waste issues. Nevertheless, some elements and instruments related to EPR are present in the existing national solid waste management policy of 2007 and have similarities with the EPR policy. Moreover, the introduction of the Solid Waste and Public Cleansing Management Act (SWPCMA) in 2007 has created a favourable environment for the implementation of EPR policy elements.

In addition, there are several Acts and National Plans in Malaysia that are related to EPR elements and highlight the importance of the principal toward achieving circular economy, such as the Environmental Quality Act 1974 (section 30A and 30B) and the National Strategic Plan on Solid Waste Management. Moreover, both the 10th and 11th Malaysia Plan provide guiding principles for effective and sustainable waste management for the period 2011 -2020.

Also in Malaysia, voluntary actions are taken on the private side with the most prominent one being the foundation of the ‘Malaysian Recycling Alliance Berhad’ (MAREA), which was officially launched in March 2021. MAREA is Malaysia’s voluntary PRO organisation, supported by several multinational companies. MAREA is also engaging in technical working groups organised by the Economic Planning Unit with representatives from ministries to develop a suitable EPR scheme for Malaysia.

Marine litter

The consumption of SUP and packaging in Malaysia has gradually increased over the last years. A study by WWF (2020) pointed out that Malaysia has one of the highest per capita rates in terms of household plastic consumption, higher than, for instance, in China, Indonesia, Thailand, Vietnam and the Philippines (MPMA, 2018). Today, Malaysia is ranked 8th amongst the countries with mismanaged plastic waste in the world

with an annual leakage of 140,000 to 370,000 tons of plastic waste being released into the oceans annually (KPKT, 2019). Many types of plastic items are littered in the coastal areas and beaches in Malaysia. Table 18 showcases the increase of items such as plastic beverage bottles, food wrappers, plastic grocery bags, plastic take away containers and cigarette butts in 2020 compared to 2017.

Table 18: Top 10 items collected in Malaysia during Ocean Clean-up Campaigns

Item	Percentage of items (2017)	Percentage of items (2020)
Plastic beverage bottles	8.3	21.1
Plastic bottle caps	4.0	4.4
Food wrappers	8.9	15.3
Plastic lids	3.3	1.4
Plastic grocery bags	9.5	13.0
Straws, stirrers	3.6	3.1
Plastic take away containers	1.6	2.8
Plastic cups, plates	Not among top 10	1.3
Other plastic bags	6.7	1.7
Glass beverage bottles	1.4	Not among top 10
Cigarette butts	8.5	21.1

Source: The Ocean Conservancy, 2017 & 2020

The WWF estimated that Malaysia gains around RM 4.14 million in value from collection for recycling of PET bottles. However, the country loses around RM 8.3 million in value to landfills and around RM 4.14 million in value due to leakage into the marine environment. Sorting and recycling practices still need to be improved. The country is following traditional collection methods without developing a systematic scheme or a

national concept adapted to its geographic specificities. In fact, more than 1.6 MT are disposed of in landfills and open dumpsites without being put into value (WWF , 2021).

As a response to the current marine litter issues, Malaysia is establishing several initiatives to find sustainable solutions to address this challenge (Sea Circular, 2020).

Conclusion

Malaysia has recognised EPR as an important tool for its further development within its 12th Five Year Plan (2021 – 2025, 12th Plan), outlining important steps for the country's future development. There is an importance of implementing EPR – alongside other approaches – to combat

marine litter. Yet, no specific details have been decided upon and no specific legal framework has been drafted so far. Thus, no impact of EPR on marine litter generation can be assessed at this point

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