

Addressing marine plastics: A systemic approach

Recommendations for action



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**Addressing
Marine Plastics**
A Systemic Approach



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Foreword



We live in a world with a high reliance on plastics. Since 1950, the global production of plastic has increased by an estimated 9 per cent and much of the world's plastic waste has found its way into landfills and our oceans. This report seeks to address marine plastic pollution through providing a perspective on how a circular economy approach to the design, production, use and disposal of plastics can help keep our seas clean and healthy.

Such an approach requires us to keep plastics within the economy at their highest possible value so we do not see it so easily as waste. We need to explore innovative business models that use less plastic and if used, do so with maximum efficiency. We need to seek out and promote alternative products and materials and nudge consumers to make more sustainable choices.

The importance of shifting to more sustainable consumption and production patterns, and building more circularity in our economies was highlighted at the Fourth Session of the UN Environment Assembly. The United Nations Environment Programme is therefore working with countries in addressing the challenge of plastic pollution in a systemic way while collaborating with stakeholders, in order to close the tap and promote more sustainable practices in the consumption and production of plastics.

This report recommends actions that need to be taken by different stakeholders and sectors where plastic waste is substantial and impacts on the environment are high.

This report is the output of support from the Global Environment Facility (GEF) to address marine plastics. We deeply appreciate the support of GEF to its development. We hope this report will encourage further efforts to address plastic pollution and help build a future with clean seas.

A handwritten signature in black ink, which appears to read 'Inger Andersen'.

Inger Andersen
Executive Director
United Nations Environment Programme

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Executive Summary

Addressing marine plastic pollution is an urgent action, considering the rising levels of plastics in the environment and the impacts to coastal and marine ecosystems. The problem of plastic pollution is cross-boundary and cross-cutting, and it requires systemic solutions covering policy, technology, management, financing, knowledge and research, awareness raising and behaviour change. The Ministerial Declaration and resolutions of the United Nations Environment Assembly at its Fourth Session (UNEA-4) reinforce this understanding.¹

Building on the findings from two previous reports on stocktaking of the global plastic value chain and existing actions, this report identifies gaps to address marine plastics at each value chain stage, and finally recommends actions to achieve a circular economy for plastics at the global level.

Gaps to Address Plastic Pollution

Gaps in addressing plastic pollution exist in various aspects, including knowledge, policy, technology, financing and awareness. More specifically:

- ▶ **Gaps in knowledge** around marine plastics include: stocks and flows of macro- and microplastics in the oceans, the environmental and socio-economic impacts of marine plastics, human behaviour and cultural drivers of plastics consumption, and tools to assess innovative sector-relevant solutions. A global

1. Relevant UNEA-4 resolutions include Resolution 4/6 on addressing marine plastic litter and microplastics (UNEP/EA.4/RES.6), Resolution 4/9 on addressing single-use plastic products pollution (UNEP/EA.4/RES.9), Resolution 4/11 on protection of the marine environment from land-based activities (UNEP/EA.4/RES.11) and Resolution 4/1 on innovative pathways to achieve sustainable consumption and production (UNEP/EA.4/RES.1). The UNEA-4 ministerial declaration and resolutions are available at: <https://web.unep.org/environmentassembly/proceedings-report-ministerial-declaration-resolutions-and-decisions>

exchange platform to address plastic pollution can facilitate knowledge generation and exchange, as requested in Resolution 4/6 of UNEA-4 on Marine Plastic Litter and Microplastics (UNEP/EA.4/Res.6).

- ▶ Numerous national and regional initiatives have been implemented around the world, but **gaps in policy** remain. In particular, coordinated policies, agreements and action plans to support implementation of upstream solutions (acting from upper stages of the value chain by applying sustainable consumption and production, such as eco-design, product lifetime extension, and innovative business model etc.), improve recyclability, incentivise demand for recycled plastics, and streamline downstream plastic management are lacking and/or non-binding in most countries and regions. There is also a need for increased global policy coordination, including regulations on chemicals and waste related to plastic pollution.
- ▶ **Gaps in technology** and innovation are evident across the plastics value chain. Standards and guidelines for reuse and recycling are lacking. There is a need for designing and producing plastic products with lower impacts in use and end-of-life phases, as well as improved technologies that allow secondary materials to be transformed into high-value products with high recyclability. There is a lack of affordable and sustainable alternatives available to consumers, to shift away from single-use plastic products.
- ▶ Coordinated **financing and incentives** are notable gaps to support upstream solutions to plastic pollution and to prevent the leakage of plastics

into the environment, including the financing of innovative product design and business models, and integrated waste management systems.

Systemic Actions

To fill these gaps, this report recommends **systemic actions** along the plastic value chain, including material engineering, design of product and business models, consumer behaviour, waste management (collection, sorting, recycling and disposal), as well as cross-cutting actions.

Cross-cutting actions deliver the enabling conditions to implement circular economy, to cover the aspects of knowledge, policy, financing and coordination. They also connect the actions that are proposed at different cycle stages, to make sure they collectively achieve bigger impacts through the value chain, while addressing potential trade-offs. Action on **knowledge** includes: establishing nomenclature and methodologies to allow for harmonized assessment on plastic material flows, leakage and impacts with consistent sampling of marine litter and microplastics; setting up country baselines and tracking progress with quantitative indicators for measuring and evaluation, based on such methodology and data collection effort. Actions on **policy and financial mechanisms** need to focus on the reduction of the amount of plastic waste generated, promotion of reuse and remanufacturing, and increasing the demand for recycled content (e.g. through recycled content standards, voluntary commitments, minimum requirements, public procurement, etc.). Developing extended producer responsibility (EPR) policy and support its implementation are rather instrumental, to encourage design for reuse and recycling, while taking care of end-of-life products by setting up collection and recycling systems with sustainable financing schemes and investment plans. Economic measures, banning unnecessary products, and sustainable public procurement can also be policy tools to curb the production and consumption of e.g. single-use plastic

products, and to promote reuse and create markets for recycled materials. Multi-stakeholder, cross-regional, and global coordination is needed among governments, industry and civil society, to exchange on best practices and develop capacity through peer-learning and cooperation. However, governments have a special role given that they set the agenda and define responsibilities of stakeholders in relevant policies. A **common platform** to foster the engagement of all relevant stakeholders would be very useful in developing, implementing and coordinating action plans to address plastic pollution at different scales.

Under the systemic framework, actions are also recommended on specific themes with targeted stakeholders, according to the life cycle stages of the plastics sector:

- ▶ For **material engineering**, actions are recommended to increase the research and funding into alternative materials as well as the better use of traditional materials to achieve system-wide benefits and avoid potential burden shifting between the life cycle stages. Industry needs to develop processes that are able to transform secondary materials into high quality “raw” materials. Research on new materials that do not generate pollution from microplastics is required, which is in particular relevant for synthetic fibres and vehicle tyres. Design for recyclability needs to be applied as a principle, in particular to reduce/avoid additives that make plastics difficult to recycle. Governments could ban or restrict materials with a high probability to end up in the environment or little/no chance of being reused, recycled or composted. This needs to be done by providing alternative solutions and guide substitutions with less impacts.
- ▶ For **design of product and business models**, design for reuse needs to be prioritised, wherever possible, over design for recyclability, while the latter needs to focus on finding alternatives to additives that cause adverse environmental and human health impacts. Brands and industry need to upscale innovative

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business models to shift from single-use to reusable plastic packaging and products, with specific attention to develop cost-effective alternatives (in particular sector-relevant alternatives for products with high use phase losses and for products where reuse and recycling rates are especially low). Bans or restrictions could be used by governments on products with high plastic losses to the environment (such as microbeads).

- ▶ For **use and consumption of plastic products**, increase in consumer awareness through targeted and effective consumer campaigns are recommended to trigger behaviour change. Research is required to better understand what drives consumer behaviour with regard to single-use plastic consumption, recycling and littering. There is a need for the industry to provide clear and reliable sustainability information based on life cycle thinking, and for governments to promote labelling standards so that consumers are aware of more sustainable choices. Governments are also recommended to set up Sustainable Public Procurement policies to support reusable options and products containing recycled content.
- ▶ At **collection, sorting, recycling and disposal** stage, upgrading systems and technology for efficient collection and reprocessing are critical. Public-private partnerships are recommended to be developed with brands/industry contributing to the set-up of initiatives and infrastructure to manage their products after use. These include partnerships which could significantly improve the management of municipal solid waste (in particular plastic wastes) and increase the coverage of wastewater and effluents treated in wastewater treatment plants. Collection efficiency from municipalities and other collection channels for plastics products needs to be improved including by engaging the informal sector where relevant. Extended Producer

Responsibility (EPR) schemes could help drive industry involvement and sustainable financing in treating their products at end-of-life.

These actions should be planned by following the principles of life cycle thinking and circular economy, so that they do not work in fragments, but rather link with each other to amplify the effect to reduce the impacts for the whole value chain.

Actions for Priority Sectors and Products

Besides the recommendation for systemic actions on the whole plastic sector, priority actions have also been contextualised for 8 focus areas (sub-sector or product category), where plastic losses are substantial with significant impacts:

For **packaging (excluding PET bottles)**: scaling-up reusable and returnable packaging models whilst eliminating the use of unnecessary and difficult to recycle plastics. Alternatives should be selected based on Life Cycle Assessment (LCA); and coordinated actions are needed to ensure plastic packaging achieves a high level of recycling, including building markets for recycled materials, promoting standardised labelling, improving collection and sorting, and financing and incentivising recycling.

For **PET bottles**: providing alternatives to bottled water, such as reusable bottles and refill schemes along with the provision of safe tap water; implementing material and product standards to ensure bottles are recyclable; and increasing global application of deposit and return schemes.

For **single-use plastic products**: coordinating actions are needed between governments, NGOs, industry and consumer groups to eliminate the most problematic and unnecessary items through incentives or disincentives (bans, taxes, etc.). Such actions should require alternatives to be assessed with LCA to address unintended consequences. Innovative designs and new

product delivery models are needed to shift consumers' reliance on single-use products.

For **textiles**: research is needed to gain a clear understanding of where the majority of microplastic releases from textiles occur along the value chain to identify corresponding interventions. Other important activities include the development of standard tests to determine releases from different textile products and alternatives; and the promotion of the design of sustainable fabrics and clothing.

For **cosmetics and personal care products**: brands need to develop products that do not contain microbeads, and legislators are recommended to phase out the intentional addition of microplastics to products.

For the **tourism** sector: key actions include promoting locally relevant, innovative packaging and reuse models; and developing public-private partnerships to address the significant failures in waste management prevalent in many tourist destinations.

For **fishing and aquaculture**: the key focus is to avoid loss of gear and equipment. Actions include: implementing gear marking and tracking programmes, devising concrete solutions for gear recovery such as incentivising the repair/reuse of fishing gear; and ensuring policies do not encourage intentional losses of gear (e.g. port fees) by providing free of charge reception facilities for discarded fishing gear and aquaculture equipment.

For **shipping**: generate data on the sources and quantities of plastics emitted from shipping sector; increased application of "no special fee" ports (i.e. where the cost of delivering waste to port reception facilities is included in the fee paid by all ships visiting the port, irrespective of the quantities discharged) and incentives towards better waste management (such as certification schemes providing discounts on port fees).

To summarize, systemic solutions will require all stakeholders to rethink and redesign the entire plastics economic system. A holistic approach with strategic interventions across the plastics value chain is needed, with national and local governments establishing appropriate legal frameworks and incentives. Actions by brands and industry to improve design for reuse and recycling and exploring innovative business models, and actions by civil society to create awareness and encourage behaviour change, are greatly needed. Actions need to be implemented at the appropriate local, national and regional scales, adjusting interventions according to the socio-economic conditions of the local context, taking into account the technical and financial availability, and tailored to the specific plastics product/application sector.

In this way, a collective vision can be achieved towards a world without negative impacts from plastics, where plastics retain their highest value along the value chain, no plastics leak into and cause damage to the environment, and optimal circularity for plastic materials is reached around the globe.

وتوفر الإجراءات الشاملة لعدة قطاعات الظروف المواتية لتنفيذ الاقتصاد التدويري، وتغطية جوانب المعرفة والسياسة والتمويل والتنسيق. كما أنها تربط الإجراءات المقترحة في مراحل مختلفة من الدورات، للتأكد من أنها تحقق أثر أكبر من خلال سلسلة القيمة، في الوقت الذي تعالج فيه المفاضلات المحتملة. وتشمل الإجراءات المتعلقة بالمعرفة: وضع تسميات ومنهجيات للسماح بإجراء تقييم منسق لتدفقات المواد البلاستيكية وتسربها والآثار الناجمة عنها بأخذ عينات متسقة من النفايات والجسيمات البلاستيكية البحرية الدقيقة؛ ووضع خطط قطرية ومتابعة التقدم المحرز بمؤشرات كمية للقياس والتقييم، استناداً إلى هذه المنهجية وإلى جهود جمع البيانات، ويلزم أن تركز الإجراءات المتعلقة بالسياسات والآليات المالية على تخفيض كمية ناتج النفايات البلاستيكية، وتشجيع إعادة الاستخدام وإعادة التصنيع، وزيادة الطلب على المحتوى المعاد تدويره (على سبيل المثال من خلال معايير إعادة تدوير المحتوى، والالتزامات الطوعية، وشروط الحد الأدنى، وصفقات الشراء العمومي، وما إلى ذلك). ويعد تطوير سياسة مسؤولية المنتج الموسعة ودعم تنفيذها أمراً أساسياً إلى حد ما، لتشجيع التصميم الموجه لإعادة الاستخدام وإعادة التدوير، مع الاهتمام بالمنتجات التي انتهى عمرها الافتراضي من خلال إنشاء نظم للجمع وإعادة التدوير معززة بخطط تمويل مستدامة وخطط استثمار. كما يمكن أن تكون التدابير الاقتصادية، وحظر المنتجات غير الضرورية وصفقات الشراء العمومي المستدام أدوات في السياسة العامة توظف للحد من إنتاج واستهلاك المنتجات البلاستيكية الأحادية الاستخدام، والترويج لإعادة الاستخدام وإنشاء أسواق للمواد المعاد تدويرها. ويلزم التنسيق بين أصحاب المصلحة المتعددين على كل من الصعيد الإقليمي والعالمي فيما بين الحكومات والقطاعات والمجتمع المدني، لتبادل أفضل الممارسات وتطوير القدرات من خلال التعلم من الأقران والتعاون. غير أن للحكومات دوراً خاصاً نظراً إلى أنها تضع جدول الأعمال وتحدد مسؤوليات أصحاب المصلحة في السياسات ذات الصلة. ولعل إنشاء منصة مشتركة لتعزيز مشاركة جميع أصحاب المصلحة المعنيين سيكون مفيداً للغاية في وضع وتنفيذ وتنسيق خطط العمل الرامية إلى التصدي للتلوث البلاستيكي على مستويات مختلفة.

وفي إطار النهج التّظمي، يوصى أيضاً باتخاذ إجراءات بشأن مواضيع محددة تستهدف أصحاب مصلحة معينين، وفقاً لمراحل دورة حياة قطاع البلاستيك:

▶ بالنسبة لهندسة المواد، يوصى باتخاذ إجراءات لزيادة البحث والتمويل بهدف إيجاد مواد بديلة وكذلك تحسين استخدام المواد التقليدية لتحقيق فوائد على نطاق المنظومة وتجنب نقل العبء المحتمل بين مراحل دورة الحياة. ويلزم أن تطور الصناعة عمليات قادرة على تحويل المواد الثانوية إلى مواد

«خام» عالية الجودة. كما يوجد حاجة لإجراء أبحاث بشأن المواد الجديدة التي لا تتسبب في تلوث ناجم عن الجسيمات البلاستيكية الدقيقة، وهو أمر له صلة خاصة بالآليات الاصطناعية وإطارات المركبات. ويلزم العمل بتصاميم إعادة التدوير كمبدأ، خاصة لتقليل/تجنب المواد المضافة التي تجعل إعادة تدوير البلاستيك عملية صعبة. ويمكن أن تحظر الحكومات أو تقيد استخدام المواد التي يكون احتمال التخلص منها في نهاية المطاف في البيئة أو احتمال إعادة استخدامها أو إعادة تدويرها أو تحويلها إلى سماد احتمالاً ضئيلاً أو منعدماً. ويلزم القيام بذلك من خلال توفير حلول بديلة وتوجيه البدائل ذات الأثر الضئيل.

▶ وبالنسبة لتصميم نماذج المنتجات والنماذج التجارية يلزم أن تولى الأولوية لتصميم إعادة الاستخدام، كلما كان ذلك ممكناً، على تصميم القابلية لإعادة التدوير، بينما يلزم أن تركز إعادة التدوير على إيجاد بدائل للمواد المضافة التي تسبب آثاراً ضارة للبيئة وصحة الإنسان. ويلزم أن ترفع العلامات التجارية والقطاع الصناعي مستوى النماذج التجارية المبتكرة للتحويل من التعبئة البلاستيكية والمنتجات البلاستيكية الأحادية الاستخدام إلى التعبئة والمنتجات البلاستيكية القابلة لإعادة الاستخدام، مع إيلاء اهتمام خاص لتطوير بدائل فعالة من حيث التكلفة (لا سيما البدائل ذات الصلة بالقطاع بالنسبة للمنتجات ذات الفوائد العالية في مراحل الاستخدام والمنتجات التي تكون معدلات إعادة استخدامها ومعدلات إعادة تدويرها منخفضة للغاية). ويمكن أن تلجأ الحكومات إلى حظر أو تقييد المنتجات ذات الفوائد البلاستيكية العالية بالنسبة للبيئة (من قبيل الحبيبات الدقيقة).

▶ وبالنسبة لاستخدام واستهلاك المنتجات البلاستيكية، يوصى بتوعية المستهلك من خلال حملات توعية موجهة وفعالة تهدف إلى تغيير السلوك، ويلزم البحث لتحسين فهم دوافع سلوك المستهلك فيما يتعلق باستهلاك البلاستيك الأحادي الاستخدام وإعادة التدوير والتخلص العشوائي من النفايات. ويلزم أن توفر دوائر القطاع الصناعي معلومات واضحة وموثوقة بها عن الاستدامة تعتمد على تفكير يراعي دورة الحياة، كما يلزم أن تعزز الحكومات معايير وضع العلامات بحيث يكون المستهلكون على دراية بخيارات أكثر استدامة. وتوصى الحكومات أيضاً بوضع سياسات مستدامة لصفقات الشراء العمومي لدعم الخيارات القابلة لإعادة الاستخدام والمنتجات المحتوية على مواد معاد تدويره.

▶ وفي مرحلة الجمع والفرز وإعادة التدوير والتخلص، يكتسي تحديث النظم والتكنولوجيا من أجل كفاءة الجمع وإعادة المعالجة أهمية حاسمة. ويوصى بإقامة شراكات بين القطاعين

العام والخاص تسهم في إطارها العلامات التجارية/دوائر القطاع الصناعي في إعداد المبادرات والبنية التحتية لإدارة منتجاتها بعد الاستخدام. وتشمل شركات يمكن أن تحسن بشكل كبير إدارة النفايات البلدية الصلبة (وخاصة النفايات البلاستيكية) وزيادة تغطية مياه الصرف الصحي والنفايات السائلة المعالجة في محطات معالجة مياه الصرف الصحي. ويلزم تحسين فعالية جمع النفايات من البلديات وغيرها من قنوات تجميع منتجات البلاستيك، بما في ذلك من خلال إشراك القطاع غير الرسمي عند الاقتضاء. ويمكن أن تساعد نظم مسؤولية المنتج الموسعة في حمل دوائر الصناعة والتمويل المستدام على معالجة منتجاتها في نهاية العمر الافتراضي.

وينبغي تخطيط هذه الإجراءات باتباع مبادئ منطق دورة الحياة واقتصاد التدوير، حتى لا يكون مفعولها مفككاً، بل ترتبط مع بعضها البعض لتضخيم مفعول الحد من الآثار على سلسلة القيمة بأكملها.

إجراءات للقطاعات والمنتجات ذات الأولوية

وإلى جانب التوصية باتخاذ إجراءات نُظمية في قطاع البلاستيك بأكمله، تم تحديد سياق الإجراءات ذات الأولوية في 8 مجالات (قطاع فرعي أو فئة منتجات)، حيث تكون فواقد البلاستيك كبيرة ومقترنة بآثار ملموسة:

بالنسبة للتعبئة (باستثناء قنينات بولي إيثيلين تيريفثاليت): التوسع في نماذج التعبئة القابلة لإعادة الاستخدام والقابلة للإرجاع مع التخلي عن استخدام المواد البلاستيكية غير الضرورية والتي يصعب إعادة تدويرها. وينبغي اختيار البدائل بناءً على تقييم دورة الحياة؛ ويلزم اتخاذ إجراءات منسقة لضمان بلوغ التعبئة البلاستيكية مستوى عالٍ من إعادة التدوير، بما في ذلك بناء أسواق للمواد المعاد تدويرها، وتشجيع وضع علامات موحدة، وتحسين عملية الجمع والفرز، والتمويل وتحفيز إعادة التدوير.

وبالنسبة لقنينات بولي إيثيلين تيريفثاليت: توفير بدائل للمياه المعبأة في قنينات، من القنينات القابلة لإعادة الاستخدام ونظم إعادة الملء مع توفير مياه الصنبور الآمنة؛ والعمل بمعايير المواد والمنتجات التي تضمن إعادة تدوير القنينات؛ وزيادة التطبيق العالمي لنظم الضمانة المالية وإعادة.

وبالنسبة للمنتجات البلاستيكية الأحادية الاستخدام: يلزم تنسيق الإجراءات بين الحكومات والمنظمات غير الحكومية ودوائر القطاع الصناعي وفئات المستهلكين للقضاء على المواد الأكثر إثارة للإشكال وغير الضرورية من خلال الحوافز أو المثبطات (الخطر، الضرائب، وما إلى ذلك). وينبغي أن تشترط هذه الإجراءات تقييم البدائل باستخدام تقييم دورة الحياة لمعالجة النتائج غير المقصودة. ويلزم وضع تصاميم مبتكرة ونماذج جديدة لتوصيل

المنتجات وذلك من أجل صرف المستهلكين عن الاعتماد على المنتجات الأحادية الاستخدام.

وبالنسبة للمنسوجات: يلزم البحث لاكتساب فهم واضح لمكامن حدوث غالبية إصدارات الجسيمات البلاستيكية من المنسوجات على طول سلسلة القيمة لتحديد التدخلات اللازمة لها. وتشمل الأنشطة المهمة الأخرى استحداث اختبارات قياسية لتحديد الإصدارات من مختلف منتجات النسيج وبدائلها؛ وتعزيز تصميم الأقمشة والملابس المستدامة.

وبالنسبة لمستحضرات التجميل ومنتجات العناية الشخصية: يلزم أن تطور العلامات التجارية منتجات لا تحتوي على الحبيبات الدقيقة، ويوصى المشرعون بإنهاء التدريجي للإضافة المتعمدة للجسيمات البلاستيكية الدقيقة إلى المنتجات.

وبالنسبة لقطاع السياحة: تشمل الإجراءات الرئيسية الترويج لنماذج التعبئة وإعادة الاستخدام المبتكرة والمرتبطة بالنطاق المحلي؛ وتطوير شركات بين القطاعين العام والخاص لمعالجة ما يسود في إدارة النفايات من قصور كبير في العديد من الجهات السياحية.

وبالنسبة لصيد الأسماك وتربية الأحياء المائية: ينصب الاهتمام الرئيسي على تجنب فقدان الأجهزة والمعدات. وتشمل الإجراءات تنفيذ برامج وصم الأجهزة وتعقبها، ووضع حلول ملموسة لاستعادة الأجهزة من قبيل التحفيز على إصلاح/إعادة استخدام معدات صيد الأسماك؛ والحرص على ألا تشجع السياسات فقدان المتعمد للأجهزة (فرض رسوم الموائئ مثلاً) من خلال توفير مرافق استقبال مجانية لأجهزة صيد الأسماك المهمة ومعدات تربية الأحياء المائية.

وبالنسبة للشحن: إصدار بيانات عن مصادر وكميات المواد البلاستيكية الصادرة من قطاع الشحن؛ وزيادة تطبيق سياسة الموائئ «المعفاة من الرسوم الخاصة» (حيث تُدرج تكلفة نقل النفايات إلى مرافق الاستقبال المرفئية في الرسوم التي تدفعها جميع السفن التي تزور الميناء، بصرف النظر عن الكميات التي يتم تفريغها) والعمل بالحوافز من أجل إدارة أفضل للنفايات (من قبيل خطط إصدار الشهادات التي توفر خصومات من رسوم الميناء).

ومجمل القول، إن الحلول النُظمية تتطلب أن يعيد جميع أصحاب المصلحة التفكير في النظام الاقتصادي للمواد البلاستيكية بأكملها وإعادة تصميمه. ويلزم اتباع نهج شمولي معزز بتدخلات استراتيجية عبر سلسلة قيمة المواد البلاستيكية، تضع في إطارها الحكومات الوطنية والمحلية أطراً وحوافز قانونية مناسبة. وثمة حاجة ماسة إلى قيام العلامات التجارية ودوائر الصناعة بتحسين تصميم إعادة الاستخدام وإعادة التدوير واستكشاف

نماذج تجارية مبتكرة، كما تشتد الحاجة إلى إجراءات يتخذها المجتمع المدني للتوعية وتشجيع تغيير السلوك. ويلزم تنفيذ الإجراءات على المستويات المحلية والوطنية والإقليمية المناسبة، وتكييف التدخلات وفقاً للظروف الاجتماعية والاقتصادية للسياق المحلي، مع مراعاة ما هو متاح تقنياً ومالياً، وتصميمها خصيصاً لقطاع منتجات/تطبيقات البلاستيك المحددة.

وبهذه الطريقة، يمكن بلوغ رؤية جماعية لعالم بدون آثار سلبية ناتجة عن المواد البلاستيكية، تحتفظ فيه المواد البلاستيكية بأعلى قيمتها على طول سلسلة القيمة، ولا تسرب أي مواد بلاستيكية إلى البيئة أو تلحق أضراراً بها، ويتأقن تدوير رشيد للمواد البلاستيكية في جميع أنحاء العالم.

执行摘要

由于环境中塑料含量升高并且影响到沿海和海洋生态系统，治理海洋塑料污染刻不容缓。塑料污染问题跨国界、跨领域，需要系统性解决方案，综合考虑政策、技术、管理、融资、知识和研究、提高认识和改变行为各方面因素。联合国环境大会第四届会议（UNEA-4）的部长级宣言和决议强化了对这一问题的理解。¹

本报告以此前两份关于全球塑料价值链评估报告的结论和现有行动为基础，指出了现有海洋塑料治理在每个价值链阶段存在的不足，并就如何在全球层面采取行动实现塑料循环经济提出了建议。

塑料污染治理方面存在的不足

现有塑料污染治理在多个方面存在不足，包括知识、政策、技术、资金和认识。具体而言：

- ▶ 关于海洋塑料的知识不足存在于以下方面：海洋中大塑料和微塑料的存量和流动，海洋塑料对环境和社会经济的影响，塑料消费的人类行为和文化驱动因素，以及评估与行业相关的创新解决方案的工具等。如能根据UNEA-4关于海洋塑料垃圾和微塑料的第4/6号决议（UNEP/EA.4/Res.6）的要求，建立一个治理塑料污染的全球交流平台，可以促进相关知识的产生和交流。
- ▶ 世界各地已实施许多国家性和地区性倡议，但政策方面仍然存在不足。特别是，旨在支持实施上游解决方案（通过推动可持续消费和生产，从价值链的上游阶段采取行动，如生态设计、延长产品寿命和创新的商业模式等）、提高可循环性、刺激对再生塑料的需求以及完善下游塑料管理的协调政策、协议和行动计划，在大多数国家和地区都有所不足和/或没有约束力。还需要加强全球政策协调，其中包括与塑料污染有关的化学品和废弃物的监管工作协调。
- ▶ 技术和创新方面的不足在整个塑料价值链上都很明显。具体包括：缺乏有关再利用和循环的标准和指导方针。需要设计和生产在使用和生命周期结束阶段影响较小的塑料产品，还需要改进技术，使次生材料转化为容易循环利用的高价值产品。目前消费者缺乏负担得起且可持续的替代品，无法摆脱一次性塑料制

品。

- ▶ 对于支持旨在解决塑料污染和防止塑料向环境中泄漏的上游解决方案，建立在相互协调基础上的供资和激励措施显著不足，其中包括创新产品设计和商业模式以及废弃物综合管理系统缺乏资金支持。

系统性行动

为弥补这些不足，本报告建议沿塑料价值链采取系统性行动，包括在材料工程、产品设计和商业模式、消费者行为、废弃物管理（收集、分类、回收和处置）等方面以及跨领域采取行动。

跨领域行动提供了实施循环经济的有利条件，并涵盖知识、政策、融资和协调等方面。跨领域行动还把针对不同周期阶段所建议的行动联系起来，以确保其在整个价值链上共同实现更大的影响，同时可以兼顾到潜在的权衡取舍问题。关于知识方面的行动包括：建立术语表和方法论，以便对塑料物料流、泄漏和影响进行协调评估，对海洋垃圾和微塑料进行持续的抽样调查；在相关方法论和数据收集工作的基础上，建立国家基准线，并使用量化指标追踪、测量、评估进展情况。政策和供资机制方面的行动应着重于减少产生的塑料废弃物数量，促进再利用和再制造，并增加对再生材料的需求（例如，通过实施再生材料标准、自愿承诺、最低要求、公共采购等）。制定生产者责任延伸（EPR）政策并支持其落实大有裨益，能够鼓励针对再利用和循环的设计，同时建立具有可持续供资机制和投资计划的收集和循环系统，以处理生命周期结束的产品。经济措施、对不必要产品的禁令以及可持续的公共采购也可以作为政策工具，遏制一次性塑料制品等的生产和消费，促进再利用，并为再生塑料创造市场。各国政府、工业界和民间社会之间需要开展多利益攸关方、跨区域和全球性协调，交流最佳做法并通过同行学习和合作培养能力。各国政府扮演着特殊的角色，因其负责制定相关政策的议程并界定相关利益攸关方的责任。通过建立一个共同平台促进所有有关利益攸关方参与，将对制定、实施和协调不同层面的塑料污染治理行动计划有所帮助。

在系统性行动框架下，根据塑料行业生命周期阶段，还建议就特定主题有针对性地与利益攸关方采取行动：

- ▶ 在材料工程方面，建议采取行动，加强对替代材料的研究和资金投入，并优化传统材料，以实现全系统效益，避免生命周期各阶段之间潜在的负担转移。工业界需要开发能够将次生材料转化为高质量“原生”材料的工艺。需要研究开发不产生微塑料污染的新材

1. 相关的UNEA-4决议包括：关于海洋塑料垃圾和微塑料的第4/6号决议（UNEP/EA.4/RES.6）、关于治理一次性塑料制品污染的第4/9号决议（UNEP/EA.4/RES.9）、关于保护海洋环境免受陆上活动污染的第4/11号决议（UNEP/EA.4/RES.11）和关于实现可持续消费和生产的创新途径的第4/1号决议（UNEP/EA.4/RES.1）。UNEA-4部长级宣言和决议可查阅：<https://web.unep.org/environmentassembly/proceedings-report-ministerial-declaration-resolutions-and-decisions>

料，这与合成纤维和车辆轮胎尤为相关。需要将可循环设计作为原则加以落实，特别是减少/避免使用阻碍塑料循环的添加剂。政府可以禁止或限制那些会最终进入环境或难以乃至完全无法再利用、回收或堆肥处理的材料。这需要通过提供替代解决方案和引导使用影响较小的替代品来实现。

- ▶ 在产品设计和商业模式方面，需要尽可能优先考虑再利用设计，其次才是可循环设计，因为可循环设计要求寻找替代品取代对环境 and 人类健康造成不利影响的添加剂。品牌和行业需要升级创新商业模式，从一次性使用转向可重复使用的塑料包装和产品，并特别注意开发具有成本效益的替代品（特别是针对使用阶段损耗大的产品以及再利用和回收率特别低的产品寻找行业相关替代品）。政府可以针对易泄露到环境中的产品（如塑料微珠）实施禁令或限制。
- ▶ 在塑料制品的使用和消费方面，建议通过有针对性且有实效的消费者宣传活动来提高消费者的认识，引导行为改变。需要开展研究，更好地了解一次性塑料消费、回收和随意丢弃等消费者行为的驱动因素。工业界需要根据生命周期的思路，就产品是否可持续提供清晰可靠的信息，而政府则需要推广标签标准，让消费者注意到更可持续的选择。还建议各国政府制定可持续公共采购政策，以支持可再利用的产品和含有再生塑料的产品。
- ▶ 在收集、分类、回收和处置阶段，必须升级系统和技术，以实现高效收集和再加工。建议与品牌/行业发展公私伙伴关系，开展倡议行动及建立基础设施，以便对其使用后产品进行管理。这些伙伴关系尤其可以显著改善城市固体废弃物（特别是塑料废弃物）管理，并扩大废水处理厂处理废水和流出物的覆盖范围。市政部门和其它收集渠道收集塑料制品的效率亟待提高，或可在合适条件下让非正规部门参与进来。生产者责任延伸（EPR）计划有助于促进行业参与在产品生命周期结束阶段处理其产品并就此持续供货。

规划这些行动时应遵循生命周期思路和循环经济的原則，使不同行动不会各自为政，而是相互联系协同增效，减少对整个价值链的负面影响。

针对优先行业和产品的行动

除了建议整个塑料行业采取系统性行动外，还针对泄露到环境中数量和相关影响较大的8个重点领域（子行业或产品类别）的优先行动作出具体建议：

对于包装（不包括PET瓶）：扩大可重复使用和可回收包装模式的规模，同时禁用不必要和难以回收的塑料。应基于生命周期评估（LCA）选择替代品；需要采取协调行动，确保塑料包装的循环达到高水平，包括建立再生塑料市场、推广标准化标签、改善收集和分类以及为循环使用提供资金和激励。

对于PET瓶：提供瓶装水的替代品，例如可重复使用的瓶子和再灌装机制，并提供安全的饮用水；实施材料和产

品标准，确保瓶子可循环；以及在全球加强押金和退回机制。

对于一次性塑料制品：政府、非政府组织、行业和消费者群体之间需要协调行动，通过激励措施或劝阻措施（禁令、税收等），使人们不再使用最易导致污染且最不必要的制品。为避免产生意外后果，采取这样的行动之前需要使用生命周期评估对替代方案加以评价。需要创新的设计和新的产品交付模式，改变消费者对一次性产品的依赖。

对于纺织品：需要开展研究，以清楚地了解大部分的纺织品微塑料释放究竟发生在价值链上的哪些环节，以确定相应的干预措施。其他重要行动包括开发标准检测，以确定不同纺织品和替代品释放的微塑料；以及推广可持续面料及服装设计。

对于化妆品和个人护理产品：各品牌需要开发不含塑料微珠的产品，并建议立法者逐步禁止在产品中有意添加微塑料。

对于旅游行业：关键行动包括推广与当地相关的创新包装和再利用模式；以及发展公私伙伴关系，以解决许多旅游目的地在废弃物管理方面普遍存在的重大不足。

对于渔业和水产养殖业：重点是避免遗失渔具和设备。所建议行动包括：实施渔具标识和跟踪方案，为渔具回收制定具体的解决方案，如鼓励修理/再利用渔具；通过为废弃渔具和水产养殖设备提供免费接收设施，确保在政策上不鼓励故意丢弃渔具（例如出于规避港口费原因造成的故意丢弃）。

对于航运：就航运行业所排放塑料的来源和数量生成数据；增加“不收取特殊费用”的港口（即将废弃物运送到港口接收设施的费用包括在所有到港船舶支付的费用中，无论废弃物数量多寡）并鼓励更好地管理废弃物（例如提供港口费折扣的认证机制）。

总而言之，系统性的解决方案将要求所有利益攸关方重新思考和重新设计整个塑料经济体系。采取综合全面的方法，就是需要在塑料价值链层面进行战略性干预，需要国家和地方政府建立适当的法律框架和激励措施。也需要各品牌和行业采取行动，改进再利用和循环设计，探索创新商业模式；以及民间社会采取行动，树立意识，鼓励行为改变。并且，还需要在适当的地方、国家和地区范围落实行动，根据当地的社会经济条件调整干预措施，同时考虑到技术和资金能力，针对具体的塑料制品/应用行业制定行动计划。

采取这些措施将有助于塑料在整个价值链中保有最高价值，避免其泄漏到环境中造成损害，并且在全球范围形成材料最佳循环，从而实现让世界免受塑料污染影响的共同愿景。

Résumé exécutif

Il est urgent d'agir contre la pollution plastique en milieu marin, au vu des quantités croissantes de déchets plastiques dans l'environnement et de leur impact sur les écosystèmes côtiers et marins. Le problème de la pollution plastique est transfrontalier et transversal, et exige des solutions systémiques couvrant les politiques, la technologie, la gestion, le financement, les connaissances et la recherche, la sensibilisation et la modification des comportements. La déclaration ministérielle et les résolutions adoptées par l'Assemblée des Nations Unies pour l'environnement à sa 4^e session (UNEA-4) renforcent ce constat¹.

En s'appuyant sur les conclusions de deux précédents rapports sur l'inventaire de la chaîne de valeur mondiale des plastiques et des mesures existantes, le présent rapport identifie les lacunes dans la lutte contre les déchets plastiques marins à chaque étape de la chaîne de valeur, et recommande des actions à mettre en œuvre pour parvenir à une économie circulaire des plastiques à l'échelle mondiale.

Lacunes dans la lutte contre la pollution plastique

Les lacunes dans la lutte contre la pollution plastique s'observent sur différents plans, notamment ceux des connaissances, des politiques, de la technologie, du financement et de la sensibilisation. Plus particulièrement :

- ▶ **Les lacunes concernant les connaissances** entourant les déchets plastiques marins incluent notamment : les quantités et les flux de macro et microplastiques dans les océans, les impacts environnementaux et socioéconomiques des déchets plastiques marins,

1. Les résolutions de l'UNEA-4 concernées sont notamment la résolution 4/6 sur la lutte contre les déchets plastiques et les microplastiques dans le milieu marin (UNEP/EA.4/RES.6), la résolution 4/9 sur la lutte contre la pollution par les produits en plastique à usage unique (UNEP/EA.4/RES.9), la résolution 4/11 sur la protection du milieu marin contre la pollution due aux activités terrestres (UNEP/EA.4/RES.11) et la résolution 4/1 sur les moyens novateurs de parvenir à une consommation et une production durables (UNEP/EA.4/RES.1). La déclaration ministérielle et les résolutions de l'UNEA-4 peuvent être consultées à l'adresse suivante : <https://web.unep.org/environmentassembly/proceedings-report-ministerial-declaration-resolutions-and-decisions>

les comportements humains et les facteurs culturels de la consommation de plastique, ainsi que les outils permettant d'évaluer les solutions sectorielles innovantes. Une plate-forme mondiale d'échange sur la lutte contre la pollution plastique pourrait faciliter la production et l'échange de connaissances, comme le demande la résolution 4/6 de l'UNEA-4 sur les déchets plastiques et les microplastiques dans le milieu marin (UNEP/EA.4/Res.6).

- ▶ De nombreuses initiatives nationales et régionales ont été mises en œuvre à travers le monde, mais il subsiste des **lacunes sur le plan des politiques**. En particulier, les politiques, les accords et les plans d'action coordonnés pour soutenir la mise en œuvre de solutions en amont (agissant à partir des étapes supérieures de la chaîne de valeur par l'application de modes de consommation et de production durables, tels que l'éco-conception, l'extension de la durée de vie des produits et les modèles d'entreprise innovants, etc.), améliorer la recyclabilité, encourager la demande de plastique recyclé et rationaliser la gestion des plastiques en aval sont, dans la plupart des pays et régions, inexistantes et/ou non contraignants. Il est également nécessaire d'accroître la coordination politique mondiale, notamment en termes de réglementations sur les produits chimiques et le gaspillage associé à la pollution plastique.
- ▶ **Les lacunes sur le plan technologique** et de l'innovation sont évidentes dans l'ensemble de la chaîne de valeur des plastiques. Les normes et les directives en faveur de la réutilisation et du recyclage sont insuffisantes. Il est nécessaire de concevoir et de produire des produits en plastique ayant des impacts moindres dans les phases d'utilisation et de fin de vie, ainsi que de meilleures technologies permettant de transformer les matériaux de récupération en produits de grande valeur à haut niveau de recyclabilité. Les consommateurs manquent d'alternatives abordables et durables pour se détourner des produits en plastique à usage unique.

- **Des financements et des mesures incitatives** coordonnés font particulièrement défaut pour soutenir les solutions en amont à la pollution plastique et prévenir les rejets de matières plastiques dans l'environnement, notamment le financement de modèles de conception de produits et d'entreprise innovants, ainsi que de systèmes intégrés de gestion des déchets.

Actions systémiques

Pour remédier à ces lacunes, le présent rapport recommande des **actions systémiques** à tous les niveaux de la chaîne de valeur des plastiques, notamment l'ingénierie des matériaux, la conception de produits et de modèles d'entreprise, les comportements des consommateurs, la gestion des déchets (collecte, tri, recyclage et élimination), ainsi que des actions transversales.

Les actions transversales établissent les conditions qui permettent de mettre en œuvre l'économie circulaire, de couvrir les aspects des connaissances, des politiques, du financement et de la coordination. Elles relient également les actions qui sont proposées à différentes étapes du cycle, afin de s'assurer qu'elles produisent collectivement des effets plus importants tout au long de la chaîne de valeur, tout en tenant compte des arbitrages potentiels. Les actions sur le plan des **connaissances** incluent : l'établissement de nomenclatures et de méthodologies permettant l'évaluation harmonisée des flux, des rejets et des impacts des matières plastiques, avec un échantillonnage cohérent des déchets marins et des microplastiques ; la création de bases de référence nationales et le suivi des progrès avec des indicateurs de mesure et d'évaluation quantitatifs, basés sur cette méthodologie et cet effort de collecte de données.

Les actions sur le plan des **mécanismes politiques et financiers** doivent mettre l'accent sur la réduction de la quantité de déchets plastiques générés, la promotion de la réutilisation et du reconditionnement et l'augmentation de la demande de contenus recyclés (par exemple au travers de normes sur les contenus recyclés, d'engagements volontaires, d'exigences minimales, de marchés publics, etc.). Il est important de développer la politique de responsabilité élargie du producteur et de soutenir sa mise en œuvre, afin d'encourager la conception favorisant la réutilisation et le recyclage, tout en s'occupant des produits en fin de vie en créant des

systèmes de collecte et de recyclage accompagnés de programmes de financement et de plans d'investissement durables. Les mesures économiques, l'interdiction des produits non indispensables, ainsi que les pratiques durables de passation des marchés publics peuvent également compter parmi les outils politiques permettant de ralentir la production et la consommation de produits en plastique à usage unique, par exemple, et de promouvoir la réutilisation et de créer des marchés pour les matériaux recyclés. Une coordination multi-parties prenantes, interrégionale et mondiale est nécessaire entre les pouvoirs publics, l'industrie et la société civile, pour échanger sur les bonnes pratiques et renforcer les capacités au moyen de l'apprentissage par les pairs et de la coopération. Les pouvoirs publics ont toutefois un rôle spécial à jouer étant donné qu'ils fixent l'agenda et définissent les responsabilités des parties prenantes dans les politiques concernées. Une **plate-forme commune** favorisant l'engagement de tous les acteurs concernés serait très utile dans l'élaboration, la mise en œuvre et la coordination des plans d'action visant à lutter contre la pollution plastique à différents niveaux.

Le cadre systémique recommande également des actions sur des thèmes spécifiques ciblant telle ou telle partie prenante, selon les étapes du cycle de vie du secteur des matières plastiques :

- En ce qui concerne **l'ingénierie des matériaux**, il est recommandé de prendre des mesures pour accroître la recherche et les financements dans les matériaux alternatifs et améliorer l'utilisation des matériaux traditionnels pour produire des avantages à l'échelle du système et éviter la charge potentielle d'une réorganisation des étapes du cycle de vie. L'industrie doit mettre au point des processus qui soient capables de transformer les matériaux de récupération en matériaux « bruts » de grande qualité. La recherche sur les nouveaux matériaux qui ne génèrent pas de pollution par les microplastiques est nécessaire, et particulièrement pertinente pour ce qui concerne les fibres synthétiques et les pneus de véhicules. La conception en vue de la recyclabilité doit être appliquée en tant que principe, notamment afin de réduire/éviter les additifs qui rendent les matières plastiques difficiles à recycler. Les pouvoirs publics pourraient interdire ou limiter les matériaux qui présentent un risque élevé de finir dans l'environnement ou peu/pas de chances d'être réutilisés, recyclés ou compostés. Cela doit se faire en fournissant des solutions alternatives et en proposant

Recommandations d'actions

des matériaux de substitution générant moins d'impacts.

- ▶ En ce qui concerne la **conception des produits et les modèles d'entreprise**, la conception en vue de la réutilisation doit être prioritaire, dans la mesure du possible, par rapport à la conception en vue du recyclage, alors que cette dernière doit s'attacher à trouver des alternatives aux additifs qui provoquent des effets néfastes sur l'environnement et la santé humaine. Les marques et l'industrie doivent développer des modèles d'entreprise innovants pour produire des emballages et des produits en plastique non plus à usage unique mais réutilisables, en prêtant une attention particulière à l'élaboration d'alternatives rentables (notamment des alternatives sectorielles pour les produits associés à de forts rejets en phase d'utilisation et pour les produits où les taux de réutilisation et de recyclage sont particulièrement bas). Les pouvoirs publics pourraient mettre en place des interdictions ou des restrictions sur les produits associés à de forts rejets de matières plastiques dans l'environnement (telles que les microbilles).
- ▶ En ce qui concerne **l'utilisation et la consommation de produits en plastique**, il est recommandé de sensibiliser davantage les consommateurs par le biais de campagnes ciblées et efficaces afin de susciter des changements de comportement. Des recherches sont nécessaires pour mieux comprendre ce qui influence les habitudes des consommateurs en termes de consommation, de recyclage et d'élimination des produits en plastique à usage unique. L'industrie doit fournir des informations de durabilité claires et fiables fondées sur la philosophie du cycle de vie, et les pouvoirs publics doivent promouvoir des normes d'étiquetage informant les consommateurs sur les choix plus durables. Il est également recommandé aux pouvoirs publics d'élaborer des politiques sur les pratiques durables de passation des marchés publics afin de soutenir les produits pouvant être réutilisés et les produits contenant des matériaux recyclés.
- ▶ À l'étape **de la collecte, du tri, du recyclage et de l'élimination**, il est essentiel de mettre à niveau les systèmes et les technologies pour assurer une collecte et un retraitement efficaces. Il est recommandé de nouer des partenariats public-privé avec les marques/industries qui contribuent

à la mise en place d'initiatives et d'infrastructures permettant de gérer leurs produits après utilisation. Ces partenariats pourraient notamment améliorer considérablement la gestion des déchets solides municipaux (en particulier les déchets plastiques) et accroître la couverture des eaux usées et des effluents traités dans les stations d'épuration. Il est nécessaire de renforcer l'efficacité de la collecte par les municipalités et les autres canaux de collecte des produits plastiques, notamment en faisant appel au secteur informel, le cas échéant. Les programmes de responsabilité élargie du producteur pourraient aider à promouvoir l'engagement des industries et le financement durable du traitement de leurs produits en fin de vie.

Ces actions devraient être planifiées en suivant les principes de la philosophie du cycle de vie et de l'économie circulaire, de sorte qu'elles ne soient pas fragmentées, mais plutôt reliées entre elles afin d'amplifier l'effet de réduction des impacts pour l'ensemble de la chaîne de valeur.

Actions pour les secteurs et produits prioritaires

Outre les recommandations d'actions systémiques concernant l'ensemble du secteur des matières plastiques, des actions prioritaires ont également été contextualisées pour huit domaines d'intervention (sous-secteur ou catégorie de produit), où les rejets de matières plastiques sont importants et ont des impacts significatifs :

Pour **les emballages (à l'exception des bouteilles PET)** : développer les modèles d'emballages réutilisables et consignés, tout en éliminant l'usage des matières plastiques inutiles et difficiles à recycler. Les alternatives devraient être choisies sur la base de l'analyse d'impact du cycle de vie ; et des actions coordonnées sont nécessaires pour s'assurer que les emballages en plastique atteignent un haut niveau de recyclabilité, notamment en créant des marchés pour les matériaux recyclés, en promouvant des normes d'étiquetage, en améliorant la collecte et le tri, et en finançant et en encourageant le recyclage.

Pour **les bouteilles PET** : fournir des alternatives à l'eau en bouteille, telles que les bouteilles réutilisables et les systèmes de recharge, ainsi qu'une eau du robinet potable ; mettre en place des normes pour

les matériaux et les produits afin de s'assurer que les bouteilles soient recyclables ; et accroître l'application à l'échelle mondiale des programmes de consigne et de reprise.

Pour **les produits en plastique à usage unique** : des actions coordonnées sont nécessaires entre les pouvoirs publics, les ONG, l'industrie et les groupes de consommateurs afin d'éliminer les produits les plus problématiques et inutiles en prenant des mesures incitatives ou dissuasives (interdictions, taxes, etc.).

De telles mesures supposeraient d'évaluer les alternatives dans le cadre d'une analyse d'impact du cycle de vie afin de remédier aux conséquences imprévues. Des conceptions innovantes et de nouveaux modèles de fourniture des produits sont nécessaires pour éliminer la dépendance des consommateurs vis-à-vis des produits à usage unique.

Pour **les textiles** : des recherches doivent être menées afin de bien comprendre où se produisent la majeure partie des émissions de microplastiques tout au long de la chaîne de valeur et d'identifier les interventions correspondantes. Parmi les autres activités importantes figurent l'élaboration de tests standards pour identifier les particules libérées par les différents produits textiles ainsi que les alternatives ; et la promotion de la conception de tissus et de vêtements durables.

Pour **les cosmétiques et les produits d'hygiène corporelle** : les marques doivent élaborer des produits qui ne contiennent pas de microbilles, et il est recommandé aux législateurs d'interdire progressivement l'ajout intentionnel de microplastiques dans les produits.

Pour **le secteur du tourisme** : les principales actions incluent la promotion de modes de conditionnement et de réutilisation innovants et pertinents à l'échelle locale ; et la création de partenariats public-privé pour remédier aux manquements importants dans la gestion des déchets qui sont fréquents dans de nombreuses destinations touristiques.

Pour **la pêche et l'aquaculture** : le principal objectif consiste à éviter la perte d'engins et de matériel. Les actions consistent notamment à : mettre en œuvre des programmes de marquage et de localisation des engins ; élaborer des solutions concrètes pour récupérer les engins, telles que la promotion de la

réparation/réutilisation des engins de pêche ; et s'assurer que les politiques n'encouragent pas les pertes intentionnelles d'engins (par exemple au moyen de taxes portuaires) en mettant à disposition des installations de réception gratuites pour les engins de pêche et les matériels d'aquaculture abandonnés.

Pour **les transports maritimes** : production de données sur les sources et les quantités de matières plastiques émises par le secteur des transports maritimes ; application accrue du système de ports « sans droit spécial » (c'est-à-dire, où le coût du dépôt de déchets dans les installations de réception portuaires est inclus dans le montant payé par tous les navires visitant le port, quelles que soient les quantités déchargées) ; et mesures incitatives pour une meilleure gestion des déchets (telles que les programmes de certification offrant des réductions sur les taxes portuaires).

Pour résumer, les solutions systémiques exigeront que tous les acteurs repensent et redéfinissent l'ensemble du système économique des matières plastiques. Une approche holistique accompagnée d'interventions stratégiques tout au long de la chaîne de valeur des plastiques est nécessaire, et les administrations nationales et locales doivent mettre en place des cadres juridiques et des mesures incitatives adéquats. Il est indispensable que les marques et les industries s'engagent à améliorer la conception en vue de la réutilisation et du recyclage et développent des modèles d'entreprise innovants, et que la société civile conduise des actions de sensibilisation et encourage les changements de comportement. Les actions doivent être mises en œuvre à l'échelle locale, nationale et régionale appropriée, en ajustant les interventions en fonction des conditions socioéconomiques du contexte local et en tenant compte des technologies et des financements disponibles, et adaptées aux différents secteurs de produits/applications plastiques.

De cette manière, on peut parvenir à une vision collective vers un monde débarrassé des effets néfastes du plastique, où les matières plastiques conservent leur valeur maximale tout au long de la chaîne de valeur, où les déchets plastiques ne sont pas rejetés dans l'environnement et ne causent pas de dommages à ce dernier, et où une circularité optimale des matières plastiques est atteinte dans le monde entier.

Рабочее резюме

В условиях постоянного повышения уровня загрязнения окружающей среды пластиковыми отходами и с учетом последствий, которые это может иметь для прибрежных и морских экосистем, борьба с пластиковым загрязнением Мирового океана предполагает принятие неотложных мер. Трансграничный и междисциплинарный характер этой проблемы требует принятия системных мер в отношении стратегии, технологии, управления, финансового, методологического и научного обеспечения, повышения осведомленности и формирования новых поведенческих моделей. Это понимание получило закрепление в Декларации министров и резолюциях четвертой сессии Ассамблеи Организации Объединенных Наций по окружающей среде (ЮНЕА-4)¹.

Основываясь на выводах двух предыдущих докладов об оценке экологического воздействия глобальной производственно-сбытовой цепочки индустрии пластмасс и принятых мерах, в настоящем докладе анализируются «пробелы» в решении проблемы загрязнения морской среды пластиковым мусором на всех этапах производства и сбыта пластиковой продукции, а также предложены меры глобального характера, призванные обеспечить переход к экономике замкнутого цикла в отношении изделий из пластмассы.

Трудности в решении проблемы пластикового загрязнения

Пробел в решении проблемы пластикового загрязнения морской среды проявляются в целом ряде аспектов, в частности в отсутствии необходимых знаний, технологий, стратегического подхода, финансовых механизмов, а также в недостаточной осведомленности. Если говорить более конкретно:

- ▶ Под **отсутствием знаний** понимается недостаточная информация об объемах и циркуляции

1. К числу соответствующих резолюций ЮНЕА-4 относятся: резолюция 4/6 о путях решения проблемы загрязнения морским пластиковым мусором и микропластиками (UNEP/EA.4/RES.6), резолюция 4/9 о решении проблемы загрязнения пластмассовыми изделиями одноразового пользования (UNEP/EA.4/RES.9), резолюция 4/11 об защите морской среды от загрязнения в результате осуществляемой на суше деятельности (UNEP/EA.4/RES.11) и резолюция 4/1 об инновационных путях обеспечения рационального потребления и производства (UNEP/EA.4/RES.1). С декларацией министров и резолюциями ЮНЕА-4 можно ознакомиться по ссылке: <https://web.unep.org/environmentassembly/proceedings-report-ministerial-declaration-resolutions-and-decisions>

пластикового мусора и микропластиков в Мировом океане, об экологическом и социально-экономическом воздействии загрязнения морей пластиковыми отходами, о поведении людей, а также о культуре использования пластиковой продукции и инструментах оценки эффективности предлагаемых отраслью инновационных решений. Предусмотренное в резолюции 4/6 о путях решения проблемы загрязнения морским пластиковым мусором и микропластиками (UNEP/EA.4/RES.6) создание глобальной платформы по обмену информацией в этой области будет способствовать накоплению и распространению соответствующих знаний.

- ▶ Несмотря на предпринимаемые по всему миру многочисленные инициативы национального и регионального характера, по-прежнему ощущается **отсутствие стратегического подхода**. В частности, в большинстве стран и регионов отсутствуют и/или не имеют обязательной юридической силы скоординированные стратегии, соглашения и планы действий, направленные на поддержку реализации упреждающих решений (т.е. на принятие мер на начальных этапах производственно-сбытовой цепочки посредством внедрения устойчивых моделей потребления и производства, таких как использование эко-дизайна, продление срока эксплуатации товара, использование инновационных моделей хозяйствования и т.п.), а также на расширение возможностей вторичной переработки, стимулирование спроса на переработанный пластик и рационализацию использования пластмассы на постпроизводственном этапе. Наряду с этим необходима более эффективная координация стратегий на глобальном уровне, в том числе согласование регламентов в отношении химических веществ и отходов, влияющих на пластиковое загрязнение.
- ▶ **Нехватка технологий** и инновационных разработок очевидна на всех этапах производственно-сбытовой цепочки индустрии пластмасс. Отсутствуют стандарты и руководящие принципы повторного использования и вторичной переработки. Необходимы технологии разработки и производства товаров из пластмассы, которые оказывали бы меньшее воздействие на этапе их использования и после исчерпания ими эксплуатационного ресурса, а также усовершенствованные технологии, позволяющие превращать вторичное сырье в товары с высокой

добавленной стоимостью и высокой степенью переработки. Отсутствуют доступные по цене и экологически безопасные альтернативы, которые позволили бы потребителям отказаться от пластмассовых изделий одноразового пользования.

- ▶ Отсутствие скоординированных **механизмов финансирования и стимулирования**, в частности финансовой поддержки в вопросах разработки современного дизайна продукции, а также внедрения новых моделей хозяйствования и комплексных систем обращения с отходами, является серьезной проблемой для принятия упреждающих решений, направленных на борьбу с пластиковым загрязнением и предотвращением сброса полимерных материалов в окружающую среду.

Принятие мер системного характера

Для ликвидации вышеперечисленных узких мест в докладе рекомендовано принятие **мер системного характера** на всех этапах производственно-сбытовой цепочки индустрии пластмасс, включая разработку перспективных материалов, дизайна и бизнес-моделей, формирование поведенческих привычек потребителей, рационализацию процессов обращения с отходами (сбор, сортировка, переработка и утилизация), а также межотраслевое взаимодействие.

Сквозной подход создает благоприятные условия для развития безотходной экономики и позволяет охватить аспекты, касающиеся знаний, стратегий, финансирования и координации. Он объединяет в себе меры, предлагаемые для реализации на разных этапах производственно-сбытовой цепочки в целях достижения максимального синергетического эффекта и при необходимости выработки компромиссных решений. Меры, направленные на **устранение недостатка в знаниях и опыте**, включают в себя: разработку номенклатуры и методологической основы, которые позволят проводить унифицированную оценку потоков, объемов сброса и воздействия пластиковых материалов путем систематического взятия морских проб на содержание пластикового мусора и микрочастиц пластмасс; установление на основе такой методологии и результатов сбора данных постранных исходных параметров и отслеживание положительных изменений с использованием количественных показателей для измерения и оценки достигнутого прогресса.

Меры в отношении **стратегий и финансовых механизмов** должны быть ориентированы, в первую очередь, на сокращение объемов образующихся пластиковых отходов, поощрение повторного использования и переработки пластика, а также на повышение спроса на материалы вторичной переработки (в частности, путем разработки стандартов качества переработанных отходов, внедрения практики добровольных обязательств, установления минимальных требований, рационализации государственных закупок и т.п.).

Разработка стратегий по расширению ответственности производителей (РОП) и содействие ее реализации будет иметь решающее значение с точки зрения поощрения практики повторного использования и вторичной переработки. Одновременно необходимо позаботиться об утилизации товаров, исчерпавших эксплуатационный ресурс, в частности, путем создания систем сбора и утилизации, подкрепленных соответствующих устойчивыми схемами финансирования и инвестиционными планами. Применение экономических мер для недопущения скапливания неиспользуемых товаров наряду с рационализацией государственных закупок также могло бы стать действенным средством сдерживания производства и потребления, в частности пластмассовых изделий одноразового пользования, и поощрения практики их многократного применения, а также создания рынков материалов вторичной переработки. Необходимо наладить многостороннюю межрегиональную и глобальную координацию усилий на уровне правительственных органов, профессионального сообщества и общественных организаций в целях распространения передовой практики и наращивания потенциала путем обмена опытом и развития сотрудничества. При этом правительствам отводится особая роль учитывая, что именно они определяют повестку дня и сферу ответственности заинтересованных сторон при реализации соответствующей политики. Весьма эффективным с точки зрения поощрения участия всех соответствующих заинтересованных сторон в разработке, осуществлении и координации планов действий различного уровня в области борьбы с загрязнением пластиковыми отходами могло бы стать создание **общей платформы**.

В рамках общих принципов деятельности в докладе сформулированы рекомендации по конкретным направлениям работы, адресованные соответствующим заинтересованным сторонам в зависимости от этапов жизненного цикла пластиковой продукции:

- ▶ В отношении **разработки материалов** рекомендуется принятие мер, направленных на расширение исследований и увеличение финансирования, связанных с разработкой альтернативных материалов, а также на более эффективное применение традиционных материалов в целях достижения общего положительного эффекта и предотвращения возможного перераспределения нагрузки между различными этапами жизненного цикла. Индустрия пластмасс нуждается в разработке технологий, которые позволили бы превращать вторичные материальные ресурсы в высококачественное «исходное» сырье. Необходимы исследования, связанные с использованием новых видов сырья, не грозящих загрязнением микрочастицами пластмасс, что особенно актуально для производства синтетических тканей и автомобильных шин. Принципом должна стать изначальная нацеленность на последующую

Практические рекомендации

переработку, в том числе в интересах сокращения/прекращения использования добавок, затрудняющих переработку пластмасс. Государствам следовало бы запрещать или ограничивать производство материалов, которые, с высокой долей вероятности, в итоге попадут в окружающую среду, либо имеют малые шансы/не имеют таковых вообще для повторного использования, вторичной переработки или превращения в компост. Для этого необходимо предложить альтернативные решения и направить усилия на замещение материалами, которые будут оказывать меньшее негативное воздействие.

► Что касается **разработки дизайна продукции и моделей хозяйствования**, то изначально приоритетное значение во всех соответствующих случаях должно уделяться возможности многократного использования, более важной в данном случае, чем возможность повторной переработки, поскольку последняя продиктована, в первую очередь, необходимостью поиска альтернативы добавкам, оказывающим негативное воздействие на окружающую среду и здоровье человека. Брендovým предприятиям и производителям необходимо расширять внедрение перспективных бизнес-моделей, предусматривающих отказ от одноразовой упаковки и продукции в пользу многоразовой, уделяя при этом особое внимание предложению эффективных с точки зрения затрат альтернатив (в частности, в отношении продукции отрасли, характеризующейся большим объемом отходов в процессе эксплуатации, а также изделий, повторное использование и повторная переработка которых являются экономически неэффективными). Власти могли бы применять запреты или ограничения в отношении изделий, использование которых ведет к попаданию существенных объемов пластика в окружающую среду (в частности, микрочастиц пластика).

► В отношении **использования и потребления продукции из пластика** в докладе рекомендовано повышать уровень информированности населения путем проведения целенаправленных и эффективных информационных кампаний в интересах потребителей, призванных способствовать изменению их поведенческих привычек. Требуется дополнительное исследование, которые позволят лучше понять причины, подталкивающие потребителя использовать, сдавать в переработку или просто выбрасывать пластмассовые изделия одноразового пользования. Производители должны предоставлять ясную и достоверную информацию об экологической безопасности своей продукции, руководствуясь концепцией жизненного цикла; при этом государственные органы должны информировать население о стандартах маркировки, что позволит потребителю делать осознанный выбор, руководствуясь критериями экологичности товара. Наряду с этим правительствам рекомендуется разработать руководящие документы

с целью рационализации государственных закупок и поощрения закупки товаров многократного пользования, изготовленных из материалов вторичной переработки.

► В отношении этапа **сбора, сортировки, переработки и утилизации** важнейшее значение имеет модернизация соответствующих систем и технологий в целях повышения их эффективности. В докладе рекомендовано развивать государственно-частное партнерство с торговыми предприятиями/производителями в целях реализации инициатив и создания инфраструктуры, которые обеспечат рациональное использование их продукции по завершении ее жизненного цикла. Такого рода партнерство позволит существенно повысить эффективность управления твердыми бытовыми (в том числе пластмассовыми) отходами, а также расширить охват системами водоочистки жидких отходов и сточных вод. Эффективность муниципальных и других служб сбора пластмассовых отходов необходимо повысить, в том числе за счет привлечения, где это уместно, возможностей неформального сектора. Применение механизмов расширенной ответственности производителей (РОП) может стимулировать вовлечение предприятий отрасли и обеспечить устойчивый источник финансирования деятельности, связанной с утилизацией товаров из пластмассы, исчерпавших свой эксплуатационный ресурс.

Подобные меры должны планироваться на основе концепции жизненного цикла и в соответствии с принципами безотходной экономики, что исключит их непоследовательное применение и обеспечит синергетический эффект, уменьшив тем самым негативные последствия для производственно-сбытовой цепочки в целом.

Меры в отношении приоритетных областей и категорий продукции

Наряду с рекомендациями системного характера, касающимися пластмассовой отрасли в целом, были также сформулированы приоритетные задачи в отношении следующих восьми конкретных областей (подсекторов или категорий товаров), характеризующихся существенным объемом пластиковых отходов и значительным воздействием на окружающую среду и здоровье человека:

Тара (за исключением ПЭТ-бутылок): расширение практики использования многоразовой и возвратной тары с одновременным отказом от использования необязательной упаковки и трудно перерабатываемых пластмасс. Альтернативные варианты должны отбираться на основе оценки жизненного цикла (ОЖЦ). Необходимо также принятие скоординированных мер, которые обеспечили бы высокую степень пригодности пластиковой тары для вторичной переработки, включая

создание рынка материалов вторичной переработки, поощрение стандартизированной маркировки, повышение эффективности систем сбора и сортировки, а также финансирование и стимулирование вторичной переработки.

ПЭТ-бутылки: предложение альтернативных на замену бутилированной воды вариантов, таких как многоразовые бутылки и возможность повторного их наполнения с одновременным обеспечением доступа к безопасной водопроводной воде; внедрение стандартов для материалов и продукции, которые обеспечили бы пригодность бутылок для вторичной переработки; расширение повсеместного применения схемы депозитов и возврата.

Пластмассовые изделия одноразового

пользования: необходима координация усилий между государственными органами, НПО, промышленностью и группами потребителей в целях отказа от наиболее проблемных с экологической точки зрения и необязательных товаров с использованием системы стимулов/антистимулов (запреты, налоги и т.п.).

Такие меры требуют предложения альтернативных вариантов на основе ОЖЦ в целях исключения непреднамеренных негативных последствий. Для уменьшения предпочтений потребителей в отношении изделий одноразового пользования необходимо предложить им оригинальный дизайн и новые модели доставки товара.

Синтетический текстиль: необходимы исследования для получения более четкого представления о том, какой именно этап производственно-сбытовой цепочки сопровождается выделением основного объема микрочастиц пластмассы из синтетического текстиля, что позволит определить характер требуемых мер. Еще одним важным направлением работы является разработка стандартных тестов для определения объема микрочастиц, выделяемых из разных типов синтетического текстиля и альтернативной продукции, а также содействие в производстве экологически безопасных тканей и одежды.

Косметика и средства личной гигиены: брендовым предприятиям необходимо создавать продукцию, не содержащую микрочастицы пластика; при этом рекомендуется постепенно отказаться на законодательном уровне от намеренного добавления микропластиков в подобную продукцию.

Туризм: в числе основных мер предлагается продвижение актуальных в местном контексте современных моделей упаковки и повторного использования, а также развитие государственно-частного партнерства в целях устранения серьезных сбоев, характерных для многих туристических направлений в плане удаления отходов.

Рыбный промысел и аквакультура: основное внимание направлено на предотвращение утери снастей и

оборудования. Предлагаемые меры включают: осуществление программ маркировки и отслеживания местонахождения орудий лова; разработку конкретных предложений, которые будут мотивировать поиск утерянных орудий лова, например, содействие в ремонте/повторном использовании рыболовных снастей; недопущение того, чтобы действующие правила поощряли преднамеренную утерю снастей (например, портовые сборы) посредством бесплатного предоставления помещений для приема непригодных для использования рыболовных снастей и оборудования для аквакультуры.

Морской транспорт: необходим сбор данных об источниках и объемах сброса пластикового мусора морским транспортом; расширение практики отказа портов от взимания специальных сборов (т.е. включение расходов, связанных с приемом отходов портовыми пунктами приема, в сумму сбора, уплачиваемого всеми заходящими в порт судами, вне зависимости от объема отходов), а также использование мер стимулирования для поощрения более эффективного обращения с отходами (например, выдача свидетельств, дающих право на льготные портовые сборы).

Подводя итог, можно сказать, что принятие общесистемных мер потребует от всех заинтересованных сторон переосмысления и перестройки всей системы хозяйственной деятельности, связанной с пластмассами. Необходим комплексный подход, предусматривающий принятие мер стратегического характера в отношении всей производственно-сбытовой цепочки индустрии пластмасс, при этом от национальных и местных органов власти потребуются создание соответствующих правовых рамок и стимулов. Со стороны брендовых предприятий и производителей потребуются меры, которые повысят конструктивную пригодность товаров для повторного использования и переработки и будут стимулировать поиск инновационных моделей хозяйствования. При этом гражданскому обществу нужно предпринять шаги, которые будут способствовать повышению осведомленности и изменению моделей поведения. Осуществление мер местного, национального и регионального масштаба должно обеспечиваться с учетом социально-экономических условий на местах и наличия соответствующих технических и финансовых возможностей. Эти меры должны быть адаптированы к конкретной категории пластиковых изделий или конкретной отрасли.

При таком подходе может быть достигнуто общее понимание перспектив мира, свободного от негативного воздействия пластмасс, мира, в котором полимерная продукция сохраняет максимальную ценность на протяжении всей цепочки приращения стоимости, мира, в котором пластик не попадает в окружающую среду и не наносит ей вреда, наконец, мира, в котором выстроена глобальная эффективная система замкнутого цикла производства пластиковых материалов.

Resumen ejecutivo

Resulta urgente adoptar medidas para luchar contra la contaminación marina por plásticos, dados los niveles crecientes de desechos plásticos en el medio ambiente y sus repercusiones en los ecosistemas costeros y marinos. El problema de la contaminación por plásticos es transfronterizo y transversal, y requiere soluciones sistémicas que abarquen las políticas, la tecnología, la gestión, la financiación, el conocimiento y la investigación, la concienciación y el cambio de comportamiento. La Declaración Ministerial y las resoluciones de la Asamblea de las Naciones Unidas sobre el Medio Ambiente en su cuarto período de sesiones (UNEA-4) permiten comprender mejor esta cuestión¹.

Con base en las conclusiones de dos informes anteriores sobre la evaluación de la cadena de valor del plástico a nivel global y las medidas existentes, este informe señala las brechas en la lucha contra los plásticos marinos en cada eslabón de la cadena de valor, y por último recomienda medidas encaminadas a lograr una economía circular de los plásticos a nivel global.

Brechas en la lucha contra la contaminación por plásticos

Las brechas en la lucha contra la contaminación por plásticos son evidentes en varios planos, incluidos el conocimiento, las políticas, la tecnología, la financiación y la concienciación. Más concretamente:

- ▶ **Las brechas en el plano del conocimiento** de los plásticos marinos comprenden las cantidades y flujos de macro y microplásticos en los océanos, las repercusiones ambientales y socioeconómicas de los plásticos marinos, el comportamiento humano y las motivaciones culturales del consumo de plásticos, y las herramientas para evaluar soluciones innovadoras

1. Entre las resoluciones pertinentes de la UNEA-4 figuran la resolución 4/6 sobre la basura plástica y microplásticos marinos (UNEP/EA.4/RES.6), la resolución 4/9 sobre combatir la contaminación causada por productos de plástico desechables (UNEP/EA.4/RES.9), la resolución 4/11 sobre la protección del medio marino frente a las actividades realizadas en tierra (UNEP/EA.4/RES.11) y la resolución 4/1 sobre vías innovadoras para lograr el consumo y la producción sostenibles (UNEP/EA.4/RES.1). La Declaración Ministerial y las resoluciones de la UNEA-4 están disponibles en el siguiente enlace: <https://web.unep.org/environmentassembly/proceedings-report-ministerial-declaration-resolutions-and-decisions#>

adaptadas al sector. Una plataforma mundial de intercambio para combatir la contaminación por plásticos podría facilitar la creación e intercambio de conocimientos, como se pide en la resolución 4/6 de la UNEA-4 sobre basura plástica y microplásticos marinos (UNEP/EA.4/Res.6).

- ▶ Se han puesto en marcha numerosas iniciativas nacionales y regionales en todo el mundo, pero las **brechas en las políticas** persisten. En particular, en la mayoría de los países y regiones faltan políticas, acuerdos y planes de acción coordinados para apoyar la puesta en práctica de soluciones en las fases aguas arriba (intervenir en los primeros eslabones de la cadena de valor aplicando modos de consumo y producción sostenibles, como el ecodiseño, la extensión de la vida útil de los productos, modelos empresariales innovadores, etc.), mejorar la capacidad de reciclaje, alentar la demanda de plásticos reciclados, y racionalizar la gestión de los plásticos en las fases aguas abajo, o cuando los hay no son vinculantes. También es necesario ampliar la coordinación de las políticas mundiales, en particular las normas sobre productos químicos y desechos relacionados con la contaminación por plásticos.
- ▶ Las **brechas en el plano de la tecnología** y la innovación son evidentes a lo largo de la cadena de valor de los plásticos. Se carece de normas y directrices para la reutilización y el reciclaje. Es importante diseñar y producir productos plásticos con menos efectos en las fases de uso y fin de la vida útil, y poner a punto tecnologías mejoradas que permitan transformar los materiales secundarios en productos de gran valor con una alta posibilidad de reciclaje. No existen alternativas asequibles y sostenibles disponibles para los consumidores, que les permitan dejar de consumir productos de plástico de un solo uso.
- ▶ Son notables las brechas en **financiación e incentivos** coordinados para promover soluciones aguas arriba a la contaminación por plásticos

aguas arriba en la cadena de valor, y prevenir la fuga de plásticos al medio ambiente, incluida la financiación de modelos empresariales y de diseño de productos innovadores, y sistemas integrados de gestión de residuos.

Medidas sistémicas

Con miras a cerrar estas brechas, este informe recomienda **medidas sistémicas** a lo largo de la cadena de valor del plástico referentes, entre otras cosas, a la ingeniería de materiales, el diseño de productos y modelos empresariales, el comportamiento de los consumidores y la gestión de residuos (recogida, clasificación, reciclaje y eliminación), así como medidas transversales.

Las medidas transversales crean las condiciones habilitantes para poner en práctica la economía circular, y cubrir los aspectos referentes a los conocimientos, las políticas, la financiación y la coordinación. También vinculan entre sí las medidas que se proponen en las diferentes etapas del ciclo, a fin de garantizar que, en conjunto, surtan mayores efectos a lo largo de la cadena de valor, teniendo en cuenta las posibles compensaciones de ventajas y desventajas. Entre las medidas relativas al plano del **conocimiento** figuran el establecimiento de nomenclaturas y metodologías que faciliten la evaluación armonizada de los flujos, fugas y repercusiones de los materiales plásticos, con un muestreo coherente de basura marina y microplásticos; así como la creación de líneas base nacionales y el seguimiento de los progresos con indicadores cuantitativos para la medición y la evaluación, partiendo de dicha metodología y la actividad de recopilación de datos.

Las medidas referentes a **mecanismos políticos y financieros** deben centrarse en la reducción de la cantidad de residuos plásticos generados, la promoción de la reutilización y la remanufactura, y el aumento de la demanda de contenido reciclado (por ejemplo, mediante normas sobre el contenido reciclado, compromisos voluntarios, requisitos mínimos, contratación pública, etc.). Es indispensable formular una política de responsabilidad ampliada del productor y respaldar su aplicación para fomentar el diseño orientado a la reutilización y el reciclaje, al mismo tiempo que se toman en cuenta los productos al final de su vida útil estableciendo sistemas de recolección y reciclaje con planes de financiación e inversión sostenibles. Las

medidas económicas, la prohibición de productos innecesarios y las adquisiciones públicas sostenibles también pueden ser herramientas de política para frenar la producción y el consumo de productos de plástico de un solo uso, por ejemplo, y para promover la reutilización y crear mercados para los materiales reciclados.

Es necesaria una coordinación de múltiples partes interesadas, interregional y mundial entre los gobiernos, la industria y la sociedad civil para intercambiar mejores prácticas y desarrollar la capacidad por medio del aprendizaje entre pares y la cooperación. Sin embargo, los gobiernos cumplen una función destacada, dado que fijan la agenda y definen las responsabilidades de los interesados en las políticas pertinentes. Una **plataforma común** que fomente la participación de todos los interesados sería muy útil para elaborar, ejecutar y coordinar planes de acción que permitan luchar contra la contaminación por plásticos a diferentes escalas.

En el marco sistémico también se recomiendan medidas sobre temas determinados dirigidas a actores específicos, según las etapas del ciclo de vida del sector de los plásticos:

- ▶ Para la **ingeniería de materiales** se recomiendan medidas para ampliar la investigación y la financiación de materiales alternativos, y mejorar el uso de los materiales tradicionales para obtener beneficios en todo el sistema y evitar el posible desplazamiento de problemas ambientales entre las etapas del ciclo de vida. La industria necesita crear procesos que sean capaces de transformar los materiales secundarios en materias "primas" de alta calidad. Resultan indispensables las investigaciones sobre nuevos materiales que no produzcan contaminación por microplásticos, lo que es especialmente importante para las fibras sintéticas y los neumáticos de vehículos. Un diseño que tenga en cuenta la posibilidad de reciclar debe convertirse en un principio, en particular para reducir/evitar los aditivos que dificultan el reciclaje de los plásticos. Los gobiernos podrían prohibir o restringir los materiales con una gran probabilidad de terminar en el medio ambiente o con poca o ninguna posibilidad de ser reutilizados, reciclados o convertidos en abono. Esto debe hacerse ofreciendo soluciones alternativas y dando orientación sobre sustituciones con menos efectos.
- ▶ Para el **diseño de productos y modelos empresariales**, se debe dar prioridad al diseño

Recomendaciones para la acción

orientado a la reutilización, siempre que sea posible, frente al diseño que permita el reciclado, mientras que este último debe centrarse en la búsqueda de alternativas a los aditivos que tienen repercusiones adversas en el medio ambiente y la salud humana. Las marcas y la industria deben ampliar modelos empresariales innovadores para fabricar empaques y productos de plástico reutilizables en lugar de desechables, prestando especial atención a encontrar alternativas rentables (en particular, alternativas sectoriales para productos con altas pérdidas en la fase de uso y productos con tasas de reutilización y reciclado especialmente bajas). Los gobiernos podrían aplicar prohibiciones o restricciones a los productos que emiten grandes cantidades de plástico en el medio ambiente (como las microesferas de plástico).

- ▶ Para el **uso y consumo de productos plásticos**, se recomienda sensibilizar en mayor medida al consumidor mediante campañas de consumo específicas y efectivas que susciten un cambio de comportamiento. Las investigaciones son necesarias para comprender mejor las motivaciones del comportamiento de los consumidores con respecto al consumo de plásticos de un solo uso, el reciclaje y la contaminación. La industria debe proporcionar información clara y fiable sobre sostenibilidad basada en el pensamiento de ciclo de vida, y los gobiernos deben promover normas de etiquetado para dar a conocer a los consumidores opciones más sostenibles. También se recomienda a los gobiernos que establezcan políticas de adquisiciones públicas sostenibles para apoyar alternativas reutilizables y los productos con contenido reciclado.
- ▶ En la fase de **recolección, clasificación, reciclaje y eliminación**, es fundamental perfeccionar los sistemas y la tecnología para una recolección y reprocesamiento eficientes. Se recomienda entablar alianzas público-privadas con las marcas/la industria, que contribuyan a crear iniciativas e infraestructura para la gestión de sus productos después del uso. Estas alianzas podrían, en particular, mejorar significativamente la gestión de los residuos sólidos municipales (en particular los residuos plásticos) y ampliar la cobertura de las aguas residuales y los efluentes tratados en las plantas de tratamiento de aguas residuales. Debe mejorarse la eficacia en la recolección por parte de los municipios y otros

canales de recolección de productos plásticos, entre otras cosas promoviendo la participación del sector informal cuando sea pertinente. Los planes de responsabilidad ampliada del productor podrían ayudar a impulsar la participación de la industria y la financiación sostenible del tratamiento de sus productos al final de la vida útil.

Estas medidas deberán idearse siguiendo los principios del pensamiento del ciclo de vida y la economía circular, de modo que no funcionen de manera fragmentada, sino que se vinculen entre sí para ampliar el efecto de reducción de los impactos en toda la cadena de valor.

Medidas para los sectores y productos prioritarios

Además de las medidas sistémicas recomendadas para todo el sector del plástico, también se han contextualizado medidas prioritarias para ocho áreas de enfoque (subsector o categoría de producto), donde las emisiones de plástico son sustanciales y sus impactos significativos:

Para los **envases y empaques (excluidas las botellas PET)**: generalizar los modelos de embalajes reutilizables y retornables, eliminando así el uso de plásticos innecesarios y difíciles de reciclar. Deberán seleccionarse las alternativas sobre la base de la Análisis de Ciclo de Vida (ACV), y aplicarse medidas coordinadas para garantizar que los embalajes de plástico alcancen un alto nivel de posibilidad de reciclaje, incluida la creación de mercados para materiales reciclados, la promoción del etiquetado estandarizado, la mejora de la recogida y la clasificación, y la financiación e incentivo del reciclaje.

Para las **botellas PET**: ofrecer alternativas al agua embotellada, como botellas reutilizables y sistemas de rellenado, junto con el suministro de agua corriente segura; aplicar normas para los materiales y productos a fin de garantizar que las botellas sean reciclables; y aumentar el establecimiento de modelos de depósito y retorno.

Para los **productos plásticos de un solo uso**: se necesitan medidas coordinadas entre los gobiernos, las ONG, la industria y los grupos de consumidores para eliminar los artículos más problemáticos e innecesarios gracias a incentivos o desincentivos (prohibiciones,

impuestos, etc.). Tales medidas requerirán el análisis de alternativas según la ECV para hacer frente a las consecuencias imprevistas. Se precisan diseños innovadores y nuevos modelos de suministro de productos para cambiar la dependencia de los consumidores en productos de un solo uso.

Para los **textiles**: se requieren estudios para comprender claramente dónde se produce la mayor parte de liberación de microplásticos de los textiles en la cadena de valor, y establecer las medidas correspondientes. Otras actividades importantes son la elaboración de pruebas estándar para determinar las liberaciones de diferentes productos textiles y sus alternativas; y la promoción del diseño de tejidos y ropa sostenibles.

Para los **cosméticos y productos de cuidado personal**: las marcas tienen que crear productos que no contengan microesferas de plástico, y se recomienda a los legisladores que prohíban gradualmente la adición intencional de microplásticos a los productos.

Para el sector del **turismo**: las medidas clave incluyen el fomento de modelos de empaque y reutilización innovadores y apropiados al contexto local; y el establecimiento de alianzas público-privadas para corregir las fallas en la gestión de residuos que son frecuentes en muchos destinos turísticos.

Para **la pesca y la acuicultura**: el objetivo principal consiste en evitar la pérdida de aparejos y equipos. Algunas de las medidas son las siguientes: poner en marcha programas de marcado y rastreo de aparejos, idear soluciones concretas para la recuperación de aparejos tales como incentivos para la reparación/reutilización de aparejos de pesca, y garantizar que las políticas no favorezcan las pérdidas intencionadas de aparejos (por ejemplo, las tasas portuarias) poniendo a disposición instalaciones de recepción gratuitas de aparejos de pesca y equipos de acuicultura desechados.

Para el **transporte marítimo**: generar datos sobre las fuentes y las cantidades de plásticos emitidos por el sector del transporte marítimo; y aplicar en mayor medida el sistema de puertos "sin tasa especial" (es decir, en los que el coste de la entrega de residuos a las instalaciones portuarias receptoras de desechos está incluido en la tasa que pagan todos los buques que llegan al puerto, independientemente de las cantidades descargadas) e incentivos para una mejor gestión de

los residuos (como los sistemas de certificación que ofrecen descuentos en las tasas portuarias).

En resumen, las soluciones sistémicas requerirán que todas las partes interesadas reconsideren y rediseñen el sistema económico de los plásticos en su totalidad. Se necesita un enfoque holístico con medidas estratégicas a lo largo de toda la cadena de valor de los plásticos, y que los gobiernos nacionales y locales establezcan los marcos legales y los incentivos apropiados. Resulta muy necesario que las marcas y la industria pongan en práctica medidas para mejorar el diseño con miras a la reutilización y el reciclaje y estudien modelos empresariales innovadores, y que la sociedad civil se esfuerce por crear conciencia y fomentar un cambio de comportamiento.

Las medidas deben aplicarse en el plano local, nacional o regional, según corresponda, ajustando la acción a las condiciones socioeconómicas del contexto local, teniendo en cuenta la disponibilidad técnica y financiera, y adaptándose al sector específico de productos y aplicaciones de los plásticos.

De esta manera, será posible lograr una visión colectiva que nos acerque a un mundo sin repercusiones nefastas de los plásticos, donde los plásticos mantengan su mayor valor a lo largo de la cadena de valor, en el que no haya fugas de plásticos que causen daños al medio ambiente, y donde se logre una circularidad óptima para los materiales plásticos en todo el planeta.



Introduction

This report is developed by the United Nations Environment Programme (UNEP) under the Global Environment Facility (GEF) funded project: Addressing Marine Plastics – A Systemic Approach. The recommendations identified in this report arise from a research-based approach, informed by desktop studies and analysis. They are also built on the background research conducted by UNEP² and two multi-stakeholder consultation workshops³ under the GEF project, which highlighted hotspots, problematic products and polymers, and key areas of intervention along the global plastics value chain. These recommendations have been validated through stakeholder consultations and peer review.

The report is structured in a logical manner as below: Section 1 of the report summarises the gaps to address marine plastics in the areas of knowledge, policy, technology and action, and awareness and financing. Section 2 looks at the barriers and opportunities to addressing marine plastics across the plastics value chain, along with the actions needed to seize the opportunities. Section 3 provides recommendations for actions in specific priority sectors where plastic losses are substantial and/or impacts on the marine environment are high. The report finalises with concluding remarks in section 4.

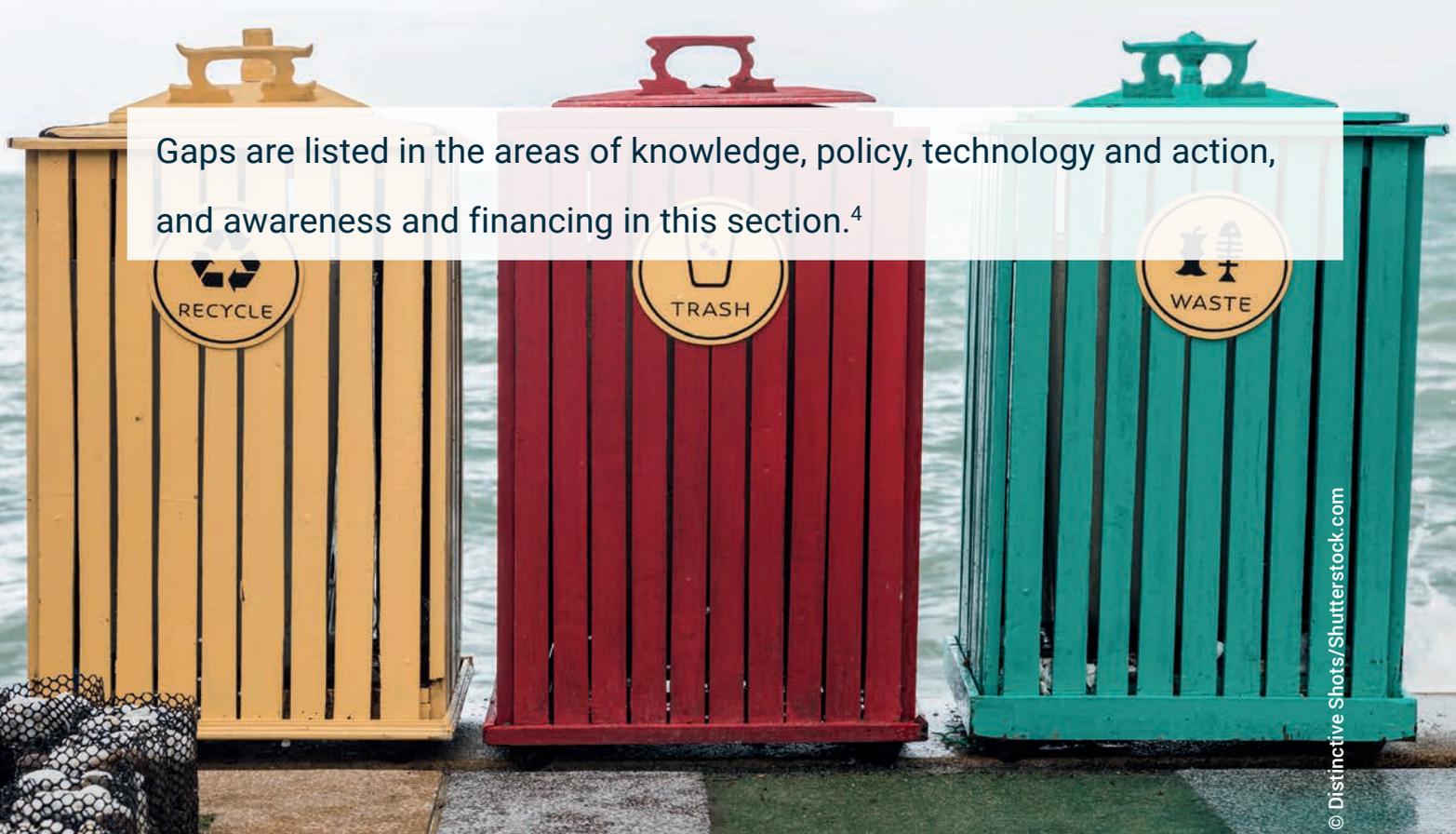
2. Two reports have been published by UNEP under this project:

- a) The Addressing marine plastics: A systemic approach - Stocktaking report takes stock of the extent of knowledge on plastics in the marine environment. It provides a high-level summary of the available literature on the key sources and locations of marine plastics, and the problem products and polymers making up marine plastics and microplastics. It also looks at what is currently being done to address the problem and summarizes existing policy responses, <https://gefmarineplastics.org/files/2018%20Stock%20taking%20report%20on%20marine%20plastics%20-%20final%20version.pdf>
- b) The report on "Mapping of global plastics value chain and plastics losses to the environment - with a particular focus on marine environment" provides a comprehensive global mapping of plastic losses to the environment throughout the plastic value chain using 2015 as the reference year. This mapping covers plastics production and processing, use of plastics or plastic containing products, and disposal of the products. It differentiates 23 types of plastics and 13 plastic applications, including division between macro- and microplastics, <https://gefmarineplastics.org/files/2018%20Mapping%20of%20global%20plastics%20value%20chain%20and%20hotspots%20-%20final%20version%20r181023.pdf>
3. Two multi-stakeholder consultation workshops have been held by UNEP under this project. Each workshop convened around 40 participants across a range of nationalities and stakeholders, including industry, academia, non-governmental organisations (NGOs), not-for-profits (NPOs), regional and national government and intergovernmental organisations from a marine litter background and from a life cycle/circular economy plastics background. Reports of the two workshops can be found from: <https://gefmarineplastics.org/publications>



1

Gaps to address marine plastics



Gaps are listed in the areas of knowledge, policy, technology and action, and awareness and financing in this section.⁴

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1.1. Gaps in knowledge

Material flows

The gap in knowledge on plastic material flows is in part due to a lack of common terminology, monitoring methodologies and coordinated research and monitoring efforts. This has led to calls for a global exchange platform, such as that called for in Resolution 4/6 on Marine Plastic Litter and Microplastics of the United Nations Environment Assembly at its Fourth Session.

4. Gaps are identified based on a literature stocktaking of marine plastics and its environmental and socio-economic impacts, along with the policies and actions being undertaken to address the problem (UNEP 2018a). The review draws on several key reports by UNEP, GESAMP, IUCN, Ocean Conservancy and others on marine plastics quantities, impacts and policy responses, for example (GESAMP 2015; SCBD 2016; UNEP 2016b, 2016c, 2017; UNEP and GRID-Arendal 2016), as well as on the wider scientific literature on marine plastics. Gaps were also elicited from experts in a multi-stakeholder consultation workshop under the GEF project.

Data on waste generation and characterisation, and on the management of plastic wastes, is insufficient. There is also a lack of consistent information on sources and volumes of plastics entering the marine environment by product and polymer type, and by geographical region. The mass of plastics entering the ocean from shipping and fishing activities is not presently known (Lebreton et al. 2018). Accumulation, transportation and distribution of plastic litter via various pathways as well as through oceanic transportation between countries and regions still constitute gaps in our understanding. Further understanding of biodegradation and fragmentation of plastics in the marine environment is required for models to better predict concentrations and end-locations of plastics in the oceans. In particular, how plastics behave once they have entered the ocean and how they breakdown are not yet well understood.

Impacts on marine environments and human health

It is known over 800 species are affected by marine plastics, however there are gaps in identifying the most vulnerable species to plastics and characterising the impacts of marine plastics on the ingestion, migration and reproduction activities of marine fauna and flora. Potential interactions between the impacts of plastics and other stressors are also not well characterised. The lack of consistent methodologies for measuring impacts is an impediment to prioritising interventions; whilst without global and regional marine impact indicators it is not possible to monitor baselines.

In addition to the impacts on marine wildlife caused by the ingestion of microplastics, there is also the risk to human health when consuming seafood contaminated by plastics. The inability to observe the potential effects of ingested microplastics at the nanoscale particle size is a notable gap. In addition, the role plastics play in the marine environment as a carrier of bacteria and Persistent Organic Pollutants (POPs) and other chemicals of concern needs to be further understood.

Marine plastic pollution already fulfils two essential conditions for a planetary boundary threat: 1) it is spread at global scale; 2) its effects are not readily reversible. The disruptive effect on vital Earth-system processes is still unknown and requires further understanding, especially on the role chemicals and additives in plastics play in this regard (Villarrubia-Gómez, Cornell, and Fabres 2018)

Economic and social costs of plastics in the environment

The economic costs of plastics, when considered from a life cycle perspective, are not well quantified. This includes the direct costs of marine plastic litter on commercial fishing, shipping, recreation and tourism, as well as indirect human health costs that are harder to quantify.

The social impacts of marine plastic litter are a notable gap, including, amongst other aspects, the fact that the collection and recycling of plastic wastes in most developing economies are handled by the informal sector. Initiatives to improve solid waste management and recycling in developing economies thus need to consider the livelihoods of millions of people, often the elderly and women, working in the informal waste sector, whilst recognising the health risks and hazardous working conditions faced by these vulnerable communities.

Human behaviour and the value of plastics

Consumer purchase behaviour and individuals' choices on waste management are poorly understood. Furthermore, there is insufficient understanding of cultural conventions, gender aspects and the role plastics play in enabling people to accomplish everyday tasks (Andrady et al. 2015). Comprehending these aspects of human behaviour is required to identify the most successful interventions in different parts of the world to drive down the habitual and routine consumption of single-use plastic products.

There have been few studies evaluating the effectiveness and outcomes of initiatives on public education and consumer information campaigns. Such knowledge is needed to guide the design of future initiatives and develop regionally and globally coordinated actions.

Tools to assess sector- and material-relevant solutions

The social and environmental impacts of interventions to relevant sectors need to be better assessed across the whole life cycle, with effective tools to evaluate the sustainability of plastics and their potential alternatives. The ability to conduct comprehensive assessment of plastics and their alternatives are gaps in current life cycle impact assessment models.

1.2. Gaps in policy

Policy responses to marine plastics range from global instruments such as MARPOL (The International Convention for the Prevention of Pollution from Ships), UNCLOS (United Nations Convention for the Law of the Sea) and the Honolulu Commitment and Strategy, through regional action plans such as the Regional Plan on Marine Litter Management in the Mediterranean, to specific product bans at municipal or national level. While 127 countries have taken some form of action on single-use plastic bags, only 27 have taken action on other types of single-use plastic products and 8 have taken action on microbeads (UNEP 2018d). However, recent assessments have found that there are currently no agreements on a global level that comprehensively address marine plastics in an integrated manner (UNEP 2017, 2019).

Policies, agreements or action plans that support the implementation of upstream solutions to shift (either reduce or transform) plastic production need to be coordinated with those that aim to improve recyclability, incentivise demand and increase markets for recycled plastics. There is a need to further develop increased global policy coordination, including coordination with chemicals and waste regulations.

Production and consumption of plastics

Making affordable products with clear environmental benefits over their life cycle available to consumers is an important enabler of sustainable consumption. Actions taken by countries have predominantly been in the form of taxes, product bans and waste disposal fees, whilst the use of incentives as a mechanism to drive consumer behaviour towards options favouring a circular economy, is a gap. Greater innovation is required in policies to enable, for example, rewards for consumers that decrease the consumption of less sustainable products and for increasing recycling. Successful experience from bottle deposit schemes

and reward schemes, such as discounts and cash-backs, can be used as good examples.

Policies and incentives to encourage plastic converters to increase their use of secondary (recycled) plastic is a gap. This is especially needed under market conditions where there is a price incentive for using primary (virgin) plastic. Similarly lacking are policies and incentives encouraging design for recycling, and policies and legislation requiring plastics to be free of chemicals of concern, which together will increase the potential for plastic products to become high-grade secondary material at end-of-life. Policy support to create stable markets for secondary (recycled) plastics is a notable gap.

Management of plastics at end-of-life

There are no coherent, binding global instruments that relate to waste management and prevention of the entry of plastic waste into the environment. An exception is the May 2019 amendment to the Basel Convention to include plastic waste in a legally-binding framework that will make global trade in plastic waste more transparent and better regulated, whilst also ensuring that its management is safer for human health and the environment. The amendment requires that exporting countries obtain consent from countries receiving contaminated, mixed or unrecyclable plastic waste. The amendment will come into force in January 2021. At the same time that the amendment was passed, a Plastic Waste Partnership was established in order to mobilise business, government, academic and civil society to improve and promote the environmentally sound management of plastic waste at the global, regional and national levels and to prevent and minimize its generation.

The action plans relating to marine litter (including plastics) and microplastics that have been developed under the Regional Seas programmes provide a good starting point for engagement with industry but are fragmented and challenged by a lack of binding agreements to underpin them (UNEP 2017). Only the Mediterranean Action Plan is legally binding.

Providing enabling conditions through policy is necessary to improve the management of plastics and prevent them from entering the environment. Solid waste management, including the collection, disposal and recycling of solid wastes, and the management of wastewater is a sovereign function, and is mostly the mandate of institutions operating at the sub-national level. Local governments, especially in developing nations, often lack the skills and funding to adequately carry out these management functions. Stakeholder consultation, monitoring and enforcement are notable gaps in many countries that have implemented plastics end-of-life management, be it recycling targets or landfill taxes.

1.3. Gaps in technology and action

Production and consumption of plastics

Gaps from a plastic production and conversion perspective are: applying technologies allowing higher levels of recycled content; transforming secondary materials into high-value products that are themselves recyclable; reducing/eliminating additives that prevent recyclability and/or increase environmental impacts; and scaling-up the implementation of innovative product designs and alternative materials.

A further gap is sector-relevant solutions to reduce or eliminate emissions of microplastics that arise during the use of products. For example, developing new materials that do not shed microfibrils during the washing of textiles or prevent the loss of nanoparticles of rubber from the wear and tear of tyres.

There is a lack of sustainable and affordable alternatives available to consumers. In most instances, consumers do not have the option of avoiding single-use plastic products. This is especially true for low-income consumers, and particularly problematic as small-format packaging targeting low-income consumers tends to have the highest plastic intensity.

Management of plastics at end-of-life

In many parts of the world there is an urgent need for improved solid waste management, facilitated by improved infrastructure for collection and treatment of waste, and achieved through implementation of integrated waste management systems.

Development and adoption of systems for the retention of microplastics in wastewater treatment is similarly required, along with systems for the disposal of sludge from wastewater treatment works to ensure microplastics are not washed back into water bodies. Extending the coverage of wastewater treatment plants, particularly to include stormwater runoff, is also required.

1.4. Gaps in awareness and financing

Coordinated financing to support resource efficiency in the manufacturing and conversion of plastic products and to better manage plastics at end-of-life is a gap. Raising awareness is equally important for implementing systemic changes.

Production and conversion of plastics

A shift away from the design of single-use products towards design for reuse and recyclability and the creation of a market for recycled products and reuse will require considerable awareness raising in brand owners and industry and in policy makers. Furthermore, much confusion and misinformation exist (such as on biodegradable plastics), thus clear guidance on sustainable alternatives and best practice is required to enable brand owners and product designers to choose materials and designs with the lowest plastic losses and lowest environmental impacts.

Besides a handful of “innovation prizes”, financing to develop innovative products that allow reusability or avoid plastic losses are generally lacking, as is financing for bringing new innovative materials to market.

Gaps in consumer awareness around the use and disposal of plastics

Access to information on the plastics content of products and on the potential impacts of plastics in products is a gap. Brand owner/retailers, as well as public authorities, should provide consumers with reliable sustainability information about their products, needed to inform consumer behaviour change towards more sustainable choices.

Creating awareness around littering and promoting responsible recreation are measures that are still lacking in many parts of the world. Education and awareness campaigns are needed to drive up acceptance of products made from secondary materials and to drive down consumer choice of non-recyclable products and packaging, as well as driving consumer participation in recycling programmes.

2

**Recommended
actions to
address marine
plastics along
their life cycle**



A systemic view of the plastics value chain highlights the connections between the value chain stages. Systemic opportunities to address the loss of plastics into the environment and ultimately into the sea occur at various intervention points in the value chain, and are often interdependent and reinforcing. The actions that can be applied at the different value chain stages to realise these opportunities are discussed in the following sections, along with the necessary enabling conditions to overcome the barriers.



2.1. Cross-cutting enabling conditions

Opportunities

The concepts of circularity and resource efficiency respond to the need for a transition towards the sustainable consumption and production of plastic products. These approaches apply a systemic perspective to the improvement of product systems as a whole.

It is estimated that USD 80-120 billion in material value lost to the economy annually from single-use plastic packaging alone, which underlines the opportunity for a plastics circular economy (Ellen MacArthur Foundation 2016). The opportunity for circular economy in plastics is inherently cross-cutting as circularity requires collaboration of stakeholders across the value chain. It requires demand for sustainable products, design of products for reuse and recovery along with new business models, markets for recovered material, and systems and technology for efficient collection and reprocessing.

A number of government policies and instruments provide the opportunity to accelerate change across the plastics value chain, including:

- ▶ Bans of problematic products and materials, such as plastic bags and microbeads;
- ▶ Taxes and levies on problematic products;
- ▶ Design requirements;
- ▶ Taxes on virgin materials;
- ▶ Information based instruments for consumer information;
- ▶ Collection and recycling requirements and targets; and
- ▶ Minimum recycled content.

There is an opportunity to take inspiration from those that have implemented measures, such as the EU's single-use plastics directive⁵, in which specific measures are introduced to reduce the use of the most frequently littered plastic products.

Barriers

The lack of harmonised standards and coordination across the plastics value chain results in a diverse range of materials, formats, labelling, sorting and reprocessing systems, which prevents cost-effective material recovery. Furthermore, without the necessary collaborative mechanisms, the environmental benefits across the value chain might not be achieved.

The low cost of single-use plastics – or the fact that the market does not consider the high external costs of plastics – is a barrier as alternative materials and alternative business models are unable to compete on cost. Consequently “green solutions” have tended to penetrate only high-end applications.

Policy instruments cannot function effectively in isolation and especially if their application is not coordinated across the value chain. For example, achieving recycling targets requires products of suitable designs available to be recycled, as well as markets for the recyclate. Furthermore, adopting and implementing new regulations and legislation takes time, and once in place, they require compliance and enforcement to be effective.

Achieving systemic changes across the plastic value chain requires considerable innovation in materials, in business models, in shifting consumer behaviour towards choices consistent with a circular economy and in recovering and reprocessing materials at end-of-life. A barrier to innovation is the general lack of funding, especially in bringing solutions to scale.

5. Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2019.155.01.0001.01.ENG

Recommendations for action

A common platform for all value chain stakeholders to define coordinated approaches to reduce plastic pollution, analogous to what has been achieved for climate change, is recommended. Amongst other actions, the platform should include a global monitoring section to inform priority actions and action plans, which would serve as a repository for best practices, case studies, guidelines and other resources. This is crucial as collaboration between stakeholders across the plastics value chain is a prerequisite to developing the coordinated approaches needed for sustainable consumption and production and circularity.

The platform should also facilitate the spaces for exchange at **regional, sub-regional and national levels**. In addition to regional approaches, the platform should facilitate sector-based approaches. Sectors identified through “hot-spots” assessments, for example, the value chains of packaging, fishing gears and synthetic fibres, could be the subject of task teams with stakeholders assembled to develop sector-relevant actions.

The platform should link to **complementary actions under the 2030 Agenda for Sustainable Development**.

Progress on many of the Sustainable Development Goals not explicitly related to oceans, such as Goal 6 on “Clean Water and Sanitation” and Goal 12 on “Sustainable Consumption and Production”, will also contribute to addressing plastic pollution. Partnerships and coordinated actions around water and waste management, poverty reduction and education are important levers to addressing the multi-faceted problem of marine plastics.

Actions are needed to secure funding for innovative and sector-relevant solutions, especially **funding to move solutions from research to implementation** at a scale where they can deliver benefits. A global platform, as well as, regional, sub-regional and national approaches can play a key role to coordinate, continue and extend funding on systemic initiatives to address plastic pollution. Collaboration between governments, the

private sector and the finance community needs to be strengthened through regular exchange of innovations.

UNEA-4 Resolution 4/6 on marine plastic litter and microplastics (UNEP/EA.4/RES.6) calls for a multi-stakeholder platform to be established within the United Nations Environment Programme. The platform is called to take immediate action towards the long-term elimination, through a life cycle approach, of discharges of plastics into the oceans, by strengthening coordination and cooperation between stakeholders whilst building on existing initiatives. The functions that the UNEP multi-stakeholder platform may include, as outlined in the Resolution, will fulfil many of the needs identified above. Furthermore, other multi-stakeholder initiatives and working groups, such as the Basel Convention’s partnership on plastic waste, and the Ad Hoc Open-ended Expert group on marine litter, established by the United Nations Environment Assembly to advance relevant response options to marine plastic litter, are similarly addressing these needs in part. The various groups and initiatives underscore the need for a global platform to coordinate activities and ensure initiatives reinforce and build on each other.

Building on the work of the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP)⁶, it is important to have **harmonised definitions, data and research** for marine plastics and microplastics. Harmonised global methodologies will allow consistent national and regional baselines on marine plastics and plastic wastes to be developed, necessary for the monitoring and evaluation of interventions. Along with baselines, SMART⁷ targets should be developed by countries to drive measurable progress on reducing plastic pollution.

A **complete inventory of policy instruments** and their respective scope in addressing plastics is required. This should be extended to compiling **best**

6. Guidelines for the Monitoring and Assessment of Plastic Litter in the Ocean (GESAMP 2019) and Sources, fate and effects of microplastics in the marine environment (Part 1 & Part 2) (GESAMP 2015, 2016)

7. Specific, Measurable, Achievable, Realistic and Timely (SMART)

practice guidelines on the implementation of policy instruments to support the transition to a circular plastics economy.

International organisations can play an active role in disseminating best practices to governments by exploiting synergies with existing global processes. Through the proposed global platform, countries can share their experiences implementing different types of policy instruments, and provide guidance to peer countries with similar geographical and political contexts.

Notwithstanding the need for a global platform, the need for a globally binding agreement on plastics is recognised. The widespread lack of governance to reduce marine plastics, the global nature of the plastics industry and the transboundary nature of marine plastic pollution means that this issue will not be solved by any one country, or group of countries, acting alone.

Comprehensive life cycle assessments (LCAs) and the waste hierarchy⁸ should be used to guide policy and actions on marine plastics. Assessments that look at the whole value chain (such as LCAs) are also needed to ensure collaboration across the value chain is occurring, for example, appropriate product design and good collection systems are required at end-of-life to provide clean, uncontaminated materials for recycling.

Life cycle based assessment tools are required to assess the consequences of actions to be taken, including substitutions of plastics with newly developed materials, reuse models and alternatives for managing plastics materials at end-of-life. Further development of life cycle-based assessment tools is needed. In particular, life cycle impact assessment methods must be able to fully capture the environmental and health impacts associated with marine litter and microplastics. This is essential so that the environmental and social impacts of marine litter and microplastics can be meaningfully weighed up against other global environmental problems, such as climate change and water scarcity.

8. The waste management hierarchy indicates an order of preference for sustainable waste management and demonstrates that first and foremost policy should take action on preventing waste generation. This is followed by reduction, recycling, recovery and lastly disposal (UNEP 2015b)

2.2. Material engineering: raw material and polymer production

Opportunities

There are opportunities to develop inexpensive and lightweight materials that can be used as alternatives, including innovations with traditional materials as well as the development of non-plastic materials.

Plastics made from natural resources (biomass) present an opportunity to remove the dependency of plastics on fossil fuels and to reduce the climate impact associated with plastics production (with the condition that the biomass is sustainably sourced). Plastics that degrade to benign substances under ambient conditions, such as Polyhydroxyalkanoates (PHA), also present an opportunity for reduced impacts at end-of-life.

Additionally, there have been significant developments in materials produced from unconventional feedstocks, such as fungal mycelium (mushrooms), edible materials, nano-cellulose and algae. These materials have properties allowing them to fulfil the functions of conventional plastics but degrade completely to elements found in nature at their end-of-life. Developments in 3D printing present an opportunity for the increased uptake of alternative materials, since 3D printing overcomes barriers to injection-moulding that were formerly present for alternative materials.

There are also opportunities within existing plastic materials. Plastic is a material capable of being recycled, with certain resins and polymers achieving higher recycling rates than others. There are thus opportunities to shift to resins with the highest recycling capability and to further develop this property of resins. In particular, single-polymer materials have higher value as secondary materials, whilst removing certain additives and pigments increases

Recommendations for action

the purity, and consequently increases the value of the recycled material.

Barriers

A barrier to the evaluation and adoption of alternatives to conventional plastic materials is the confusing and often misleading terminology and claims around these materials. Obtaining clarity on what is meant by “bio-plastics” is thus essential to understanding the barriers and potential environmental benefits, where the “bio” in bio-plastics can refer to either the feedstock from which the plastic is made (bio-based) or to its ability to break down at rates faster than conventional plastics (biodegrade), or both. Common terms and definitions around bio-plastics are given in Table 1.

There are currently no internationally agreed upon standards for biodegradable plastics, resulting in ambiguous product information on biodegradable packaging. Plastics that are certified as biodegradable or compostable require specific conditions to decompose and most often do not degrade in seawater and other natural environments. Biodegradable plastics are also not necessarily bio-benign, and may release toxic substances during degradation. Furthermore, there is a risk that biodegradable plastics will lock-in the mind-set of single-use plastic products consumption and littering, and for most biodegradable plastics degradation in natural environments has been shown to be only marginally faster than conventional plastics and still occurs too slowly for negative impacts to be avoided.

Biodegradable plastics have to be kept separate from conventional plastics at end-of-life, else the secondary products of both plastic types will be compromised, i.e. compost contaminated with conventional plastics and recycle contaminated with biodegradable plastics.

The additional waste infrastructure to sort, collect and compost biodegradable plastics is a barrier, especially in countries already struggling to provide basic waste management services.

Table 1. Terms and definitions around bio-plastics

Term	Definition
Bio-based	Plastics produced from renewable feedstocks such as corn, potatoes and sugarcane. Bio-based plastics contribute to a growing competition for renewable resources, increasing commodity prices and accelerating the conversion of natural land to agricultural land. Particular attention should therefore be placed on the source of biomass used to produce the materials. Bio-based plastics that are able to be produced from agricultural residues offer a greater opportunity for circularity, increasing the efficiency of existing agricultural systems and reducing the risk of competition with renewable resources for food production.
Biodegradable	“Biodegradation” is a process by which material disintegrates and is decomposed by micro-organisms into elements that are found in nature, such as CO ₂ and water. Plastics are typically labelled “biodegradable” if they break down at a faster rate than conventional plastics. Biodegradable plastics can be manufactured from renewable feedstocks or fossil fuels.
Compostable	“Composting” is enhanced biodegradation under managed conditions, predominantly characterised by forced aeration and natural heat production resulting from the biological activity taking place inside the material. The resulting output material, compost, contains valuable nutrients and may act as a soil improver. Compostable resins will degrade during composting but do not contribute to the compost product, since they do not contain nutrients in their composition.
Industrial composting	Most compostable plastics only break down in reasonable timescales under the conditions occurring in industrial composting facilities, i.e. at temperatures above 50°C. Standards exist to specify the conditions and time required in order for a material to be labelled as compostable.
Home composting	Home or backyard compostable refers to plastics capable of breaking down at the soil temperatures and conditions found in domestic compost piles.
Oxo-degradable / oxo-biodegradable / oxo-plastics	Plastics that contain additives that causes them to break down under favourable conditions, most often UV radiation or heat. Due to these additives, the plastic fragments over time into plastic particles, and finally microplastics, with similar properties to microplastics originating from the fragmentation of conventional plastics. Complete degradation into water and CO ₂ is yet to be proven, raising concerns that oxo-degradable plastics contribute to the negative impacts of microplastics.

Sources: (UNEP 2015a, 2018b)

A lack of transparency on the composition of plastic materials and a lack of data on their impact pathways in natural environments means that the full impacts of plastics are not adequately modelled by impact assessment models. This makes it difficult to identify chemicals of concern present in plastics, and to compare the impacts between plastics and their alternatives in order to support decision-making. For instance, the potential for bioaccumulation of toxic compounds up the food chain are not fully understood.

Additives and materials comprised of mixtures of resins reduce the value of secondary materials and create a barrier to recycling. Greater responsibility for their products at end-of-life is an enabling condition for polymer producers and plastic converters to develop materials with high recycling value.

Recommendations for action

There is a need for research and funding into **alternative materials** as well as the **use of traditional materials**. Alternatives should be **assessed for potential burden shifting**, i.e. transferring environmental and socio-economic impacts up or down the value chain or between environmental impacts. Life cycle assessment (LCA) is suggested as a tool to evaluate alternatives.

There is also a need for research into **new materials that do not shed microplastics**. This is particularly relevant for synthetic fibres and vehicle tyres.

Research and innovation are required to improve the efficiency of recycling. Achieving circularity in the plastics value chain will require industry to take on design for recyclability principles. On the polymer production side this means finding alternatives to certain additives and resins that currently prevent recycling or only find application in recycling at low levels. Alternatively, industry needs to develop processes that are able to transform secondary materials that currently are “down-cycled” (if recycled at all) into high quality “raw” materials. Currently, the responsibility is on recyclers to handle the secondary

material produced, but it should equally be on the producers. Better integration between the beginning and end-of-life actors is a requirement. Companies are moving forward with agreements to purchase feedstock derived from used plastics. Further voluntary actions by industry and government policies to encourage growth of such actions is needed.

A related need is for industry to apply design for sustainability principles. In particular to **find alternatives to additives that cause adverse environmental and human health impacts**.

Governments also have a role to play here, banning or otherwise restricting chemical additives and resins (or mixtures thereof) with negative health and environmental impacts. Given the global nature of the plastics trade, coordination and guidance to governments from international and regional conventions is crucial in this regard.

Degradation of biodegradable plastics is significantly slowed or halted in marine and freshwater environments, and as such, **biodegradable plastics are currently not a viable solution to marine plastic pollution**. Consumers must be educated and provided with clear and correct product information, such as product labels clearly stating how the product should be handled after use, and infrastructure for correct disposal must be available and easily accessible.

2.3. Design of product and business model

Opportunities

There are changes that can be made at the polymer conversion and product design stages of plastics production that present opportunities to reduce products becoming waste after use. Circular economy business models promote resource efficiency and innovation, optimising the recovery of materials or regenerating products at their end-of-life. There are also

Recommendations for action

opportunities to redesign products to reduce or entirely avoid packaging.

There is an opportunity to reduce or eliminate packaging materials by **designing reusable products and packaging materials**. An example is reusable shopping bags that are already promoted at many stores. The design of reusable products needs to be linked to shifts in consumer behaviour and provides an opportunity to encourage and create awareness in consumers (see Section 2.4). Consumer education on reusable options should include responsible use of reusable products so as to achieve the desired sustainability outcomes. Options should be assessed over their whole value chains, such as done in LCAs, to avoid potential burden shifting, i.e. transferring environmental and socio-economic impacts between the value chain stages. Reverse logistics, which has been proven successful for beverage bottles, presents a successful example with potential for expansion, especially considering the rise in online shopping and home delivery.

There are several **design opportunities to improve rates of plastic collection for recycling**. Certain distinctive designs could facilitate easier sorting for recycling, making materials easily distinguishable from each other. For example, Coca Cola's distinct bottle shape assists informal pickers and recyclers to identify a reliable source of PET. Other design elements include standardised icons and labels, which clearly show the material used and are detectable by automated sorted technology.

Design for disassembly enables mixed materials to be easily separated to facilitate recycling, whilst **design for recycling** maximises the recovery rate of materials by removing the barriers to recycling. For plastic products, this is achieved by using high-value recyclable plastics that are easy to identify and sort. Multi-material packaging is only possible to recycle into low value products. Designing single-polymer plastic products and reversible adhesives enables simplified recycling and increases the value of the secondary material (OECD 2018).

Other design opportunities to reduce plastic production and waste generation include **designing repairable and durable products and packaging** and offering **product-as-a-service**. Service-related business offerings, as opposed to selling physical products, have the potential to decouple economic growth from the consumption of physical items.

Barriers

The barriers to circular business models and innovative design include cost, unintended negative effects and limited commercial-scale opportunities. Barriers to overcome include:

- ▶ **Design for recycling:** A lack of markets for recycle, and a lack of engagement between recyclers, waste managers and packaging designers regarding innovations in design.
- ▶ **Design for durability and reuse:** The higher cost of durable products relative to those designed with planned obsolescence, as they are designed to be long-lasting and to be repairable. These higher production costs are passed on to consumers, creating therefore a barrier to widespread adoption, especially in low-income households.
- ▶ **Removing additives and designing reversible adhesives:** These innovations are still at the laboratory and conceptual stage, and further development is required to produce cost-competitive products (Ellen MacArthur Foundation 2016).
- ▶ **Chemical markers:** These are at an early stage of development, with food-grade markers currently at the pilot stage (Ellen MacArthur Foundation 2016).

A barrier embedded in the business model of the plastics industry is the high product throughput required to attain acceptable payback times for capital investment; a result of the typically low unit value of plastic products and the high capital costs of manufacturing machinery. Achieving the needed

high product throughput requires plastic resins of consistent, specific properties. Machinery able to work within only a narrow range of very specific resin properties is a major contributing factor to the multitude of different grades of plastics currently hindering recycling. Furthermore, it is also the reason why it is so difficult to incorporate post-consumer recycled resins into plastic feedstocks, since recycled resins have varying physical properties.

Recommendations for action

Brands and retailers need to think outside of “business as usual” and **develop business models related to the reuse of products**. Design for reuse needs to be prioritised, wherever possible, over design for recyclability, in accordance with the waste hierarchy. Actions to change the focus to “reduce and reuse” require the involvement of brands and retailers along with the producers of plastic products and consumers.

Comprehensive value chain assessments, such as LCA, should be used in the design of solutions to ensure collaboration across the value chain and avoid potential burden shifting between the value chain stages.

Governments have a role to play to require industry to take responsibility for their products after their use, and especially to move away from single-use products. **Extended Producer Responsibility (EPR)** requirements have been found to work well in certain markets, especially in promoting material recovery at end-of-life and in encouraging a return to durable packaging. Economic measures (taxes/levies) have been successful at moving consumers to reusable plastic bags when effectively implemented and alternatives are available to consumers. Regulations in the form of bans are relevant for certain products, especially when alternatives (that have demonstrated to be the more sustainable choice by life cycle studies) exist and the plastic use is avoidable.

Achieving a circular plastic economy will require industry to take on **design for recyclability** principles.

On the product design side this means moving towards product delivery systems that avoid difficult to recycle packaging formats, such as certain polymer mixtures (additives and pigments), printing practices and multi-layered materials.

Going hand-in-hand with actions to increase recyclability is the need for actions to **secure markets for recycled materials** and to provide **incentives to increase the use of secondary materials** over primary plastics. Governments and industry need to work together to ensure a legislative environment that promotes recycled content in plastic products; for example, refining legislation (where this can be done without compromising safety) that prevents secondary material content. Minimum recycled content standards and recycled content requirements as part of sustainable public procurement policies are potential measures.

Brands and industry need to design consumer **products with lower associated plastic losses** and move away from products with intentional plastic losses (such as microbeads in cosmetics and abrasive cleaners). The producers of products with plastic losses in their use phase, both intentional and through “wear and tear”, need to put greater resources into researching alternatives and towards working with their consumers to prevent plastic losses. Governments have a role to play in restricting products with high plastic losses, especially where alternatives are available (e.g. microbeads in consumer products).

Industry should continue to strengthen initiatives for zero loss of pre-production pellets, building on the success of Operation Clean Sweep⁹. Initiatives must focus not only on production losses, but also on transport losses, with preparedness measures for accidents and extreme weather events in place.

9. Operation Clean Sweep is an international industry program designed to help resin handling operations implement good housekeeping and containment practices to prevent pellet, flake, and powder loss to the environment: <https://www.opcleansweep.org/>

2.4. Consumer behaviour

Opportunities

Consumers play a pivotal role in preventing plastics from getting into the environment and ultimately into the oceans. There are opportunities to reduce the consumption of plastics and to reduce the generation of plastic waste, thereby reducing plastics in the environment. These opportunities can be realised by changing consumer behaviour through awareness and education tools, and/or by using market-based measures, such as incentives. Market-based measures include deposit-refund systems, tradable recycling credits and waste disposal fees.

Public awareness and education campaigns, especially targeting youth and children, are crucial tools to encourage behavioural change and facilitate consumers to make informed purchasing decisions. This is particularly important for countries that do not have adequate waste management systems in place. The prevailing assumption that women are the main decision-makers around household consumption oversimplify gender dynamics in the household (UNEP 2016a). Thus, awareness and education campaigns need to be aware of - and be sensitive to - gender dynamics and purchasing “power” in different local contexts. Nonetheless, evidence that women play important roles as major household consumers (and sometimes as decision-makers), together with indications that women are potentially more engaged than men with sustainability issues (UNEP 2016a) means that campaigns should recognise the significant role women play in driving the needed change.

Given the widespread use of smartphones and social media, awareness-raising tools on these platforms can reach a wide and diverse audience and lead to informed purchasing habits and an increasing demand for sustainable substitutes. Other tactics include

documentaries and short-films, and advocacy and activism through public events, such as beach clean ups.

There are opportunities for brands and retailers to work with their customers to scale up the adoption of reusable packaging, including (Ellen MacArthur Foundation 2016):

- ▶ Packaging designed to be refilled at home: for example, reusable dish washing liquid containers, where the active ingredient is shipped in concentrate form to refill containers;
- ▶ Reusable packaging home delivery: where product is delivered in reusable containers and then returned for refill; and
- ▶ Reusable packaging stores: consumers are encouraged to bring their own containers and use self-service weighing machines to buy grocery products.

There are also opportunities to develop reusable business-to-business packaging, with four possible models for the application of business-to-business reuse systems (Ellen MacArthur Foundation 2016):

- ▶ Individual adoption: the use of reusable containers and reverse logistics within one company;
- ▶ Single-industry pooling as a service: a reuse system operated by a third-party organisation and offered as a service to an industry;
- ▶ Multi-industry pooling as a service: a reuse system based on several operators across industries; and
- ▶ Physical internet: an entirely new logistics model that transforms the way physical objects are moved, stored and supplied in a manner analogous to how the Internet moves packets of information from a host computer to another host computer.

Barriers

Consumers in low-income countries may not have the luxury of choosing products based on their plastic content or design, and may be unable to afford durable,

reusable products, despite the longer-term cost and environmental savings these offer.

A significant barrier is a lack of alternatives. Whilst educating consumers to make sustainable consumption choices is critical, providing consumers with alternatives and with clear, understandable product labels are essential for them to be able to make such choices.

Cultural norms, entrenched gender roles and the culture of convenience are also significant barriers that need to be overcome. Through understanding consumers' needs, alternatives that meet these needs, whilst providing more sustainable options, can be better devised.

Recommendations for action

Continued actions are needed to drive **sustainable consumption and production**. Resolution 4/6 on marine plastic litter and microplastics (UNEP/EA.4/RES.6) requests UNEP, through its 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, to elaborate guidelines on plastic use and production in order to inform consumers (including on standards and labels), to incentivise businesses and retailers to commit to sustainable practices and products, and to support governments to promote the use of information tools and incentives to foster sustainable consumption and production.

Actions to drive sustainable consumption of plastics are strongly aligned with actions to achieve SDG 12 on Sustainable Consumption and Production. In particular, sustainable consumption requires all consumers to have access to sustainable alternatives. Service-oriented alternatives should be explored, as they tend to lead to reusable options and increased product stewardship. Delivering sustainable alternatives will require the participation of brand owners, retailers, consumers and governments. In particular, actions are required to **increase consumer awareness to inform consumer behaviour change**. This goes hand in hand

with a requirement for brands/industry to provide to consumers **reliable sustainability** information, that is understandable, reliable and **based on LCA**, and for governments to promote **labelling standards** to ensure such information is provided to consumers.

Sustainable Public Procurement can create markets for sustainable solutions and offer a concrete pathway for governments to lead by example.

Research is needed to better **understand consumer behaviour**, particularly around the drivers for consumer choices, gender roles in household consumption choices and the effectiveness of consumer education campaigns to **prevent littering and promote recycling**. Barriers to consumers adopting sustainable practices are currently not well researched, and without this understanding, consumer education campaigns may have less impact than expected. Such research - and the ensuing actions - need to be within specific economic and cultural contexts (including personal identities, gender and values), and recognise the wide diversity in global consumers.

2.5. Collection, sorting, recycling and disposal

Opportunities

Collection is the basis of any integrated waste management system and is key to addressing plastic leaking into the environment. There are opportunities to significantly improve collection rates through investment and public-private partnerships. Identifying solutions that are both profitable and impactful is critical for mobilising capital from a variety of investors, as is exploring opportunities to access funding from novel and alternative funders. For example, crowd funding was used to fund the Ocean Cleanup in 2014, mobilising over \$2 million in 100 days¹⁰. There are also

10. <https://theoceancleanup.com/milestones/crowd-funding-campaign/>

opportunities to improve collection via technological innovations and advancements.

Informal collectors remove high-value plastics for recycling from the waste stream, thereby preventing plastic from entering the environment and supporting the livelihoods of millions of people. There is an opportunity to engage with the informal sector by supporting local waste cooperatives and decentralised collection networks and by providing equipment, accompanied with social protection. This provides opportunities especially for women, who are more often involved in voluntary and informal waste collection activities than men, and as such, are at higher risk to the adverse health impacts associated with working in close contact to waste (UNEP-IETC and GRID-Arendal 2019). There is also opportunity for incentives and investment programmes to enhance the capacity of informal collectors to collect both low and high-value plastic.

Sorting can be done at source (i.e. at households and businesses generating the wastes) or after collection at material recovery facilities (MRFs). Source separation avoids contamination with organic waste and improves the quality and yield of recyclables, allowing a higher degree of automation and reducing costs. Several innovative sorting technologies for plastics have emerged, presenting opportunities for enhanced material recovery.

Recycling levels of plastics remain low across the globe, despite its potential as a circular material. This is largely attributed to a lack of markets for secondary

materials. There is therefore a need to create a market for after-use plastic, providing economic incentives to develop collection and recycling infrastructure. Furthermore, plastics with high after-use value are less likely to leak into the environment, especially in countries with an informal waste sector. There are several opportunities to support and transform the recycling market, such as standardised material specifications, improved mechanisms to match supply and demand and increasing the demand for recycled content through industry commitments, policy measures and consumer purchasing options (Ellen MacArthur Foundation 2016).

There are three types of recycling for conventional plastics: mechanical open-loop recycling, mechanical closed-loop recycling and chemical recycling, described in Table 2. Creating viable recycling markets requires moving away from mechanical open-loop recycling, in which materials are recycled into applications requiring lower grade materials, towards mechanical closed-loop recycling, in which materials are recycled into applications of similar quality. Chemical recycling can be seen as complementary to mechanical recycling, potentially providing recycling options for materials that cannot be recycled by mechanical methods.

Advances in mechanical recycling processes, such as advanced cleaning and chemical extraction, can assist the required shift from open-loop to closed-loop recycling. Nonetheless, design for recyclability presents the most cost-effective and environmentally preferable opportunity (see section 2.3). Investments in commercial

Table 2. Types of recycling applicable to conventional plastic polymers

Type	Description	Opportunities	Barriers
Mechanical open-loop	Materials are sorted, shredded and recycled into lower grades; suitable only for lower value, non-packaging applications	Widespread	Secondary applications are not recyclable after use
Mechanical closed-loop	Recycles materials into the same application or applications produced with materials of similar quality	Keeps the quality of materials at similar levels by recycling materials into the same or similar applications	Requires high grade input materials (clean, sorted recyclables)
Chemical recycling	Breaks down the polymers into the individual monomers that can be used as feedstock to reproduce polymers	Good option for materials that cannot be mechanically recycled e.g. multi-layer materials	Currently not widespread, with value chain agreements being developed to enable greater scaling

scale chemical recycling facilities represents a shift towards the use of plastic waste as a feedstock.

Integrated waste management systems (IWMS) offer the potential to fully assess the life cycle impact of decisions around waste management, and encompass all the aspects required to be considered for effective handling of plastic material at end-of-life, including collection and sorting, processing (for recycling or reuse) and disposal (waste to energy or landfill). The more recent Plastic Waste Partnership (established in May 2019) extends this aim to improve the environmentally sound management of plastic waste at the global, regional and national levels, with the aim of preventing and minimising the generation of plastic waste.

Landfill disposal is the least preferable waste management option for plastics at end-of-life. Nonetheless, disposal in a managed sanitary landfill is still preferable to informal disposal and littering. Regulations restricting the siting of landfills, for example, prohibiting the construction of landfills near the coast or near wetlands, inter-tidal areas and nature reserves, help to keep plastic wastes out of sensitive environments.

Barriers

The main barrier to collection is cost. The cost of waste management and collection is typically paid for by citizens, businesses and governments through taxes and levies. Consequently, high income countries tend to have higher rates of collection than low income countries. Mountainous countries and those with scattered small islands face specific challenges, where lack of scale and high transport and logistics costs prohibit effective collection.

Whilst informal waste collectors play a valuable role in the recycling economies of many countries, their collection methods can contribute to plastic leakage and tensions can arise when efforts are made to formalise the recycling economy. Incorporating informal waste collectors into formal collection schemes has found to be challenging as they are often

not interested in being part of the formal economy or cannot legally be employed, and potentially increase the liability of waste management companies (e.g. through non-compliance with labour legislation). It therefore requires tackling much larger societal issues of poverty and marginalisation, while providing informal collectors with the necessary training, protection measures and job security. It is also important to address gender inequalities in education and access to employment, otherwise it is likely that women – who play a significant role in the informal waste sector in most countries - will be left out when the sector formalises (UNEP-IETC and GRID-Arendal 2019).

Waste collection and **sorting** need to be tailored to the situation, with low waste density areas (rural areas) having different solutions to high waste density areas, for example, manual sorting rather than automatic sorting (Ocean Conservancy 2015). Furthermore, effective on-going consumer education, recognising the role women play in the management of household waste, is required to ensure households participate and effectively manage and separate their waste.

Whilst automated sorting technologies hold promise, their adoption is limited partly because they are still in development (such as marker technology) or are limited by the capital cost (such as optical sorting technology). Their application also depends on the availability of clean, dry recyclables, i.e. depends on collection systems being in place. Sorting on its own is generally not profitable unless the sorters are being paid by processors further down the value chain or cost savings are being generated by reducing the volume of waste being sent to landfill (for example, in countries with high landfill costs). Cross-subsidisation of costs is only feasible for the higher value plastic recycling streams (primarily PET and PE), with lower value, harder to recycle plastics unlikely to be sorted and recycled without additional funding and support (for example, with industry funding, as might be required by Extended Producer Responsibility, either voluntary or legislated).

Insufficient investment in waste management is a major barrier to effective Integrated Waste

Recommendations for action

Management Systems (IWMSs), especially in Asia, Africa and Latin America, as is the limited market for recycled plastics. The variety of plastics and plastic products, coupled with the presence of additives, adhesives and other contaminants, makes plastics difficult to sort and adds costs to the recycling process. Whilst advances in recycling technologies are promising, these are not feasible solutions for most recycling businesses. A far more cost-effective solution is for producers to work with recyclers to avoid the need for expensive processing downstream. Furthermore, advanced recycling processes require more water and energy for cleaning than simple mechanical processing and thus may have higher environmental impacts.

For a certain fraction of plastics, such as contaminated plastics, mechanical recycling is not possible.

Chemical recycling technologies, such as pyrolysis and gasification, are increasingly offering a solution to convert contaminated and other non-recycled plastics into raw material feedstocks for the chemical industry. Waste to energy can generate higher returns than disposal without energy recovery, with incineration the most common form of waste to energy. Barriers to waste to energy include the capital investment required for infrastructure, the risk that waste to energy creates demand for plastic waste, diverting materials away from recycling and reuse, and the generation of pollutants. Thus waste to energy is not considered as an option contributing to building circularity in our economies.

In some cases, legislation around waste management, such as restrictions on where it can be processed and how it can be transported, as well as restrictions around what products waste can be made into can also hinder the recycling of plastic wastes (both mechanical and chemical recycling).

Recommendations for action

The development of public-private partnerships is recommended to address the lack of waste management infrastructure. This is especially needed in fast developing economies, where waste

management infrastructure has not kept up with rapidly increasing consumption. Such partnerships will require **government actions (legislation)**, as well as **industry action/engagement** to cover the cost of infrastructure.

Industries need to become involved in waste management, with producers taking responsibility for the end-of-life management of their products.

Volatility in secondary material markets means that plastics recycling businesses often fail without support for collection networks and for markets for recyclate when there is a downturn. It is recommended that producers play a far greater role here: as financiers (or co-financers) of collection and sorting schemes (as local governments often lack the resources) and as generators of markets for the recyclate produced. Extended Producer Responsibility (EPR) programmes - both voluntary and legislated - have shown effective in driving industry involvement in product end-of-life. At the same time, government policies should promote circular thinking and limit regulatory barriers associated with the recycling of plastic wastes.

Plastic waste fractions that currently have low/no recycling value (such as plastic laminates) particularly require government actions. This is needed to drive producers either towards using alternative materials or to developing effective recycling processes and secondary markets for such materials.

Integrated solid waste management is recommended, where end-of-life processes with the least environmental cost and greatest socio-economic benefit are implemented for **all waste fractions**.

And end-of-life/waste management solutions need to be **specific to the geographical and cultural context**. Waste management is most often the responsibility of local government, but many local governments, especially in developing countries, lack the resources, skills and/or capacity to implement national government policies for integrated solid waste management. **Better integration between national and local government** is thus needed. Furthermore, local government institutions responsible for waste management require **support from industry**, such as through public-private partnerships, which can be

encouraged by national government policies. Local governments need to be capacitated to better manage plastics at end-of-life, i.e. to prevent their leakage into the environment and to enable their collection for reuse/recycling/recovery. It is recommended that local governments - working in collaboration with national governments, researchers, waste management companies and producers - collect data on plastic volumes and types of plastics in municipal solid waste and **maintain national databases on the treatment and disposal of solid wastes**. This is needed as the current lack of data hampers the design of effective policies and treatment options for plastics at end-of-life.

In line with **improving solid waste management**, there is a similar requirement for improving wastewater management. Public-private partnerships are similarly

required to increase the coverage of wastewater treatment infrastructure to ensure microplastics in wastewater are prevented from reaching rivers and the sea. The efficacy of wastewater treatment technologies to capture micro and nanoplastics needs to be further explored and new cost-effective technologies developed to prevent microplastics from entering water bodies.

National governments, supported by international and regional organisations, need to **provide the capacity and funds to comply with the requirements of the Basel Convention**, specifically the May 2019 amendment that comes into effect in January 2021, requiring exporting countries to obtain consent from countries receiving contaminated, mixed or unrecyclable plastic waste.



3



**Recommended
actions to
address marine
plastics in priority
products and
sectors**



This section recommends actions in specific products and sectors. The products and sectors - packaging, PET bottles, single-use items, textiles, cosmetics and personal care products, tourism, fishing and aquaculture, and shipping - were chosen because of the volume of their losses to, and impact on the marine environment, based on the background research by UNEP (UNEP 2018c). The recommended actions were informed by a multi-stakeholder consultation workshop¹¹.

11. Two multi-stakeholder consultation workshops have been held by UNEP under this project. Reports of the two workshops can be found from: <https://gefmarineplastics.org/publications>

3.1. Packaging (excluding PET bottles)

Packaging accounts for approximately 30% of global plastic use. Being a short-lived product, packaging has an even higher share of plastic waste. For example, packaging accounted for 39.9% of plastic demand in Europe in 2015, but for 59% of plastic waste (in 2015). Actions addressing plastic packaging will thus have the largest impact on reducing plastic waste volumes.

A priority action is to reduce plastic packaging wherever possible, for example, through **increased application of reusable and returnable packaging models**, and to **eliminate unnecessary and difficult to recycle packaging**. This will require innovation by brands and producers; actions by retailers and civil society to raise awareness, put pressure on brands and build acceptance by consumers; and actions by governments to provide legislative support, as appropriate (for example, by implementing deposit-refund schemes).

With appropriate actions, plastic packaging should be able to attain high recycling levels. Actions required include:

- ▶ Actions **to create markets for recycled material**, especially by governments, for example through **recycled content standards** and sustainable public procurement, but also through voluntary actions by leading brands;
- ▶ Actions by international organisations, industry bodies and governments to develop – and implement - **standardised product labels** (to identify material content for recycling) and **efficient collection and sorting systems** for efficient and cost-effective material recovery;
- ▶ Actions by governments, working with industry, to incentivise the **financing of recycling technology** and find ways to lower the costs of recycling infrastructure.

Table 3. Recommended actions for packaging

Action (value chain stage)	Stakeholders by whom the actions should be taken	Action at global/regional/ national level
Tackle unnecessary and excessive packaging, for example, through innovative designs, new materials and reusable models (Design of products)	<ul style="list-style-type: none"> ■ Consumer groups and civil society (create awareness); ■ Brands, retailers and industry bodies (voluntary actions); ■ Governments (legislative actions) 	Global or national (depending on the brand); National (if regulations on industry)
Build markets for recycle (Raw materials; Design of products)	<ul style="list-style-type: none"> ■ Governments (public procurement, recycled content standards, financial measures); ■ Consumer groups and civil society (build public acceptance); ■ Brands, retailers and industry bodies (voluntary actions) 	National
Enable financing of recycling infrastructure (e.g. incentivise investment, lower costs etc.) (Collection, sorting, recycling)	<ul style="list-style-type: none"> ■ Governments; ■ International organisations 	National (with international support)
Standardise collection and sorting of recyclables (Collection, sorting, recycling)	<ul style="list-style-type: none"> ■ Governments, local authorities, waste management companies and industry bodies; ■ International organisations (coordinating role) 	National, with international coordination (e.g. on recycling labels and marking technology)

3.2. PET Bottles

Over 400 billion PET bottles were produced in 2016 (almost 20,000 per second), with production increasing at over 3% per year. PET bottles are particularly buoyant, and water and soft drink bottles are consistently amongst the items found in the greatest number in coastal clean-ups. PET is however the polymer with the highest recycling rate in a number of countries, although only 7% of PET collected at end-of-life is recycled into new bottles. There is thus high potential for actions to eliminate water and soft drink bottles from landing up in the environment.

An action for governments is to put in place material **quality standards to ensure recyclability**. This should include measures to address anything negatively affecting recyclability, for example, **banning colour pigmentation** in bottles (since clear PET has high recycling value but coloured PET low/no value). Actions

by governments can be complemented by actions by brands, such as distinctive **bottle designs** to clearly identify them as PET and thus of having high recycling value, and designs whereby the cap is connected to the bottle to ensure it is collected as well.

Actions that ensure the bottle has a high value at end-of-life, such as **deposit and return schemes**, significantly increase the likelihood that bottles are recovered after use rather than discarded.

Actions are also required from civil society (consumer groups and NGOs) - supported by international organisations and governments – to **promote alternatives to single-use water bottles**. Reusable alternatives are widely available, but innovative subsidisation models might be necessary in low income countries, along with the provision of safe and affordable drinking water.

Table 4. Recommended actions for PET bottles

Action (value chain stage)	Stakeholders by whom the actions should be taken	Action at global/regional/ national level
Implement bottle standards to ensure they are recyclable, pertains to choice of polymer, additives, adhesives and labels etc. (Plastic conversion; Design of products)	<ul style="list-style-type: none"> ■ Governments; ■ Industry bodies; ■ International organisations 	National, with international coordination
Promote alternatives to bottled water, such as promoting safe tap water and refill campaigns (Use)	<ul style="list-style-type: none"> ■ Governments; ■ Civil society; ■ Consumer organisations 	National
Ban colour pigmentation in bottles preventing recycling (Design of products)	<ul style="list-style-type: none"> ■ Industry (voluntary action); ■ Governments (legislative action) 	National or global
Implement bottle deposit schemes (Use)	<ul style="list-style-type: none"> ■ Governments 	National

3.3. Single-use plastic products

Single-use plastic items are consistently amongst the top items found in the marine environment. The top items found in beach litter generally reflect consumer demand in different regions, and the following items are found in the highest numbers¹²: bottles, cups, food containers, packets and wrappers, straws, cutlery and stirrers, carrier bags, lids, cotton bud sticks, lollipop sticks, sticks for balloons, cigarette filters, wet wipes, sanitary towels and nappies (diapers). These short-lived items are consumed in high volumes, and because they make up a high proportion of municipal solid waste, they also have high prevalence in mismanaged waste leaked to the environment. Furthermore, many of these products are convenience items designed to be consumed on-the-go, and thus often end up as litter even in countries with good municipal waste management.

An action for governments, in partnership with NGOs, industry and consumer groups, is to identify the

most problematic and unnecessary single-use plastic items and institute measures to eliminate them (where environmentally preferable alternatives exist). Measures can be in the form of disincentives, such as bans or taxes, or in the form of incentives. In all cases, **unintended consequences must be considered** by conducting environmental and socio-economic assessments that consider the life cycle and a broad range of potential environmental and social impacts.

A further action for governments, in partnership with industry, is to implement policies that encourage **innovative designs of products**, and require industry to take responsibility for their products at end-of-life so as to increase material recovery and reuse. Policies that are supportive of **new product delivery models** (for example, refillable packaging models) are also needed.

Actions are also needed by governments, NGOs and consumer groups to **modify consumer behaviour**, such as through campaigns that raise awareness and educate citizens, alongside providing incentives for consumers to choose sustainable options, for example, by providing subsidies or tax breaks for reusable options.

Table 5. Recommended actions for single-use plastic products

Action (value chain stage)	Stakeholders by whom the actions should be taken	Action at global/regional/ national level
Identify the most problematic single-use plastic items and take appropriate measures to eliminate them (Design of products)	<ul style="list-style-type: none"> ■ Governments (legislative actions); ■ Consumer groups and civil society (create awareness); ■ Brands, retailers and industry bodies (voluntary actions) 	<ul style="list-style-type: none"> ■ National (if regulations on industry) ■ Global or national (depending on the brand)
Ensure alternatives to single-use plastic products are assessed with LCA taking into account all relevant environmental and socio-economic impacts so as to prevent unintended consequences (Cross cutting)	<ul style="list-style-type: none"> ■ Researchers (academic, industry and government); ■ International organisations 	<ul style="list-style-type: none"> ■ Global or national (depending on the alternative)
Innovation in the design of products, especially in the development of new product delivery models, and failing that, the development of products that will be recycled (Design and manufacturing of products)	<ul style="list-style-type: none"> ■ Brands, retailers and industry bodies (voluntary actions); ■ Governments (incentives and legal framework); ■ Consumer groups and civil society (create awareness and put pressure on brands); ■ International organisations and governments (fund research and innovation) 	<ul style="list-style-type: none"> ■ Global or national (depending on the brand)
Awareness raising, e.g., media campaigns targeting consumers, impact warnings on product labels (Use)	<ul style="list-style-type: none"> ■ Governments; ■ Consumer groups and civil society (create awareness and put pressure on brands); ■ International organisations and governments (fund research and innovation) 	<ul style="list-style-type: none"> ■ National

12. EU top ten (accounting for 86% of beach litter), International Coastal Cleanup top ten (2018 and over 25 years) and "Dirty Dozen" (South Africa)

3.4. Textiles

Textiles' high profile as a source of microplastics stems from microfibrils being found just about everywhere, from drinking water to Arctic ice. Despite their prevalence, the impact of synthetic microfibrils on human health and on the health of aquatic ecosystems is not yet well characterised, and research is on-going. Furthermore, the rise of fast fashion and the high rate of growth of the global textile industry, together with the current linear nature of textile value chains, means that it is increasingly urgent that textiles are given greater attention at the global level.

Microfibrils arise from both sea-based sources, such as dolly ropes, and from land-based sources, of which textiles account for the largest share (textiles are estimated to account for approximately 9% of annual

microplastic losses to the oceans (UNEP 2018c)). Losses from textiles occur in the production phase (pre-treatment, dyeing and finishing) and during their use (washing). Synthetic microfibrils found in sediments and ingested by fish are made of a variety of polymers, including polypropylene, polyesters, acrylic/polyacrylonitrile, polyamide (nylon) and semi-synthetic compounds, such as Rayon.

Research studies are required **to gain a clear understanding of where the majority of microplastic releases from textiles occur** so that measures can be sited to have the greatest effect. For example, if releases are found to be highest at the manufacturing stage, then measures should be focussed on industry, working with government, to ensure textiles are pre-washed, and that effluent from manufacturing facilities is treated to sufficient standards to prevent microfibre releases.

Table 6. Recommended actions for textiles

Action (value chain stage)	Stakeholders by whom the actions should be taken	Action at global/regional/ national level
Research on where in the value chain the majority of microplastic releases take place and factors affecting these releases i.e. research to identify where to best focus efforts to reduce releases from textiles and the measures to best address them (Cross-cutting)	Industry and government, working with academics and researchers	Global, regional or national-level studies
Brands take responsibility in designing sustainable clothing (Manufacturing of products)	<ul style="list-style-type: none"> ■ Brands (voluntary actions) and industry bodies; ■ Consumer groups and civil society to create awareness in consumers and put pressure on brands to address fast fashion trend; ■ Governments to require responsibility by industry (e.g. EPR, targets) 	Global or national (depending on the brand)
Manufacturers pre-wash products, first ensuring the relevant waste water treatment systems are in place (<i>dependent on the first wash being confirmed as time of greatest microplastic release</i>) (Manufacturing of raw materials and products)	<ul style="list-style-type: none"> ■ Brands; ■ Industry bodies; ■ Governments 	National
Research and innovation on fibres (both new and traditional), with assessment of fibres over their full life cycle for unintended consequences (Raw material production)	Researchers within industry, academia and governments	Global or national
Curb fast fashion trend, promoting higher quality and longer lasting textiles/clothing and reusable business models, e.g. subscription-rental (Use)	<ul style="list-style-type: none"> ■ Consumer groups and civil society to create awareness in consumers; ■ Brands, retailers and industry bodies (voluntary actions); ■ Governments and international organisations (education and awareness campaigns) 	Global, regional or national
Require brands/industry to take responsibility for their products at end-of-life (End-of-life)	<ul style="list-style-type: none"> ■ Brands (voluntary actions) and industry bodies; ■ Governments to put measures in place (e.g. EPR, targets) 	<ul style="list-style-type: none"> ■ Global or national (depending on the brand); ■ National (if regulations on industry)

The development of **standard tests to determine releases from different textile products** and development of frameworks to **assess impacts across the life cycle** are essential if fabrics that do not shed microplastics are to be developed and the relative performance of different fabrics are to be tested.

Actions for brands are to **design sustainable clothing** and **take responsibility for their products at end-of-life**. This requires related actions from consumer groups, NGOs and international organisations to raise awareness and educate consumers so that they put pressure on brands to take action, as well as regulatory actions from governments.

3.5. Cosmetics and personal care products

An estimated 14,000 tonnes of plastics in personal care products and cosmetics are emitted into oceans every year (UNEP 2018c). Although their share of the total annual microplastic load is estimated to be small, plastic losses from personal care products are in most cases direct emissions to water during the use

of the product (in contrast to most other microplastic losses being wear and tear related)¹³. In personal care products there are very concrete possibilities for action, as microplastics are intentionally added into the products.

A recommended action for brands is to **develop personal care products that do not contain microbeads**. This has already been undertaken by many leading brands, thus it is important for legislators to create an equal playing field by **banning or phasing out the intentional addition of microbeads to cosmetics and personal care products**.

An action for governments is to require **greater transparency around plastic use in personal care products**, for example, through developing standardised **labels for personal care products** that clearly and unambiguously indicate that plastic is contained in the product (and potentially also inform consumers of the impacts of plastic).

Actions are required by brands to **innovate in the packaging of cosmetic and personal care products**. For example, packaging designed with circularity in mind (reusable, returnable or recyclable containers).

Table 7. Recommended actions for cosmetics and personal care products

Action (value chain stage)	Stakeholders by whom the actions should be taken	Action at global/regional/ national level
Eliminate microplastics from personal care products (Raw materials; Design and manufacturing of products)	<ul style="list-style-type: none"> ■ Governments; ■ Brands, retailers and industry bodies; ■ Consumer groups and civil society (create awareness and put pressure on brands) 	<ul style="list-style-type: none"> ■ Global or national (depending on the brand); ■ National (if regulations on industry)
Product labelling to reflect plastic content and plastic impacts (Design and manufacturing of products)	<ul style="list-style-type: none"> ■ International organisations (to develop harmonised global labels); ■ Governments (to implement and enforce labelling requirements); ■ Brands, retailers and industry bodies 	<ul style="list-style-type: none"> ■ Global or national (depending on the brand); ■ National (for industry regulations)
Innovation in the packaging of cosmetics and personal care products (Design and manufacturing of products)	<ul style="list-style-type: none"> ■ Brands, retailers and industry bodies (voluntary actions); ■ Governments (incentives and legal framework); ■ Consumer groups and civil society (create awareness and put pressure on brands); ■ International organisations and governments (fund research and innovation) 	<ul style="list-style-type: none"> ■ Global or national (depending on the brand)

13. Secondary microplastics can be either land-based (arising from the wear or tear of plastic products on land, such as textiles, paint and tyres) or sea-based. Sea-based secondary microplastics arise from the fragmentation of plastics in the ocean, and thus all measures avoiding plastics and preventing their entry into the environment - and ultimately the oceans - are relevant to secondary microplastics.

3.6. Tourism

Coastal recreation (beach tourism) is the top source of marine litter in the North and Mediterranean seas, and a close second in the Baltic sea. Recreational boating and recreational fishing are also high contributors, with the latter the top source of marine litter in the Black sea (European Commission 2010). Along with the directly attributable recreational activities, tourism also contributes to the high amount of sanitary and general household plastics evident in the Mediterranean and Baltic seas. Tourism increases waste by up to one-third during the summertime in some Mediterranean countries, resulting in local waste management facilities often being overwhelmed (Dalberg Advisers and WWF Mediterranean Marine Initiative 2019). Many tourist destinations, particularly those in Small Island Developing States (SIDS), are ill equipped to deal with the considerable load of plastic products associated

with tourist activities. A variety of plastic products has relevance to the tourism industry, including: toiletry and personal care products; food and beverage packaging; single-use items, such as cups, straws, cutlery etc.; textiles; building and construction materials; electrical and electronic appliances and furnishings, and plastics associated with recreational activities and fishing.

Whilst the tourism sector is one of the main contributors to the increasing problem of marine litter, it is also in a position to support the conservation of oceans and the blue economy. The costs of plastic pollution to the tourism sector are beginning to be quantified and are considerable; regional economic losses attributed to plastic pollution are estimated at €641 million per year, with tourism the most affected sector (Dalberg Advisers and WWF Mediterranean Marine Initiative 2019). The tourism sector thus has a considerable vested interest in maintaining the appeal of the environment, including the marine environment.

Table 8. Recommended actions for the tourism sector

Action (value chain stage)	Stakeholders by whom the actions should be taken	Action at global/regional/ national level
Develop innovative packaging and reuse models for the tourism industry that are relevant to the local context (Design of products)	<ul style="list-style-type: none"> ■ Tourism groups and civil society (create awareness for the need); ■ Brands, retailers and industry bodies (voluntary actions); ■ Governments (create incentives, actions to facilitate implementation of solutions and avoid unintended consequences); ■ Researchers (funded/commissioned by the stakeholders listed above) 	<ul style="list-style-type: none"> ■ Local; ■ Regional or global (depending on the company involved)
Deliver campaigns to coastal recreational users, including beach goers, fishermen and boaters, to raise awareness about the impacts of marine plastics and to encourage responsible behaviour (Use).	<ul style="list-style-type: none"> ■ Local authorities; ■ Civil society; ■ Manufacturers of goods used in coastal recreation (e.g. fishing gear, boats etc.); ■ Resorts and restaurants 	<ul style="list-style-type: none"> ■ Local
Encourage or make it mandatory for hotels, resorts and other tourism service providers to adhere to standards and/or achieve certifications, ensuring that standards/certifications include criteria on eliminating consumption of single-use and non-recyclable plastics (Cross-cutting)	<ul style="list-style-type: none"> ■ Tourism associations; ■ Resorts, hotels and tour operators; ■ Governments and local authorities; ■ International organisations 	<ul style="list-style-type: none"> ■ Global; ■ Regional; ■ National
Devise actions to encourage the tourism industry to reduce/eliminate the consumption of single-use plastic items, such as developing sustainable procurement guidelines; legislative actions (e.g. bans); financial incentives (e.g. subsidies for sustainable alternatives) (Design of products; Use)	<ul style="list-style-type: none"> ■ Tourism groups and civil society (create awareness for the need); ■ International organisations; ■ Brands, retailers and industry bodies (voluntary actions); ■ Governments (legislative actions) 	<ul style="list-style-type: none"> ■ National, with regional and global cooperation
Leverage finance and public-private partnerships to fund needed solid waste and wastewater management infrastructure, including for the possibility of establishing sub-regional facilities (End-of-life)	<ul style="list-style-type: none"> ■ National and local governments; ■ Waste management companies; ■ Regional bodies 	<ul style="list-style-type: none"> ■ Local; ■ National; ■ Regional

Many tourist destinations struggle to manage plastics at end-of-life, with actions needed to reduce the high volumes of short-lived plastic products consumed in tourist activities. This includes actions by governments, supported by industry, to **promote locally relevant, innovative packaging and reuse models**, focussing especially on products consumed extensively in the tourism sector, such as bottled water.

The lack of waste management services and infrastructure, and the lack of scale for economically viable recycling, are particular problems. Thus, a priority action for local governments is to **finance waste infrastructure, with public/private partnerships** providing one possible vehicle for financing waste infrastructure. Inter-regional cooperation is also needed, as sub-regional and regional facilities are potentially a better solution, particularly in SIDS which are too small to sustain viable recycling businesses.

A growing number of tour operators are making changes to the design of their tourism packages, the development of their infrastructure, and their operations, thereby also influencing thousands of staff, customers and suppliers into thinking differently about the use of plastics. An action for tourism bodies and governments is to work with the developers of leading **standards and certifications for hotels, resorts and other service providers** to ensure these include **criteria for minimising consumption of single-use and non-recyclable plastics and for preventing littering**. Resorts and hotels should be encouraged to seek certification.

3.7. Fishing and aquaculture

At least half of the plastics in the Great Pacific Garbage Patch (GPGP) are from fishing and aquaculture (Lebreton et al. 2018), and monitoring data in some areas, such as that under the OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic, shows fishing and aquaculture to be the most significant source of marine plastics. Plastic losses from fishing gear and aquaculture are especially concerning due to the durability of the materials from which they are made and the high impacts they have on biodiversity. Plastic losses occur due to illegal disposal (dumping), as well as accidental and incidental losses. Losses due to extreme weather events are especially notable for aquaculture.

Actions to promote the recovery of lost fishing gear and reduce losses are recommended, including:

- ▶ Further develop and **implement tracking technology** able to track lost fishing gear in the ocean;
- ▶ Implement and **scale up fishing gear marking** to increase the visibility of lost fishing gear and to reduce losses at sea;
- ▶ **Incentivise lost gear recovery**, for example, governments, in partnership with fishing communities, to incentivise the **repair/reuse of fishing gear** (e.g., through tax breaks or subsidies and/or requiring producer responsibility), and to ensure fishing gear have value at end-of-life through implementing **design standards for fishing nets** so that they are recyclable; and
- ▶ **Discourage intentional losses of gear**, for example, local authorities in partnership with industry **to provide reception facilities free of charge for discarded fishing gear and aquaculture equipment; buy-back programmes** of plastic nets, line, traps and other fishing equipment (programmes in which fishermen are provided an economic incentive to return fishing gear, as currently implemented in South Korea and the USA).

Following the successful piloting of the FAO's Voluntary Guidelines on the Marking of Fishing Gear, in which special consideration was given to developing states and small-scale fisheries, a Technical Consultation recommended that the FAO Committee on Fisheries (COFI) consider the endorsement of the Voluntary Guidelines and further recommended the **development of a comprehensive global strategy to address abandoned, lost or discarded fishing gear ALDFG** (FAO 2018). Such a global strategy could include the establishment of a mechanism to facilitate the sharing of information on the global implementation of the Voluntary Guidelines, as well as for sharing data collected by national ALDFG reporting systems.

International instruments addressing lost fishing gear already exist, including the International Maritime

Organization (IMO)-negotiated Annex V of the International Convention for the Prevention of Pollution from Ships (MARPOL), which prohibits the discharge of all plastics into the sea, including synthetic fishing gear. Annex V also requires that the loss of fishing gear be reported to the vessel's flag State and to the coastal State in whose waters the loss occurred. Fishing gear marking guidelines are thus an important mechanism to complement the enforcement of Annex V of MARPOL.

Recent studies indicating the high share of fishing and aquaculture to marine plastic loads indicate that better quantification of this source of highly persistent marine plastics is a key need (Lebreton et al. 2018). Continued actions by researchers and funders in this regard are thus recommended.

Table 9. Recommended actions for fishing and aquaculture

Action (value chain stage)	Stakeholders by whom the actions should be taken	Action at global/regional/ national level
Develop a comprehensive global strategy to address ALDFG, including setting up national ALDFG reporting systems and a map showing high-risk areas for gear loss and/or high sensitivity to ghost fishing (Cross-cutting)	<ul style="list-style-type: none"> ■ International organisations and regional bodies; ■ Researchers 	<ul style="list-style-type: none"> ■ Global; ■ Regional
Implement and scale-up gear-marking programmes, promoting the use of gear tracking technology (Use)	<ul style="list-style-type: none"> ■ International organisations and regional bodies; ■ National authorities 	<ul style="list-style-type: none"> ■ Global; ■ Regional; ■ National
Evaluate the hotspots and develop innovative solutions to address these, as well as evaluate the effectiveness of solutions, such as solar LED lights on gill nets, steel cables to secure buoys, Fish Aggregating Device (FAD) made from biodegradable material etc. (Use)	<ul style="list-style-type: none"> ■ Researchers; ■ Industry; ■ International organisations 	<ul style="list-style-type: none"> ■ Global; ■ Regional
Devise and implement incentives to prevent intentional gear loss and promote gear recovery, such as providing infrastructure for gear repair and/or recycling, providing tax breaks or subsidies to promote repair, implementing design standards for fishing gear so it has value at end-of-life, implementing buy-back programmes for gear at end-of-life (possibly as part of EPR) (Use)	<ul style="list-style-type: none"> ■ National governments and local authorities; ■ Manufacturers and industry associations; ■ Waste management companies; ■ Regional bodies and International organisations (for coordination and support) 	<ul style="list-style-type: none"> ■ National; ■ Regional
Provide reception facilities free of charge for discarded fishing gear and aquaculture equipment (Use and end-of-life)	<ul style="list-style-type: none"> ■ National and local governments; ■ Port authorities; ■ Waste management companies 	<ul style="list-style-type: none"> ■ National; ■ Regional; ■ Global

3.8. Shipping

Recent studies have tended to focus on land-based sources of plastics, with shipping as a source of marine plastics not well accounted for in estimates of plastics loads to the oceans. Studies analysing litter stranding on beaches suggest that merchant shipping is still a significant source of bottles on beaches (Ryan et al. 2019; Smith et al. 2018), despite the dumping of plastics into the sea being banned by Annex V of the International Convention for the Prevention of Pollution from Ships (MARPOL) in 1989. Losses from shipping arise from the illegal disposal of ship waste (such as packaging and personal goods), as well as accidental loss of cargo (e.g., in storm events). Discharge of grey water from ships is a potential source of microplastics. A further source of plastics associated with shipping is microplastic losses during ship maintenance, including microplastics contained in paint, as well as the use of plastic pellets in “sand blasting” (paint stripping).

An action for researchers is to generate data on the **sources and quantities of plastics emitted from the shipping sector** – and for industry, governments and international organisations to fund such studies, as well as to develop and put into place systems to monitor **and prevent plastics emitted from shipping**.

Most ports operate on the “polluter pays principle”, however high fees for waste disposal incentivise marine vessels to dump their waste at sea, despite the discharge of all plastics into the sea being prohibited by Annex V of MARPOL. Actions by port operators and local authorities to disincentivise the dumping of waste at sea are thus recommended. For example, by implementing **“no special fee”** ports, in which all ships pay a fee for the use of port facilities regardless of the quantity of waste received. An action for industry and governments is to scale up the **Green Award ship certification** scheme, which aims to incentivise sustainable behaviour (including minimising single-use plastics and recycling) by providing benefits, such as

Table 10. Recommended actions for the shipping sector

Action (value chain stage)	Stakeholders by whom the actions should be taken	Action at global/regional/ national level
Extend the global coverage of no special fee ports to ensure port fees and taxes do not create incentives for ships to dump plastics at sea (Use and end-of-life)	<ul style="list-style-type: none"> ■ National and local governments; ■ Port authorities; ■ Shipping companies and shipping organisations; ■ Waste management companies 	<ul style="list-style-type: none"> ■ National; ■ Regional; ■ Global
Develop and/or extend systems that enable the better enforcement of MARPOL Annex V, such as an inventory of plastics on board (Use and end-of-life)	<ul style="list-style-type: none"> ■ International organisations and regional bodies; ■ Government authorities 	<ul style="list-style-type: none"> ■ Global; ■ Regional; ■ National
Develop or extend certification scheme for ships that incentivises sustainable behaviour, for example, by charging lower port fees if the ship is certified. Certification criteria should include specific criteria for plastics, such as requiring wastes to be sorted for recycling and minimising the use of single-use and non-recyclable plastics (Use)	<ul style="list-style-type: none"> ■ International organisations and regional bodies working with governments, port authorities and the shipping industry 	<ul style="list-style-type: none"> ■ Global
Improve port reception facilities to allow for repair and recycling. This should include forming partnerships to develop sub-regional facilities for ports too small to develop their own infrastructure (Use and end-of-life)	<ul style="list-style-type: none"> ■ National and local governments; ■ Port authorities; ■ Shipping companies and shipping organisations; ■ Waste management companies 	<ul style="list-style-type: none"> ■ National; ■ Regional
Investigate plastics use in ship maintenance and put appropriate measures in place; for example, a ban on sand blasting of ships with plastic pellets, best practice guidance on paint etc. (Manufacturing and use/maintenance)	<ul style="list-style-type: none"> ■ National governments (regulatory actions, such as ban on plastic pellets); ■ Industry organisations (voluntary actions on blasting and paints); ■ International organisations and regional bodies (provide best practice guidelines) 	<ul style="list-style-type: none"> ■ National; ■ Global
Generate better data on the sources and quantities of marine plastics originating from the shipping sector so as to enable a baseline, thereby allowing for targeted actions and monitoring and evaluation of their success (Cross-cutting)	<ul style="list-style-type: none"> ■ Researchers; ■ International organisations and regional bodies 	<ul style="list-style-type: none"> ■ Global; ■ Regional

Recommendations for action

discounts on port fees, to certified ships. Alongside incentive schemes, international organisations, regional bodies, governments and industry associations need to work together to **enforce the ban on dumping plastics at sea** (as stipulated by the MARPOL convention, Annex V).

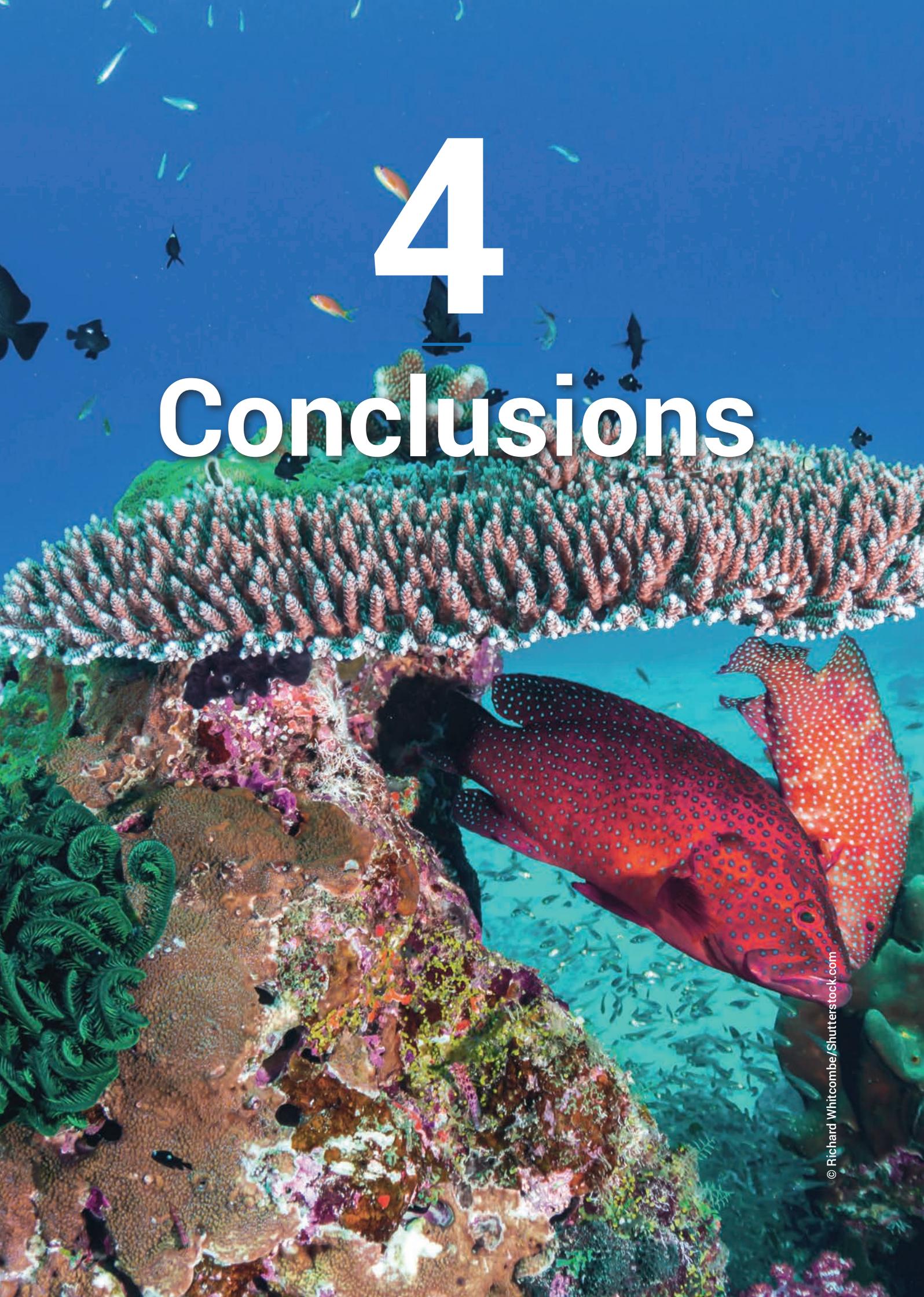
Actions are also required by local authorities to **enhance port reception facilities** to ensure good management once plastics arrive at port, such as providing collection infrastructure for recycling. Regional cooperation and **public-private partnerships are required for the development of sub-regional facilities**. Regional facilities are especially needed for SIDS that do not have sufficient scale to make

recycling profitable, or sufficient market for the recycled materials produced. Ports should also have in place **action plans to prevent losses during storm events**, including of pre-production plastic pellets.

Actions are also recommended to reduce plastic emissions in the maintenance of ships. These include actions by governments to **end the practice of using plastic micropellets in ship blasting**. Actions for the research community, supported by regulatory bodies, are to investigate microplastic releases from the materials used in ship building and maintenance (e.g., plastics in paint) and to develop alternatives that do not release plastic.

4

Conclusions



Recommendations for action

Opportunities to address marine plastic need to be combined across the entire value chain, ranging from opportunities to reduce the consumption and production of unnecessary plastics which has not been designed for circularity, to opportunities to prevent plastic products becoming waste and leaking to the environment. **Realising these opportunities requires systemic solutions tackling plastic pollution at its source.**

The plastic pollution crisis will not be solved simply through better waste management, although improved waste collection and keeping plastics out of streams, rivers and oceans are important measures in the short term. More importantly, a paradigm shift is required away from the current linear “take-make-dispose” plastics economy to a circular plastics economy, in which a fundamental redesign of plastic products keeps them out of incinerators, landfills and the environment, and circulating in the economy at the highest possible value. Systemic solutions thus take a preventive approach rather than mitigating impacts once they have occurred, consistent with the principles of sustainable consumption and production.

Life cycle based and circular economy solutions cover the production (material engineering and polymer production; plastic conversion, design and product manufacturing), consumption and re-use, and end-of-life (waste management and final disposal) of plastic products (or services currently requiring plastic products). Life cycle interventions explore opportunities across the entire plastic value chain, highlighting the life cycle stages with the highest potential for action, and promoting cross-cutting solutions that link upstream, mid-stream and downstream actors of the value chain. Coordinated actions, covering how plastics are produced, consumed, collected and reprocessed at end-of-life, are essential to avoid solutions that transfer problems from one impact to another or from one life cycle stage to another.

No single value-chain stage can effectively address marine plastic on its own, likewise, no single stakeholder group on their own can drive the systemic changes needed. Actions to tackle marine plastics thus require cooperation between governments, industry and civil society. Furthermore, the global nature of plastic supply chains means cooperation is required between nations and across regions.

Whilst it is important to recognise the cross-boundary nature of (marine) plastic pollution and global plastic supply chains, it is equally important to recognise that solutions will often be context specific. Successful interventions in one country context will not necessarily translate to another, with cultural and economic factors, amongst others, significantly influencing consumer attitudes to the consumption and disposal of plastic products. **Specific socio-economic conditions and technical and financial availability need to be taken into account when implementing the actions recommended.**

This report is developed under the Global Environment Facility (GEF) funded project: Addressing Marine Plastics – A Systemic Approach, built on two previous reports on stocktaking of the global plastic value chain and existing actions under the same project. A roadmap to address marine plastics will be further launched, which aims to provide an action-oriented strategy with core set of priority solutions to be implemented by targeted stakeholders from the whole plastics value chain under different time horizons, and at different geographical scales.

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