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**United Nations
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**Ad hoc open-ended expert group
on marine litter and microplastics
Second meeting
Geneva, 3–7 December 2018**

**Consolidated background paper of the discussion papers
presented at the first meeting of the ad hoc open-ended expert
group on marine litter and microplastics, held in Nairobi from
29 to 31 May 2018**

Note by the Secretariat

I. Introduction

1. At its first meeting, held in Nairobi from 29 to 31 May 2018, the ad hoc open-ended expert group on marine litter and microplastics requested the Secretariat to consolidate the four discussion papers,¹ drawing upon the three information documents,² to facilitate discussions at its second meeting, in 2018. The four discussion papers cover the following topics:

(a) Barriers to combating marine litter and microplastics, including challenges related to resources in developing countries (UNEP/AHEG/2018/1/2). This paper provides information on legal, financial, technological and information barriers and the challenges related to resources in developing countries;

(b) National, regional and international response options, including actions and innovative approaches, and voluntary and legally binding governance strategies and approaches (UNEP/AHEG/2018/1/3). This paper presents information on four non-exclusive categories of responses: legal and policy, technological, economic, and educational and informational. Examples are given of each category at the national, regional and international levels, with reference made to those that could be mutually supportive according to different socioeconomic contexts. The paper also contains an annex of submissions from member States on existing policies and activities;

(c) Environmental, social and economic costs and benefits of different response options (UNEP/AHEG/2018/1/4). This paper explores options, both binding and non-binding, to better address marine litter and microplastics, focusing mainly on international policy responses. Option 1 is to maintain the status quo, but strengthen the implementation of current efforts; option 2 is to review and revise existing frameworks to address marine plastic litter and microplastics and add a component to coordinate industry; and option 3 is to create a new global architecture with a multilayered governance approach, to be implemented in two phases. The paper also includes a summary of the economic, social and environmental impacts and costs of marine plastic litter;

¹ UNEP/AHEG/2018/1/2, UNEP/AHEG/2018/1/3, UNEP/AHEG/2018/1/4, UNEP/AHEG/2018/1/5.

² UNEP/AHEG/2018/1/INF/3, UNEP/AHEG/2018/1/INF/4, UNEP/AHEG/2018/1/INF/5.

(d) Feasibility and effectiveness of different response options (UNEP/AHEG/2018/1/5). This paper examines the technical and political feasibility of the three international policy options and the degree to which each instrument or policy can be successful in reaching the intended goal of reducing marine litter and plastics.

2. The discussion papers and the present consolidated paper also draw upon the following three information documents:

(a) *Marine Plastic Debris and Microplastics: Global Lessons and Research to Inspire Action and Guide Policy Change* (UNEP/AHEG/2018/1/INF/4). This report was mandated by United Nations Environment Assembly resolution 1/6. It provides a broad overview of the state of knowledge on the sources, fate and effects of marine plastics and microplastics and sets out a number of approaches and potential solutions to address this multifaceted problem;

(b) *Combating marine plastic litter and microplastics: summary for policymakers – an assessment of the effectiveness of relevant international, regional and subregional governance strategies and approaches* (UNEP/AHEG/2018/1/INF/3). This assessment was prepared pursuant to United Nations Environment Assembly resolution 2/11. A total of 18 international and 36 regional instruments were examined on the basis of their objectives of pollution prevention, protection of biodiversity and species and chemicals and waste management. The conclusion drawn from the assessment was that the main overarching problem was the absence of an international legal instrument in which combating marine litter was the primary objective. This had led to an absence of institutions with mandates to coordinate efforts under different agreements, monitor progress and establish global targets and standards for marine litter and plastics. As a result, current governance strategies and approaches were fragmented and did not address issues such as the global extraction of raw materials, the design and use of plastic polymers or the handling of hazardous additives in final treatment and disposal processes;

(c) *Report on possible options available under the Basel Convention to further address marine plastic litter and microplastics* (UNEP/AHEG/2018/1/INF/5). This report, prepared by the secretariat of the Basel, Rotterdam and Stockholm Conventions, presents possible actions under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal to further address marine plastic litter and microplastics, for consideration by the Conference of the Parties to the Basel Convention at its fourteenth meeting, to be held in 2019.

II. Background

3. For the past 60 years, plastics have brought economic, environmental and social advantages. However, the increase in the use and promotion of disposable products has caused an exponential increase in the amount of plastic waste generated by both land- and sea-based activities, creating significant economic, environmental and social issues. Dealing with this problem, as well as addressing the legacy of waste and plastic pollution, is a daunting task and will require concerted action at all levels of governance and across multiple geographic scales.

4. At its first two sessions, the United Nations Environment Assembly adopted two resolutions in which it requested reports on the research conducted so far and the gaps in knowledge on marine plastic litter and microplastics and on the effectiveness of relevant governance strategies and approaches. At its third session, the Assembly decided to convene meetings of an ad hoc open-ended expert group on marine litter and marine plastics to discuss the findings of these reports and further examine the barriers to and options for combating marine plastic litter and microplastics, especially from land-based sources. The group was to meet at least once before the fourth session of the Assembly, in 2019, when it would present its findings (see Assembly resolution 3/7).

5. The reports and discussion papers prepared for the United Nations Environment Assembly and the expert group underscore the strong moral case for not allowing the oceans to become polluted by plastics and the importance of taking social attitudes into account when designing strategies and policies to tackle the problem. Two of the reports highlighted the need to: (a) improve the governance framework; (b) increase stakeholder engagement; (c) better identify the sources of plastics found in the marine environment and the ways in which they leak into it; (d) improve solid waste management; (e) implement appropriate reduction, recovery and restoration measures; (f) deepen understanding of the impacts of macro-plastics and the uncertainties surrounding microplastics on economic sectors, human health, trophic flows and sensitive habitats; (g) strengthen and harmonize monitoring methods; (h) improve administrative and regulatory capacities; and (i) introduce global standards and definitions in order to streamline approaches and assess the effectiveness of different policies and measures.

6. Also identified in the reports was a wide range of topics on which further research was needed to support future response options, including: (a) the effectiveness of different types of governance mechanisms; (b) the properties of plastics found in marine environments, including the factors controlling degradation; (c) ways to minimize the use of additives; (d) the sources (including those arising from catastrophic events), presence, transport, fate and pathways of macro-plastics and microplastics in marine ecosystems; (e) methods for assessing risk and uncertainty; and (f) the economics of recycling and of demand for plastic and recycled products.

7. The resolutions adopted by the United Nations Environment Assembly and the creation of the expert group represent the latest step in a long journey to tackle the problem of marine litter. Since 1995, when member States adopted the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, marine litter has been identified as one of the key sources of marine pollution. It is currently one of the most prominent issues on the international agenda, reinforced by the adoption of a dedicated Sustainable Development Goal and target on pollution in the oceans (Goal 14 and target 14.1)³ by the General Assembly, the launch in 2012 of the Global Partnership on Marine Litter,⁴ based on the Honolulu Strategy and the Honolulu Commitment, and other initiatives, such as the Clean Seas campaign.

8. The Global Partnership on Marine Litter is especially important, as it provides a comprehensive package of contributions from participants aimed at reducing the impacts of marine litter worldwide, enhancing international cooperation and coordination through the Honolulu Strategy and the Honolulu Commitment, which is a multi-stakeholder pledging process, promoting knowledge management, information-sharing and monitoring of progress on the implementation of the Strategy, promoting resource efficiency and economic development through waste prevention (e.g. through the concept of reduce, reuse, recycle and redesign) and through the recovery of valuable material and the creation of energy from waste, increasing awareness of the sources of marine litter and the fate and impacts of such sources and assessing emerging issues concerning the fate and potential effects of marine litter, including the uptake of microplastics in the food web and the associated transfer of pollutants and the effects of marine litter on the conservation and welfare of marine fauna.

9. Over the same period, the pervasive nature of marine litter and plastics began to be addressed in numerous reports and conferences on oceans, underscoring the fact that microplastics and macroplastics can now be found in every ocean, on the deep ocean floor and in the most remote parts of the world. With plastic production projected to increase by up to 40 per cent over the next 10 years, achieving target 14.1 and other targets to reduce pollution presents a particularly difficult challenge.

10. The expert group recognizes that tackling marine litter and microplastics will require a holistic approach, involving legal frameworks, incentives, the adoption of waste management plans and many other actions on the part of national and local governments, robust international cooperation, continued active engagement by civil society in informing the public, generation of new knowledge, greater transparency and accountability and the development and scaling up of innovative and successful solutions.

11. Governments, civil society and businesses have been stepping up their efforts in these areas. Examples of efforts, such as the adoption in 2018 by the European Commission of a bold strategy on plastic pollution, entitled “A European strategy for plastics in a circular economy”, and the adoption of measures to reduce plastic pollution by Governments across the globe, including those of China, Eritrea, India, Indonesia, Kenya, Malawi, Rwanda and the United Kingdom of Great Britain and Northern Ireland, are moving in the right direction. However, the expert group sees that the magnitude of the problem and its transboundary nature will require global, bold and innovative solutions, with effective actions at the international, national and regional levels. Moreover, for these efforts to succeed, plastic pollution needs to become an issue of concern to all citizens, through education and outreach activities that can reach all segments of the population.

III. Barriers, gaps and success factors

12. Four types of barriers are presented in the relevant discussion paper (UNEP/AHEG/2018/1/2): legal barriers (established by, founded upon or generated by law or its absence or lack of implementation and/or enforcement); financial barriers (characterized by high costs that make a

³ By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.

⁴ The three global multi-stakeholder partnerships under the Global Programme of Action are the Global Partnership on Nutrient Management, the Global Partnership on Marine Litter and the Global Wastewater Initiative.

certain activity difficult to afford or implement; some of those also constitute economic barriers); technological barriers (include aspects related to the production, manufacturing and design of products, consumption systems and all aspects of waste collection, management and recovery); and information barriers (include access to data, research, transparency, and education and awareness). Non-exhaustive lists of examples of barriers are provided throughout the discussion paper. In addition, a non-exhaustive list of priority barriers based on the discussions at the first meeting of the ad hoc open-ended expert group is set out in the annex to the present note, without formal editing.

13. Examples of legal barriers include: (a) the lack of any internationally binding agreement with a primary objective to reduce marine plastics and microplastics; (b) a lack of measurable targets or global standards; (c) geographical gaps in the coverage of existing agreements, such as those concerning the high seas, and gaps in the number of signatories to agreements and their instruments; (d) poor implementation of policies and enforcement, often resulting from the absence of a single authority responsible for overseeing the management of marine litter; and (e) an absence of legal and market-based instruments to reduce consumption of difficult-to-recycle products and to stimulate industry involvement in finding and implementing solutions.

14. In terms of the wider issue of implementing a circular economy to tackle plastic waste, legal barriers include: a lack of definitions, clear targets and firm numerical limits in regulations; gaps in legislation, including on sustainable public procurement; lagging or incomplete implementation or enforcement of legislation; inconsistent national implementation of international legislation; and legislation reflecting conflicting values, for example hygiene regulations conflicting with regulations on food waste.

15. Examples of financial barriers include: (a) fossil fuel subsidies; (b) a chronic lack of funds in developing countries for waste infrastructure; (c) the absence of the polluter pays principle, especially in areas such as the high seas, leaving Governments with the burden of clean-up costs; (d) limited cross-border investments; (e) an absence of global and national markets for end-of-life plastics; and (f) a failure to internalize or make explicit the costs to human health and the environment.

16. Examples of technological barriers exist for all aspects of the production, manufacturing and design of products and waste collection and recovery. In the absence of global standards, there has been a proliferation of widely different approaches to recovery, sorting and reprocessing technologies, across the informal and formal sectors and between developing and developed countries, preventing the emergence of financially viable and effective markets. Waste management is often highly fragmented, with rural areas very often poorly serviced.

17. Regarding upstream processes, there is a clear disconnect between innovation in the design and production phases and in after-use systems and low prioritization of the reduce, reuse and recycle waste hierarchy, for example in finding ways to increase the recycled content of products. There are also gaps in the understanding of the best available technologies and, especially, of ways of dealing with new alternative materials appearing in the marketplace.

18. While there are multiple barriers relating to information, access to data, research, education and awareness-raising and transparency in reporting, which hamper decision-making and priority-setting, they are not sufficient to stop concrete actions from being implemented in the short term in parallel with longer-term solutions. In other words, there is enough knowledge to act immediately in many areas. Indeed, over the past five years, there has been an upsurge in major research initiatives that are delivering new data and evidence at an unprecedented rate, for example on the extent of macroplastics and microplastics in the marine environment. However, significant efforts are still needed to close the knowledge gaps on the levels and sources of marine litter and microplastics and their accumulation in organisms and associated impacts on human health and the functioning of ecosystems. These gaps have contributed, in part, to the general lack of recognition in society and international policy of the potential risks to human health of plastics, especially micro- and nano-sized particles. In addition, without a greater understanding of the extent of plastics in the marine environment that could result from improved monitoring, and in the absence of global standards and greater transparency, economic consequences include lost tax revenue as trade in plastic waste remains an illegal revenue source.

19. The challenges for developing countries in dealing with marine litter and plastic waste are even greater. These countries are often recipients of plastic products that have been designed elsewhere, with little or no regard for the prevailing conditions in the receiving countries, such as poor infrastructure and limited enforcement of environmental regulations. Rapid urban expansion, especially in the developing world, has also led to many areas being poorly serviced in terms of solid waste management, leading to an increase in illegal dumping sites. These sites are often close to rivers, which increases the risk of waste ending up in the aquatic and marine environments. As waste management is often the domain of the informal sector, individual pickers selectively remove

high-value plastics and leave behind the low-value, low-weight plastics. Overall, the list of barriers in developing countries is long, and includes inadequate financing, legal and regulatory deficits, low administrative capacities, lack of public awareness of good sanitary practices, and limited enforcement.

20. Small island developing States are particularly vulnerable to marine litter and plastics. They have limited on-island production and waste management infrastructure, such as port reception facilities, which, combined with the complication of geographical distance from other waste collection centres, means that they are unlikely to attract private investment. Their proximity to the ocean and exposure to natural hazards also increase the risk of near-shore and ocean contamination.

21. Even in cases where there is a robust legally binding agreement in place, barriers remain. For example, key challenges remain for the Mediterranean Action Plan under the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) (see UNEP(DEPI)/MED WG.444/Inf.12), including a lack of financial and other resources, measures to support circular economy strategies, knowledge about the extent of marine plastics in the Mediterranean Sea, due in part to very patchy monitoring and assessment systems, availability of or access to data produced by Governments, and coordination, in particular with the private sector and industry.

22. The expert group agreed upon the need to prioritize ways to address these barriers through short-, medium- and long-term actions and to identify key success factors. They saw an urgent need to remove barriers through upstream solutions, including by improving designs and product labelling, addressing fossil fuel subsidies and working with the private sector, to reorient production processes so that they reflect the reduce, reuse and recycle aspects of the circular economy.

23. With plastic production set to rise over the next decade, even the positive developments that are happening on the ground may be overshadowed unless there is a change in thinking about waste prevention among industry actors and individual consumers, coupled with actions at the global level. Thus, the identification of success factors that are likely to support national and international efforts will be crucial in establishing a strong basis for tackling marine litter and plastics. Examples of success factors include: (a) adopting an integrated, holistic approach to waste management; (b) embedding the reduce, reuse and recycle concept into all aspects of the economy, including the concept of producer responsibility; (c) using a source-to-sea approach, given the importance of rivers as conduits for the delivery of plastic litter to the marine environment; (d) building on successful regional and global mechanisms, such as the Regional Seas Programme and the Basel Convention, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, the Stockholm Convention on Persistent Organic Pollutants (see UNEP/AHEG/2018/1/INF/5), the Strategic Approach to International Chemicals Management and the Global Programme of Action; and (e) creating a global architecture that includes new, voluntary, as well as potentially binding, legal instruments, in a multilayered governance approach, that could be extended to other institutions, such as the World Trade Organization and the World Tourism Organization, and industry initiatives, such as the Global Plastics Alliance, which has undertaken over 350 projects in 40 countries to address marine debris, Circulate Capital, which is an investment management firm dedicated to financing companies, projects and infrastructure that prevent ocean plastic, supported by the World Plastics Council and other entities in the plastics industry, and Operation Clean Sweep. Success factors such as these could help to ensure the effectiveness of local and national solutions, including financial incentives, the best available technologies and awareness-raising campaigns, and ensure greater leverage and impact.

IV. National, regional and international response options

24. Four categories of response options are presented in the relevant discussion paper (UNEP/AHEG/2018/1/3) as a way to classify actions at the national, regional and international levels: legal and policy responses, technological responses, economic responses and educational and informational responses. Some options are mutually beneficial across the three levels, reinforcing the concept of adopting a holistic approach as a key success factor.

A. National response options

25. At the national level, two major types of legal and policy responses exist: framework laws and actions targeting specific products.⁵ Overarching framework laws, such as the Law for the Promotion of Marine Litter Disposal of Japan, enacted in 2009, and the Marine Environment Management Act of

⁵ United Nations Environment Programme, *Marine Litter Legislation: A Toolkit for Policymakers* (Nairobi, 2016).

the Republic of Korea, also enacted in 2009, mandate subnational governments to develop plans and manage responsibilities regarding marine litter. Other countries, such as Indonesia, have developed national action plans that contain reduction targets and dates. National plans are more likely to succeed when they include priority actions, baseline values and reduction targets and, when possible, are supported by monitoring and assessment programmes. These plans can then be directly linked to measuring progress on achieving Sustainable Development Goal targets, especially target 14.1.

26. There are many national laws governing the production and use of land-based materials that end up as marine litter. These include import bans on items such as plastic bags, in Kenya and Rwanda, and plastic waste, in China, and laws prohibiting, regulating and disincentivizing the manufacturing or retailing of specific goods, such as those banning single-use or “biodegradable” plastic bags and expanded polystyrene. Other countries have made it a requirement to adopt best management practices, for example in the manufacturing, handling and transport of nurdles and microbeads in personal care products,⁶ or have prohibited smoking on beaches. Extended producer responsibility is also an important policy approach, in which producers accept significant responsibility for the treatment or disposal of products.

27. The success of the ban on plastic bags in Kenya is due to a number of reasons, including the constitutional right of Kenyans to a clean and healthy environment and the application of the precautionary principle in ensuring that right; political support at the presidential level; regional examples of best practices, such as in Rwanda; the fulfilment of national responsibilities under the 2030 Agenda for Sustainable Development; support from the global community, including international leaders and partners; a growing public awareness of the environmental threats posed by plastics; and significant additional benefits, such as improved drainage during the heavy rains, entrepreneurial opportunities to develop innovative packaging solutions and the revival of the cotton sector in the manufacturing of packaging alternatives. Certain challenges remain concerning the differential impact of high fines on people of low income, the need for more data on the impacts of the ban to enable evaluation of progress made, and cross-border movement of plastic bags from countries that have not yet implemented a ban.

28. Member States have also put in place a range of binding legislative measures to improve waste management. These generally fall into one of four categories of disposal: (a) land-based waste disposal, for example in landfills; (b) land-based waste clean-up, such as community programmes to clean up beaches and public programmes such as the one in the Republic of Korea that provides funds for fisherfolk to return their litter to port; (c) the disposal of abandoned, lost and discarded fishing gear; and (d) the disposal of litter from ships. New Zealand has put further restrictions on landfill locations to ensure that they are sited away from the coast. As disasters and natural hazards can also result in a large increase in marine litter, many Governments have put in place disaster debris management plans to help to prevent litter from entering waterways and to organize its removal afterwards. Environmentally sound incineration continues to play an important part in waste disposal. For example, in Japan, funding is made available for facilities to use waste-to-energy methods.

29. The International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, largely covers the management of litter from ships; it deals with vessel-borne waste and disposal and has been adopted in the national legislation of many countries, some of which have taken a very stringent view on the type of waste that must be removed in ports and disposed of properly. Regarding plastics associated with fishing gear, Saint Kitts and Nevis prohibits any use of plastics, while other countries aim to minimize losses of such gear at sea. Some countries have adopted legislation against dumping that regulates the creation of artificial reefs from waste materials, as these may affect the functioning of ecosystems.

30. Within the national context, there are also non-binding, voluntary measures that supplement legislative measures, such as voluntary efforts taken in the private sector in Japan, Mexico, Portugal, Spain and the United States of America to manage the handling of nurdles, the voluntary phasing out of microbeads in cosmetics and a range of voluntary certification and labelling schemes.

31. Today, there are many technological solutions being developed around the world. One key area is the redesign of plastic items and packaging: in its report entitled *Valuing Plastic: The Business Case for Measuring, Managing and Disclosing Plastic Use in the Consumer Goods Industry*, the United Nations Environment Programme (UNEP) estimated that the negative externalities of packaging cost \$40 billion each year. As a result, the development of alternative, degradable materials has been a

⁶ Bangladesh has banned the manufacturing of all polythene shopping bags, China has prohibited the production, sale and use of ultrathin bags, California has banned the manufacturing of nurdles and Canada, the United Kingdom and the United States of America have banned the use of microbeads in personal care products.

clear priority for many Governments and industry. Technological improvements in waste management, such as mobile units, improved recycling of polymers, the capture of microfibres in washing machines and microbeads in wastewater systems, appropriately scaled waste-to-energy systems, the conversion of dump sites to sanitary landfills and the removal of litter using floating booms, can also enhance the effectiveness of existing national facilities. Improving the technologies for monitoring the extent of marine litter and plastics is also an important response and is vital to ensuring the effectiveness of different policies.

32. Economic responses of Governments include establishing incentives, taxes, levies and fines to reduce the production and consumption of plastics and take-back and deposit-refund schemes for plastic items such as bottles. Coupled with these are educational and awareness-raising initiatives launched in society at large and within specific industries. For example, in Germany, the plastic manufacturers and the chemicals industry have launched the Zero Pellet Loss initiative to raise employee awareness on ways to manage pellets properly, and Operation Clean Sweep encourages industry actors to prevent the accidental loss of plastic resin in the environment. Activities such as cleaning up beaches, engaging citizens in the monitoring of beach litter, rescuing marine organisms affected by litter, adopting beaches and organizing cultural events, holding information-sharing workshops and conducting national campaigns to support, for example, the Clean Seas campaign and mobile applications such as Beat the Microbead have been used to raise awareness and are now an integral part of many national action plans.

B. Regional response options

33. At the regional level, cooperation is crucial to addressing the problems of marine litter and microplastics, as no single country can manage the oceans in isolation. Regional approaches also allow for concerted actions to be taken in a way that matches the specific environmental and socioeconomic context. With the establishment of the Regional Seas Programme in 1974, UNEP adopted a regional approach to addressing the environmental degradation of the marine and coastal environments. More than 143 member States participate in one or more of the 18 regional seas programmes, 14 of which are underpinned by legally binding conventions. Nine regions have adopted protocols specific to land-based activities, seven already have action plans on marine litter and six more are developing them.

34. Other regional examples that support the conservation of the marine environment include the work of regional fisheries bodies and the Code of Conduct for Responsible Fisheries, which promotes measures to prevent the loss of fishing gear; regional policy coordination measures such as the Directive establishing a Framework for Community Action in the Field of Marine Environmental Policy of the European Union, which is a legally binding instrument, and the European strategy for plastics in a circular economy; and the Association of Southeast Asian Nations (ASEAN) conference on reducing marine debris in the ASEAN region, which issued recommendations on a regional agreement for the sustainable management of debris pollution. The Group of Seven and the Group of 20 also developed action plans to combat marine litter in order to provide valuable mechanisms for taking action, raising awareness, establishing cooperation on technical matters and engaging multiple sectors of society.

35. Regional technical and economic responses follow along similar lines, with, for example, the Horizon 2020 research and innovation programme of the European Union that funds work on marine litter and the development by the secretariat of the Pacific Regional Environment Programme of regional projects to improve solid waste management in the Pacific islands. In terms of regional educational and informational responses, UNEP has supported the creation of regional nodes of the Global Partnership on Marine Litter in the North-West Pacific, the wider Caribbean, the Mediterranean and the Pacific regions in order to strengthen interregional and regional cooperation and awareness-raising efforts. Other examples include new legislation being proposed by the European Union to reduce the use of the 10 types of single-use plastics most commonly found on beaches and in fishing gear, representing 70 per cent of the marine litter in Europe, by promoting less harmful alternatives when available, better informing consumers, using extended producer responsibility schemes when no alternatives exist and ensuring that certain products enter the existing circuits for separating, collecting and recycling waste.

C. International response options

36. When considering responses at the international level, even though coastal communities and small island States suffer visible impacts, all member States, including landlocked countries, are affected by and contribute to marine litter and microplastics. The three international policy response options presented in the assessment of the effectiveness of relevant international, regional and subregional governance strategies and approaches (UNEP/AHEG/2018/1/INF/3) are discussed below.

37. With regard to legal and policy response options, binding measures taken under option 1, which is to maintain the status quo, would involve strengthening the implementation of existing instruments, such as the regional seas programmes and other relevant multilateral environmental agreements.⁷ The Assembly of the International Maritime Organization (IMO) has recently recognized that marine plastic pollution requires further consideration in order to significantly reduce marine pollution of all kinds by 2025, and the Marine Environment Protection Committee of IMO has invited member States and others to submit concrete proposals for the development of an action plan on litter resulting from shipping. Similarly, the governing bodies of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter and its 1996 Protocol will discuss, in November 2018, a statement of concern regarding the disposal of fibreglass-reinforced plastic vessels at sea. Option 2 is aimed at strengthening existing instruments to specifically address marine litter and microplastics, amending the mandate of an existing international body to coordinate the efforts of various institutions and establishing a voluntary framework to increase industry participation in developing non-binding measures to reduce marine litter. Option 3 is the establishment of a new global binding mechanism, without duplicating efforts under existing instruments, which could either address the general issue of marine litter and plastics or be highly focused on specific areas such as microplastics or labelling and certification.

38. Voluntary measures can also be included in all three options. Relevant examples include the Global Partnership on Marine Litter, a multi-stakeholder partnership that engages more than 150 partners to tackle sources and sinks, the Global Ghost Gear Initiative, established to tackle lost and abandoned fishing gear, and the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, an intergovernmental mechanism that brings together diverse stakeholders to address marine pollution in an integrated manner, focusing on nine categories of sources, including marine litter.

39. During the meeting of the expert group, a combined three-pillar approach was explored, drawing on the options in the background paper (UNEP/AHEG/2018/1/3). The first pillar represents a strengthened cooperation under the regional seas conventions; the second focuses on the establishment of a platform for knowledge-sharing and cooperation among industry actors, relevant authorities, non-governmental organizations and other stakeholders, as well as a forum for voluntary and coordinated commitments by member States; and the third concerns an amendment to the Basel Convention to comprehensively address plastic waste as a matter of concern. It was agreed that the three-pillar proposal, in addition to the input presented at the meeting on other types of options, should be kept under consideration during the next stage to allow a range of options to be developed, as defined in the mandate of the expert group.

40. Technological and economic response options covering enhanced international coordination, collaboration on research and development to better understand the pathways and impacts of marine litter and potential solutions, and technological innovation, for example the Virtuous Circle project, together with official development assistance to improve waste management and recycling facilities in developing countries, will be necessary features of any new global mechanism. The Government of Norway has taken the initiative to establish a multi-donor trust fund in the World Bank to improve waste management and prevent marine litter, inviting other donors to add to their initial contribution. Other suggestions for a global funding mechanism to support these features included using tax levies on plastic products.

41. Educational and global awareness-raising activities will play a crucial role in any option. Campaigns such as the five-year global Clean Seas project launched by UNEP, marine organizations, such as ocean aquariums and museums, and platforms such as the Global Partnership on Marine Litter will all play an important part in developing a global outreach response, along with conferences and events on the subject, such as the International Marine Debris Conference.

⁷ The United Nations Convention on the Law of the Sea; the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks; the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter and its 1996 Protocol; annex V to the International Convention for the Prevention of Pollution from Ships; the Convention on Biological Diversity; the Convention on the Conservation of Migratory Species of Wild Animals; the Stockholm Convention on Persistent Organic Pollutants; the Basel Convention; and regional instruments, including the regional seas conventions and action plans.

V. Environmental, social and economic costs and benefits of the different international policy response options

42. The discussion paper on the environmental, social and economic costs and benefits of different response options (UNEP/AHEG/2018/1/4), based on the assessment of the effectiveness of the relevant governance strategies and approaches (UNEP/AHEG/2018/1/INF/3), focuses mainly on the three international policy options discussed above. While it was not feasible to carry out a detailed analysis that would provide monetary figures for the three options, it was possible to identify examples of costs and benefits at the national, regional and international levels of scaling up or down such efforts.

43. One major challenge in estimating the costs and benefits of marine plastics is the extent of the institutional and knowledge gaps that remain. At the regional and global levels, there are gaps in: (a) the establishment of mandates to manage upstream interventions; (b) geographical scope; (c) the recognition of risks to human health; (d) solid waste management and wastewater treatment; (e) the regulation of dumping; (f) the management of microplastics; (g) the regulation of industry pollution and emissions ending up in waterbodies; and (h) the adoption of due diligence within the plastics industry.

44. As regards knowledge gaps, most of the relevant literature is about the prevalence and forms of marine litter, but little is written about the magnitude of the costs that marine plastics impose on society, such as the social impact of the damage to human welfare caused by marine plastic litter. Comprehensive analyses and measurements of such impacts need to be conducted using economic and econometric models; however, historically, most policy interventions have been examined using a technical or engineering approach, without the application of such models, without an analysis of the costs and benefits of alternative actions, and without taking into account the benefits arising from employment opportunities, new investments in enterprise, improvements in quality of life or the protection of ecosystems.

45. All these issues make it difficult to calculate monetary figures for the different options. For example, the calculated cost of manufacturing biodegradable alternatives to plastic bags is often higher than the cost of the original bag; however, these calculations rarely include the additional costs to the environment or human health. Better life-cycle assessments are needed, in particular for products and polymers, with a view to the evaluation of recycled and alternative materials and product redesign.

46. Examples of costs and benefits relating to future actions that can be scaled up from the national to the regional and international levels are presented in the discussion paper on the costs and benefits of the different response options. Some of the most common impacts for which environmental costs can be estimated include entanglements and ghost fishing, ingestion (intestinal blockage, malnutrition and poisoning) by fish and other marine animals, blockage of filter feeding mechanisms of whales and other marine animals from small particulate (neustonic) plastic debris, physical damage and smothering of reefs, seagrass, mangroves and other habitats, litter becoming vectors for marine pests, including invasive species, and reduced resilience to climate change due to cumulative impacts.

47. Social costs can be estimated for issues such as the loss of aesthetics or visual amenity of a landscape, the loss of indigenous values, antagonism against perceived polluters, perceived or actual risks to safety, including from additives and microplastics, food security, and perceived or actual risks to human health, including from microplastics and exposure to hazardous chemicals in containers washed ashore.

48. Economic costs for which estimates can be derived include abatement costs shouldered by local governments, the cost to tourism (e.g. due to the loss of visual amenity and inability to use beaches), the cost to vessel operators (e.g. resulting from downtime and damage to the vessel due to entanglements), the cost to fishery and aquaculture operations due to damage or entanglements and the cost of clean-ups, animal rescue operations, and recovery and disposal. Public safety costs include navigational hazards (the loss of power or ability to steer at sea, which can be life-threatening), hazards to swimmers and divers (entanglements), cuts, abrasions and injuries resulting from punctures and the leaching of poisonous chemicals.

49. These costs can also be analysed according to categories such as costs incurred through preventative measures, costs resulting from direct damage, costs incurred through remedial measures (e.g. clean-up after a natural disaster) and indirect costs (e.g. the loss of ecosystem services). Direct economic costs of marine litter refer to the additional expenditure incurred by different economic sectors. Indirect economic costs refer to the negative impacts of marine litter on the marine environment, human health and productivity across different marine sectors and, ultimately, the gross domestic product of each country. Estimates of the damage caused by marine litter and the resulting

costs are generally very high. Given that much of the damage and resulting cost is avoidable, such estimates can help to point out the seriousness of the problem to Governments and the need for preventative measures.

50. The valuation of the costs resulting from such damage is usually based on the impacts on marine industry users; however, these users represent only a small fraction of the marine economy. In its report *Valuing Plastic: The Business Case for Measuring, Managing and Disclosing Plastic Use in the Consumer Goods Industry*, UNEP estimated that the damage to the value of marine environments globally was at least \$8 billion per year. In its report entitled “Assessing the economic benefits of reductions in marine debris: a pilot study of beach recreation in Orange County, California”, the National Oceanic and Atmospheric Administration of the United States estimated that reducing marine debris, even by 25 per cent, at beaches in and near Orange County could save residents roughly \$32 million during three months in the summer by not having to travel longer distances to other beaches. Similarly, it has been estimated that communities in California, Oregon and Washington, D.C., spent around half a billion dollars per year to control litter and reduce marine debris.⁸

51. Some efforts have also been made to estimate the environmental costs of the production of plastics. According to one study, the “environmental cost to society of consumer plastic products and packaging was over \$139 billion in 2015, equivalent to almost 20 per cent of plastic manufacturing sector revenue, and is expected to grow (to \$209 billion by 2025) if current trends persist”.⁹

52. The potential positive outcomes of prevention include savings to the economy, achieved through reductions in the cost of resources being consumed and in the cost of remediation, and the benefits of a healthy environment and ecosystem. Prevention should thus be included as a main goal when establishing actions under the three response options.

53. The economic, social and environmental costs and benefits are listed for each option in an annex to the relevant discussion paper. For option 1, which is to maintain the status quo, international policy actions include strengthening the implementation of existing mechanisms and monitoring developments under the Basel Convention. Costs include increased staffing and workloads related to meetings and potential conflicts linked to enforcement. Benefits include increased awareness of different multilateral instruments and possible minor environmental improvements.

54. For option 2, which is to review and revise existing frameworks and add a component to coordinate industry, international policy actions include: (a) expanding the mandate of an existing international body to coordinate the efforts of various institutions dealing with marine litter, such as the those governing the Basel Convention and administering the regional seas programmes, and promoting and developing the Sustainable Development Goals; (b) strengthening and adding measures specific to marine plastic litter and microplastics in regional seas programmes and other applicable instruments; (c) revising, for example, the Honolulu Strategy to encourage improved implementation at the national level and reach an agreement on indicators of success; and (d) adopting a voluntary agreement to standardize global, regional and national reporting on the production, consumption and final treatment of plastics and additives, introduce voluntary national reduction targets and develop and improve global industry guidelines (e.g. on the management of polymers and additives or the adoption of global labelling and certification schemes). Examples of costs include the need for increased human resources, meetings and negotiations and their carbon footprint, possible antagonism between countries and industries and the costs of monitoring and evaluating new agreements. Examples of benefits include the savings gained from a more coordinated approach, increased awareness and a reduction in the impacts of plastics on the marine environment.

55. The economic costs of option 3, which is to establish a new international and legally binding architecture, are broadly related to the international negotiation process and the establishment and operation of a fully-fledged secretariat. The main social costs are the increased burden on Governments in undertaking the negotiations and possible conflicts among stakeholders, Governments and businesses, while the environmental costs are the carbon emissions associated with the organization of meetings to conduct negotiations and the potential drop in funding of measures already in place, which may shift attention away from existing responsibilities. In developing voluntary and, eventually, binding measures, various other costs are likely to emerge, for example: (a) increased costs

⁸ Barbara H. Stickel, Andrew Jahn and Bill Kier, “The cost to West Coast communities of dealing with trash, reducing marine debris”, paper prepared by Kier Associates for the United States Environmental Protection Agency, September 2012.

⁹ Rick Lord, *Plastics and Sustainability: A Valuation of Environmental Benefits, Costs and Opportunities for Continuous Improvement* (Trucost, 2016).

for Governments and industry linked to new reporting requirements and to the monitoring and development of and compliance with global standards and new and amended legislation; (b) the administration of labelling and certification schemes; (c) increased regulation and monitoring of trade in non-hazardous plastic waste; (d) the administration of and contributions to a global funding mechanism to assist remediation in countries, in particular small island developing States, where marine plastic litter accumulates; and (e) the social costs of the perceived inconvenience of tougher environmental legislation, such as bans on disposable plastic bags and levies on plastic products. Benefits are likely to include fewer abatement measures over the long term, with significant industry savings, reduced costs resulting from damage and increased savings due to a more efficient use of plastics, support for Governments and industry in improving transparency and disclosure in achieving reduction targets, reduced harmful impacts of marine plastics and the knowledge that future generations will have access to a healthy environment, and a reduction in the harmful effects of marine plastics on marine ecosystems and an increase in resilience.

56. In establishing the costs and benefits of international policy response options, such as those listed above, more clarity is needed on the efficacy of existing partnerships and initiatives, the cost of inaction and the benefits of preventing and avoiding the costs associated with the social and environmental impacts of marine litter and plastics, the benefits of using a life-cycle approach across the design and production chain and the economic, social and environmental costs of improving the governance framework to combat marine litter and microplastics. The development of standardized methodologies and approaches to examine each of these issues would make it possible to compare different actions and options and evaluate their feasibility and effectiveness.

VI. Feasibility and effectiveness of the different international policy response options

57. The analysis presented in the relevant discussion paper (UNEP/AHEG/2018/1/5) of the feasibility and effectiveness of the three international policy response options is based on the costs, technical and political feasibility and the degree to which each instrument or policy can be successful in reaching the intended goal of reducing marine litter and even building a society in which there is no plastic waste. Ideally, this would be based on a standardized quantitative measure. However, in the absence of such an indicator and of data to measure effectiveness, proxy indicators such as reductions in the production and consumption of certain types of products that are commonly found in the environment can be used. More details can be found in the assessment report (UNEP/AHEG/2018/1/INF/3).

58. In summary, option 1 is, by definition, technically and politically feasible. Strengthening the implementation of existing instruments would require new compliance and reporting mechanisms, but could help to improve their overall effectiveness. However, it would be difficult to address the issue of marine litter from a holistic perspective, as not all of the instruments currently address the entire life cycle of products. Given that none of these steps would necessarily halt or reduce the increase in marine litter, option 1 was not seen to be effective overall.

59. While option 2 is both technically and politically feasible, the political feasibility of the voluntary agreement would depend on the precise nature of the commitments and targets and sufficient engagement with stakeholders, without which the effectiveness of the option would be undermined. If the mandate of an international body were expanded, negotiations would be involved, and if a voluntary agreement were developed, countries would need technical assistance with setting voluntary national reduction targets and monitoring and reporting. Overall, option 2 could be effective if strengthened or additional measures were implemented, as it builds on synergies and increases coordination.

60. Option 3 is technically feasible, but, depending on the different modalities adopted, it would need political support from member States and could be affected by the economic impacts of the instruments and the severity of its compliance mechanism. It would involve option 2 being launched as a first phase, to take stock, develop voluntary measures and gather experiences and data, followed by, or in parallel with, a second phase to support the development and implementation of a legally binding architecture, procedures and measures. Option 3 is likely to be effective, as it allows for an international coordinated approach; however, it is contingent upon suitable implementing and compliance mechanisms.

VII. Conclusions

61. While the expert group recognized that there was sufficient information to take action on marine litter and plastics, it was agreed that a robust analysis of different response options was required, based on: (a) a deeper understanding of the gaps in existing mechanisms and agreements, including of their coverage and the mechanisms or agreements that are working well; (b) a greater understanding of the challenges faced by existing programmes and institutions; (c) an exploration of the ways in which existing platforms such as the Global Programme of Action and the Global Partnership on Marine Litter might be extended or whether a new structure is needed; (d) clarification on the need for global coordination; (e) identification of opportunities for short-term, as well as medium- and longer-term, actions; and (f) an analysis of ways in which improved data from the monitoring of marine litter and plastics could be used to inform upstream processes and interventions. The expert group considered that addressing these issues would help to bring it closer to finding solutions for the overall goal of eliminating the discharge of litter and plastics into the oceans over the long term, as reflected in United Nations Environment Assembly resolution 3/7.

Annex

Major barriers and response options for combating marine litter and microplastics

1. Major barriers occur in four areas: legal (any impediment or barrier established by, founded upon or generated by law, the absence of it or the lack of its implementation and/or enforcement); financial (when high costs or lack of markets make a certain activity difficult to afford or implement); technological (relating to the production, manufacturing and design of products, consumption systems and all aspects of waste collection, management and recovery); and information (access to data, research, transparency, and education and awareness).
2. The meeting suggested that it would be useful to have a priority barriers extracted from the extensive list of barriers presented to the first meeting. The secretariat therefore prepared the list below as a non-exhaustive list of priority barriers based on the discussions that took place in Geneva. This list will be open for discussions during the second meeting.

Area	Barrier	National	Regional	International
Legal	<ul style="list-style-type: none"> Lack of harmonized standards or an international legally binding agreement on the reduction of marine litter and microplastics including contamination regulations for foods and ecosystems, or measurable targets or timelines at the global level for the reduction of marine pollution, particularly from land-based sources 	<ul style="list-style-type: none"> Existing legislative instruments for disposal covering: i) land-based waste disposal, for example landfills; ii) land-based waste clean-up schemes; iii) abandoned, lost and discarded fishing gear; and iv) litter from ships. Develop framework law which covers the whole life cycle of plastics including their use in products with design targets, management and multiple-Rs and safe disposal from land-based and sea-based sources such as abandoned, lost and discarded fishing gear; and litter from ships. 	<ul style="list-style-type: none"> Co-operate regionally to align with relevant action plans e.g. G7 and G20 on combatting marine litter, raising awareness, establishing co-operation on technical matters and engaging multiple sectors of society; 	<ul style="list-style-type: none"> Option 3 A legally binding architecture to be implemented in two phases: <ul style="list-style-type: none"> <i>Phase I:</i> Extend existing and new voluntary measures, including introduction of self-determined national reduction targets; development/improvement of industry led design standards that promote recovery and recycling. <i>Phase II:</i> Develop a binding agreement to include: <ul style="list-style-type: none"> ratification/accession procedures to confirm commitment by member states; <ul style="list-style-type: none"> an obligation to set self-determined national reduction targets; develop and maintain national inventories on production, consumption, final treatment and trade of plastics and additives. fixed timelines to review & improve national reduction targets; a duty to cooperate to determine global technical standards to ensure basic level environmental and quality controls by industry. a duty to cooperate to determine global industry standards for reporting, labeling & certification measures to regulate international trade in non-hazardous plastic waste; compliance measures, monitoring and reporting; legal basis set for mechanisms for liability & compensation, funding and information sharing; and consideration of the needs of developing countries and regional differences (e.g. exemptions and extensions).

Area	Barrier	National	Regional	International
	<ul style="list-style-type: none"> Limited use of legal instruments or incentives to reduce unnecessary, difficult to recycle plastics or shedding of microplastics during use, such as due diligence, “polluter pays” principle, Extended Producer Responsibility schemes, or any form of global liability and compensation mechanism 	<ul style="list-style-type: none"> Identify and ban undesirable and unnecessary products and hazardous chemicals in production and recycling processes (Reduce). All plastic types are collected, sorted and recycled irrespective of ‘value.’ 	<ul style="list-style-type: none"> Regional co-operation on legal instruments and incentives to ban undesirable and unnecessary products e.g. the European Union’s legislative action to reduce the use of the ten most commonly found single-use plastics on beaches and in fishing gear, representing 70 percent by count, by promoting less harmful alternatives when available, better informing consumers, using extended producer responsibility schemes when no alternatives exists, and ensuring that certain products enter the existing separation and collection and recycling circuit. Support regional compliance with sustainable global recycling standards. Participate in establishment of global standards for waste stream definitions, criteria and labeling to assist in purifying waste streams to increase their value 	<ul style="list-style-type: none"> Establishment of sustainable global recycling standards Global ban on undesirable and unnecessary products and hazardous chemicals in production and recycling processes Establishing global standards for waste stream definitions, criteria and labeling to assist in purifying waste streams to increase their value and limit harmful exposures and impacts
	<ul style="list-style-type: none"> Lack of targets and effective compliance and enforcement mechanisms for existing standards and regulations as well as a fragmented approach at regional levels. 	<ul style="list-style-type: none"> Effective EIA, SEA processes in place Set national collection targets, landfill reduction targets, recycling targets, and post-consumer content targets for different types of plastics Identify enforcement mechanisms and engage in regional activities on improving compliance 	<ul style="list-style-type: none"> Co-ordination under: <ul style="list-style-type: none"> (i) Regional Seas Programme: support adoption of legally binding protocols on land-and based and marine sources of litter and plastics; (ii) Regional Fisheries Bodies: adopting and implementation of Code of Conduct for Responsible Fishing; (iii) Regional policy co-ordination to achieve regional targets e.g. zero leakage to ocean from all sources; (iv) European Union’s Marine Strategy Framework Directive; European Strategy for Plastics in a Circular Economy; (v) Association of Southeast Asian Nations (ASEAN) Conference on Reducing Marine Debris in the ASEAN Region 	<ul style="list-style-type: none"> Core element of option 3

<i>Area</i>	<i>Barrier</i>	<i>National</i>	<i>Regional</i>	<i>International</i>
			<ul style="list-style-type: none"> • Participate in regional improving classification of hazardous components of plastic production and treatment under the Basel, Stockholm and Rotterdam Conventions, and ensure hazardous substances are eliminated from lifecycle of plastics, highly regulated where not possible to eliminate. • Establish regional co-operation on design and 3Rs (reduce, reuse, recycle). 	
	<ul style="list-style-type: none"> • Lack of single authority or body responsible for overseeing the management of waste and marine litter prevention and enforcement of binding instruments, particularly in areas beyond national jurisdiction 	<ul style="list-style-type: none"> • Establish dedicated government body to oversee solid waste management policies, implementation and monitoring. 	<ul style="list-style-type: none"> • Strengthen the role of regional bodies to deal with areas beyond national jurisdiction 	<ul style="list-style-type: none"> • Options 2 and 3 both have the potential to establish a single authority to take forward this element especially in relation to areas beyond national jurisdiction
	<ul style="list-style-type: none"> • Widespread absence of policies to incentives and transform markets by stimulating supply of recyclable plastics and products with recycled content, 	<ul style="list-style-type: none"> • Establish industrial policies and approaches to design for products with recycled content 	<ul style="list-style-type: none"> • Create regional markets for products with recycled content 	<ul style="list-style-type: none"> • Establish new international arrangements on green design with recognized levels of recycled material content
Financial	<ul style="list-style-type: none"> • Lack of funds and implementation of market-based instruments and tax incentives to stimulate investment for local infrastructure for collection, treatment or disposal and environmentally and financially sustainable end-of-life treatment of plastic waste 	<ul style="list-style-type: none"> • Identify new sources of funding and implement economic incentives at national level to promote 6Rs, focusing on reduction of unnecessary and undesirable products, incentives to design products for reuse, the infrastructure, collection, sorting required, diversion from landfill, and sustainable recycling practices. 	<ul style="list-style-type: none"> • Establish new regional funds to incentivize investment in infrastructure, especially where shared facilities in neighbouring states make sense 	<ul style="list-style-type: none"> • Establish new sources of international funding to encourage design of products using recycled materials and to enable technology transfer to increase extent of sustainable recycling facilities
	<ul style="list-style-type: none"> • Continued use of fossil fuel subsidies and a lack of sustainable and profitable end-markets for all end-of-life plastics, allowing new plastic to remain a cheaper source of raw material compared to recycled plastic 	<ul style="list-style-type: none"> • Removal of perverse incentives allowing new plastic to remain a cheaper source of raw material compared to recycled plastic 	<ul style="list-style-type: none"> • Identify and encourage regional bodies to remove perverse incentives allowing new plastic to remain a cheaper source of raw material compared to recycled plastic 	<ul style="list-style-type: none"> • Working with the World Trade Organisation and other relevant bodies identify sources of perverse incentives and establish alternative ways to enable materials containing recycled plastic to be recognized in the global product classification

<i>Area</i>	<i>Barrier</i>	<i>National</i>	<i>Regional</i>	<i>International</i>
Technological	<ul style="list-style-type: none"> Insufficient use of recycled materials in products in part due to insufficient involvement of industry in design, production and after-use systems and limited capacities in public authorities 	<ul style="list-style-type: none"> Identify technological needs to increase reuse, for example by recycling required components to enable this, identify design products for reuse and improve the infrastructure required (identification, collection, sorting, dismantling, etc.) 	<ul style="list-style-type: none"> Establish funds for technology transfer in the design and use of recycled plastic materials 	<ul style="list-style-type: none"> Establish funds for technology transfer in the design and use of recycled plastic materials
	<ul style="list-style-type: none"> Fragmented and low spread of innovative technological infrastructure, especially in rural areas, for waste management and recycling, dealing with alternative materials, retention of microplastics in waste water treatment and sludge and monitoring and diagnostic technologies to enable national bodies to evaluate performance environmental standards 	<ul style="list-style-type: none"> Improve technology uptake in local areas of infrastructure including the collection, transport, storage, sorting and disposal services with the aim of diverting waste from the oceans and preventing leakage in all lifecycle components. Improve sorting services to meet requirements of domestic and international recycling industry (where exported), make more plastic types recyclable, meet landfill reduction targets. 	<ul style="list-style-type: none"> Improve technology transfer across the region to support better infrastructure including the collection, transport, storage, sorting and disposal services with the aim of diverting waste from the oceans and preventing leakage in all lifecycle components. 	<ul style="list-style-type: none"> Encourage an open data and technology approach to waste and plastic infrastructure, use and design
	<ul style="list-style-type: none"> Absence of a coordinated development and adoption of labelling standards for reuse and recyclability of products 	<ul style="list-style-type: none"> Establish national guidelines and coordination for the development and adoption of labelling standards for reuse and recyclability of products 	<ul style="list-style-type: none"> Encourage at the regional level, a coordinated development and adoption of labelling standards for reuse and recyclability of products 	<ul style="list-style-type: none"> Encourage globally, the coordinated development and adoption of labelling standards for reuse and recyclability of products
Information	<ul style="list-style-type: none"> Lack of research and harmonized, monitoring methodologies and data on the sources, flows and extent of plastics and microplastics in the marine environment, their impacts on human health, food chains and ecosystems and associated costs 	<ul style="list-style-type: none"> Undertake analyses of the sources, flows and extent of plastics and microplastics in the national marine environment, their impacts on human health, food chains and ecosystems and associated costs 	<ul style="list-style-type: none"> Co-operate in regional research and innovation programmes on research and innovation e.g. European Union's Horizon 2020 research and innovation programme funding work on marine litter; Secretariat of the Pacific Regional Environment Programme developing regional projects to improve solid waste management in the Pacific islands; UNEP - Global Partnership on Marine Litter in the North-West Pacific, the Wider Caribbean, Mediterranean and the Pacific regions, to strengthen inter-regional and regional co-operation and awareness raising efforts 	<ul style="list-style-type: none"> Establish global, international research programmes on the sources and flows of plastics in the environment and their impacts on human health, food chains and ecosystems

<i>Area</i>	<i>Barrier</i>	<i>National</i>	<i>Regional</i>	<i>International</i>
	<ul style="list-style-type: none"> Lack of global and national reporting standards on the production, consumption, use, end-of-life/final treatment and trade of plastic that will eventually become waste, including if traded waste is mismanaged, by going to landfill rather than licensed facilities 	<ul style="list-style-type: none"> Participate in regional and global activities on reporting standards for production, consumption, use, end-of-life/final treatment and trade of plastic going to waste Participate in processes to set global standards for waste stream definitions, criteria and labeling to assist in purifying waste streams to increase their value. Participate in processes to improve classification of hazardous components of plastic production and treatment under national and international agreements such as the Basel, Stockholm and Rotterdam Conventions. Enhance support for research into secondary and tertiary recycling with a view to establishing national (and global) reporting standards 	<ul style="list-style-type: none"> Establish harmonized reporting standards within existing regional agreements on production, consumption, use, end-of-life/final treatment and trade of plastic that will eventually become waste, including if traded waste is mismanaged, by going to landfill rather than licensed facilities 	<ul style="list-style-type: none"> See under Option 3
	<ul style="list-style-type: none"> Lack of transparent, inclusive decision-making and public awareness preventing a broader discussion on cultural barriers, responsibilities, risks and types of behavioural changes and voluntary schemes that society is willing to undertake 	<ul style="list-style-type: none"> Encourage dialogue to put in place non-binding, voluntary measures to supplement legislative measures. For example, voluntary nurdle management, phasing out of microbeads in cosmetics and launch of voluntary certification and labelling schemes. Public campaigns on links between plastic pollution to air and water quality standards, particularly primary microplastics, additives, chemicals used for recycling, release of toxins from incinerators. 	<ul style="list-style-type: none"> Undertake regional outreach and public participation programmes aligned with monitoring and information requirements of existing agreements 	<ul style="list-style-type: none"> Continue to support global efforts such as CleanSeas, Global Programme on Marine Litter and other public engagement activities