

A Portfolio of Marine Litter Policy Options

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Executive Summary

Marine litter is a complex environmental problem originating from a variety of land- and sea-based litter sources that negatively impact the environment, society and the economy. Mitigating this problem requires a policy mix addressing the sources and impacts of marine litter at the most appropriate geographical levels.

This report provides a **portfolio of policy options** for the relevant authorities at multiple levels in the four EU marine regions: the Mediterranean Sea, Black Sea, Baltic Sea and the North East Atlantic. These options aim to prevent and reduce marine litter and, in particular, to support the implementation of the **Marine Strategy Framework Directive**¹ (MSFD). They include not only those measures and practices that can be implemented quickly within the first MSFD cycle (before 2018), but also longer-term options to address structural gaps and shortcomings in the policy framework and institutional set-up.

Unlike previous studies, this report identifies policy options to make product life cycles more sustainable and proposes region-specific mixes of measures in response to the main challenges in **each of the four EU marine regions**, which considerably differ from each other in terms of drivers, sources and impacts of marine litter. It builds on earlier research performed in the CleanSea project, including the analysis of institutional and legal gaps and barriers to marine litter reduction (Altvater et al. 2013) and the inventory of best practices in the EU (Kalfagianni et al. 2015).

On top of the best practices identified in our earlier research, we have included existing as well as additional measures in the regional assessments, taken from the Regional Action Plans (RAPs) of the marine regions and selected Programmes of Measures (PoMs) by the EU Member States. The actual assessments have been performed by applying a multi-criteria analysis (MCA). This analysis resulted in lists of **best ranked measures** and practices per region in terms of (potential) effectiveness. Subsequently, they have been used for the development of **region-specific policy options**.

As a final step, the results from the four regional assessments and the region-specific policy options have been used as input for a European portfolio of policy options for marine litter reduction. The choice of specific regulatory and voluntary approaches in the regional as well the EU-wide policy options has been based on the following five **strategic considerations**:

- Address the most prevalent marine litter items first;
- Focus on the early stages of the ‘product-to-waste cycle’ that can prevent waste and marine litter generation;
- Upscale best practices to other geographical levels;
- Use existing regulatory instruments more effectively;
- Facilitate sectoral partnerships and voluntary agreements.

The assessment of measures showed that major positive impacts are most likely to be achieved when the **focus is on specific marine litter types**. However, several of the **most abundant litter items** are not appropriately addressed as yet, such as cigarette butts, packaging, and single-use items (e.g. drink bottles and cans, plastic straws and cutlery, food containers and wrappers). Here, aside from

¹ Directive 2008/56/EC establishing a framework for community action in the field of marine environmental policy.

economic instruments, stronger regulatory measures and increased support for innovation are important policy options.

The most **powerful stages for intervening** in the current product-to-waste cycles are the first two, ‘design and production’ and ‘use and consumption’. Here, waste generation and marine litter can be prevented. With intelligent design of these phases we would make a transition from ‘product-to-waste’ cycles (which are perhaps better described as *chains*) to regenerative ‘product-to-resource’ cycles. As this study shows, these stages are currently less targeted for marine litter reduction in Europe than collection and cleanup. Policies should therefore better be steered to ensure that products are designed to be **long-lasting and reused, repairable and remanufacturable** with the most effective use of resources, minimizing the use of virgin non-degradable materials and incorporation of toxic substances. Inappropriate disposal behavior should be discouraged and citizens enabled to make responsible, well-informed decisions about the products they buy.

Innovative methods to stimulate recycling of plastics have to be developed. Several technologies have been developed by major chemical companies, but the challenge is now to make them economically viable. Therefore, material recycling needs to become competitive compared to thermal recovery which requires sufficient input of the right quality of materials. More research on product design and business models to prevent litter is necessary. The recently published **EU Action Plan for a Circular Economy**² is a first step in the direction of abandoning the linear economy because it targets the volumes of unrecycled waste produced, resulting in lower volumes of waste available in society to become marine litter.

Reducing marine litter and achieving good environmental status (GES) goes **beyond the MSFD** alone. Many powerful measures to reduce marine litter exist far upstream from the marine and maritime domains. Whether the approach is regulatory or co-managerial³, to address marine litter the policy mix should include a suite of regulatory measures related to the production of goods and waste in general, such as the Waste Framework, the Landfill and the Eco-Design Directives. Implementation of existing legislation is still fraught with shortcomings, and the consequent prosecution of infringements should be put high on the agenda in each Member State. This **implementation gap** has to be closed by all EU Member States, requiring greater political will. Furthermore, sectoral measures can contribute to filling this gap and are a necessary beginning, as ultimately only multi-sectoral and integrated⁴ approaches can ensure the achievement of sustainable management of marine litter from the diverse spectrum of land- and sea-based sources. Progress on integrated approaches to management is shown by correlated results between progress on the enabling environment of policy, law and plans and a positive impact on management practices.

Most of the measures taken in the four marine regions have a limited geographical scope, as they mainly apply to the local or national level. If successful measures were to be **upscaled** and implemented more widely, their impact might increase significantly. However, it has to be kept in

² COM (2015) 614/2, http://ec.europa.eu/priorities/jobs-growth-investment/circular-economy/docs/communication-action-plan-for-circular-economy_en.pdf

³ Co-managerial measures refer to a process of management in which government shares power with resource users, with each given specific rights and responsibilities relating to information and decision-making (see e.g. Carlsson and Berkes 2005).

⁴ The Rio+20 conference has chosen Green Economy in the context of sustainable development and poverty eradication as an overarching theme for realizing transformational change. „Integrated approaches“ are herein defined as managing resources for a multiplicity of uses and threats which are set within the much broader contexts of changes in the economic, social and political landscapes. See e.g., UNEP 2012. The UN-Water Status Report on the Application of Integrated Approaches to Water Resources Management.

mind that measures that are successful in one region may not have the same impact in other regions, and therefore need to be adjusted to local contexts and circumstances. At the same time, there exist many commonalities between the four regions, which justifies increased mutual cooperation to exchange information and **learn from each other's good and best practices**. Such cooperation may eventually require new joint institutional processes and a better use of existing institutions in the four marine regions.

The majority of the measures currently being taken have a **voluntary nature**, which means they are not legally binding and government has a less prominent role. These measures vary from local, one-issue approaches to ambitious, sectoral agreements. Although private stakeholders often have the lead in such initiatives, this does not mean that government should not be involved. On the contrary, the **role of government has proven pivotal in the success of voluntary initiatives** through the provision of targets in the context of broader regulatory frameworks, but also in terms of providing access to resources and people, and in some cases even financial support. It is therefore of major importance that Member States create institutional settings that facilitate partnerships and voluntary agreements, especially in the sectors that are the main drivers of marine litter. Such settings should also include adequate mechanisms for monitoring effectiveness.

1 Introduction

1.1 Objective of the report

Marine litter is a complex environmental problem originating from a variety of land- and sea-based litter sources that negatively impact the environment, society and the economy. Mitigating this problem requires a policy mix addressing the sources and impacts of marine litter at the most appropriate geographical levels.

This report builds on the outcomes of earlier research performed in the CleanSea project, including the analysis of institutional and legal gaps and barriers to marine litter reduction (Altvater et al. 2013) and the inventory of good and best practices in the EU (Kalfagianni et al. 2015). It takes the analysis a step further by developing a portfolio of policy options to support the relevant authorities at multiple levels in the four EU marine regions. These options are targeting the prevention and reduction of marine litter and, in particular, to support the implementation of the Marine Strategy Framework Directive⁵ (MSFD). They include not only those measures and actions that can be implemented within the first MSFD cycle, from 2015 to 2018, but also longer-term options to address structural gaps and shortcomings in the policy framework and institutional set-up.

Compared to previous studies by others (e.g. Arcadis, Milieu & EUCC 2012; Acoleyen et al. 2013), this report puts the emphasis more strongly on interventions in the early stages of the product-to-waste cycle, favouring prevention (see Figure 1). Furthermore, it proposes region-specific mixes of measures in response to the main challenges for each of the four EU marine regions, which differ substantially in terms of drivers, sources, and impacts of marine litter.

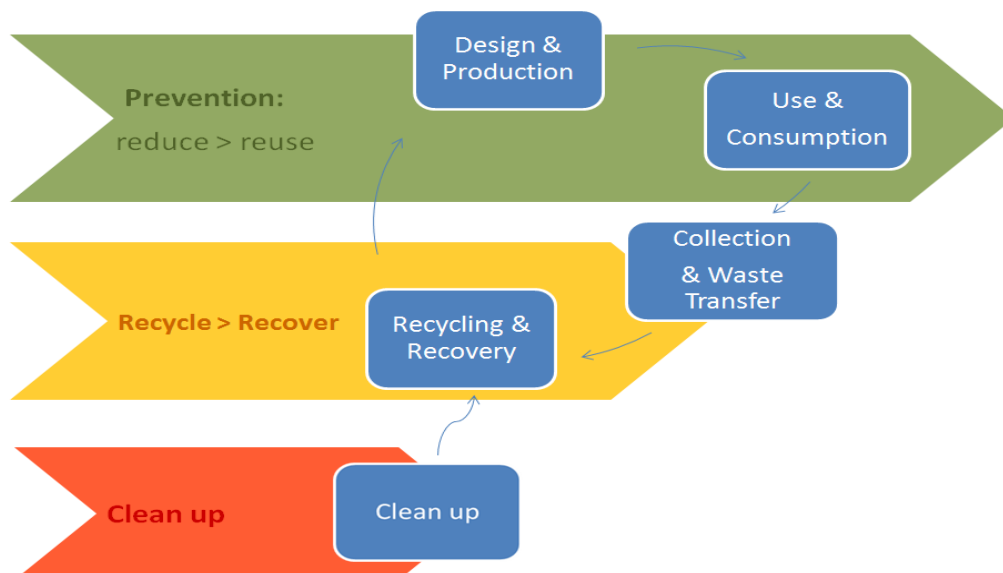


Figure 1: The 'product-to-waste cycle'

⁵ Directive 2008/56/EC establishing a framework for community action in the field of marine environmental policy.

1.2 Methodology and approach

The approach applied in this report consists of the following steps:

1. Assessing existing measures in the four marine regions;
2. Assessing additional measures in the four marine regions;
3. Developing regional policy mixes;
4. Developing an integrated portfolio of policy options.

Step 1 Assessing existing measures

A **multicriteria analysis (MCA)** has been used to evaluate existing measures and policy instruments to prevent or influence the generation of marine litter in each of the four EU marine regions. These measures were identified through literature review and project team knowledge on on-going policy developments (e.g. Regional Action Plans on Marine Litter), and consultation with key stakeholders (e.g. participatory workshops, surveys, interviews).

The general aim was **to evaluate the relative strength of measures** that are in place or are being considered in a certain region, in terms of adequacy and effectiveness in reducing marine litter in the area. Furthermore, this exercise allowed the identification of marine litter items, drivers, sources and barriers that may not be sufficiently addressed by current measures.

The MCA approach was adapted from the methodology developed by Arcadis (2015). The criteria consider different aspects of the potential impact and effectiveness on the reduction of litter, formulated as follows:

- How relevant the instrument is in addressing **key marine litter items** found in the region: this criterion is region dependent and thus a top 10 list of marine litter items most frequently found on beaches was elaborated per regional sea, considering different information sources (see Table 1);
- Which **drivers that can generate marine litter and barriers to GES** are being addressed by the instrument and how relevant are these in the region: In previous CleanSea work identified and assessed drivers and barriers per regional sea.⁶ Their intensity in a particular regional is considered in this MCA;
- What is the relative **impact of source or activity** being addressed in producing marine litter: it considers the production of litter by activities in comparison with other activities and MSFD descriptors in a certain region;
- What is the nature of the instrument: it considers the impact and compliance of the measures by differentiating e.g. legal instruments, economic incentives and competitive advantage;
- At which **geographical scale** is the instrument applied: from local to regional/international level;
- What **evidence** exists in terms of effectiveness of the instrument on the reduction of litter;
- Which **life cycle stage** of the item is targeted by the instrument: from production and design to removal and clean-up.

⁶ The executive summary of deliverable *Driving forces behind marine litter generation in European regional seas* can be found at <http://www.cleanease-project.eu/drupal/sites/default/files/project%20results/D4.1.factsheet.pdf>

Market-based instruments, like no special fee systems, are only mentioned and ranked in case they are simultaneously management tools with the need of an institutional framework. In contrast, plastic bag taxes - which exist as well and were scored highly - are not compared in this paper due to their pure economic character. Of course, these measures can be even more efficient if they are combined with a legal backing (Boteler et al. 2015).

Table 1: Key marine litter items⁷

Rank	Baltic Sea	Black Sea	Mediterranean Sea	North Sea
1	Cigarette butts	Cigarette butts	Smoking related products (butts, tips, packages and lighters)	String and cord (diameter less than 1 cm)
2	Caps/lids (total)	Crisp/sweet packets and lolly sticks (total)	Plastic bottles	Caps/lids (total)
3	Foam sponge (total)	Drink bottles (total)	Plastic bags	Cotton bud sticks
4	Other ceramic/pottery items	Caps/lids (total)	Aluminium beverage cans	Crisp/sweet packets and lolly sticks (total)
5	Bags (e.g. shopping)	Drink cans	Packaging, food wrappers and containers	Rope (diameter more than 1 cm)
6	Food incl. fast food containers	Small plastic bags, e.g., freezer bags	Cups, plates, forks, knives and spoons	Nets and pieces of net < 50 cm
7	Bottle caps	Food incl. fast food containers	Straws	Nets and pieces of net < 50 cm
8	Cutlery/trays/straws (total)	Cups	Plastic pieces	Food incl. fast food containers
9	Wood Crates	Clothing	Sanitary waste (cotton bud sticks, tampon applicators etc.)	Drink bottles (total)
10	Crisp/sweet packets and lolly sticks (total)	Bottle caps	Fishing nets and fishing traps	Cigarette butts

Step 2 Assessing additional measures

Using a similar approach and criteria as applied in Step 1, the second step focused on the evaluation of selected additional measures. The majority of them were identified in our inventory of best practices (Kalfgianni et al. 2015), the Regional Action Plans (RAPs) of the marine regions and in national Programmes of Measures (PoMs) of selected countries in each region.

Step 3 Developing regional policy mixes

For each of the four regions, a mix of policies was designed to address the remaining weaknesses and strengthen the most relevant approaches. The resulting tables with **policy mixes** provide an overview of the highest ranked implemented and foreseen measures across the different stages in the 'product-to-waste cycle' and address the top marine litter items. Furthermore, **additional measures from other regions** that scored high in the MCA were included in the policy mixes. Overall, these

⁷ Based on: Arcadis, Milieu & EUCC (2012): for the top 10 marine litter items of the Baltic, Black and North Seas;

In the Mediterranean region, the list was agreed by Member States in the project *Technical and administrative support for the joint implementation of the Marine Strategy Framework Directive (MSFD) by the EU Mediterranean Member States (Phase II)* based on Interwies et al. 2013; UNEP/MAP 2011; Arcadis, Milieu & EUCC 2012; and Öko-Institut 2012; Volkaert, A. et al. 2015).

tables represent a balanced combination of regulatory and voluntary measures that can effectively address marine litter while building upon existing or planned measures and practices at the regional scale.

Box 1: Factors of success when designing a policy mix (based on: Pattberg & Widerberg 2015)

- **Actors:** a) Motivated partner mix, b) Effective leadership, and c) A network with and capacity building between different stakeholders is established, the public sector is involved strongly.
- **Process:** a) It is more sensible to focus on some measures or even one instead of trying to implement several available measures at the same time; b) Analysis of the geographical context and scope of the measure before implementing; c) Approaches are implemented evenly across different municipalities or regions to have more equitable conditions for all stakeholders; d) Design of instruments: easy to adapt to other regions, time line overseeable, data available, monitoring and compliance mechanism in place, combination with other types of measures; and e) Sustained funding.
- **Context:** a) Coherence of instruments: how are they related to each other, conflicts, interrelations, social context; b) Fit to problem-structure.

Step 4 Developing a European portfolio of policy options

As a final step, the results from the four regional assessments were integrated by developing a European portfolio of policy options for marine litter reduction. The aim of this portfolio is to support policy makers and other stakeholders in identifying regulatory and voluntary measures which are potentially effective to reduce marine litter.

1.3 Limitations of the study

The assessment was done per regional sea, by the same team member, thus reducing the level of subjectiveness inherent to this approach. However, there are further limitations of the MCA used. The evaluation of existing and planned measures was not exhaustive but as comprehensive as possible. Furthermore, the assessment of the foreseen measures was done using the same criteria and under the assumption that they will be fully implemented. There was no assessment of the impact of implemented legislation like national waste treatment laws. The assessment however was linked to findings of the CleanSea report on gaps and barriers in legislation and administration to achieve GES (Altwater et al. 2013).

2 Assessing existing and additional measures in the four marine regions in the EU

This chapter assesses existing and additional measures based on a multicriteria analysis in order to develop appropriate policy mixes for each of the four marine regions. Section 2.1 focuses on the Baltic Sea region, Section 2.2 on the Black Sea region, Section 2.3 on the Mediterranean Sea region, and Section 2.4 on the North-East Atlantic region, respectively.

2.1 The Baltic Sea region

This section assesses existing and additional measures that are not only relevant in national Programmes of Measures (PoMs) but also in the context of the Baltic Regional Action Plan on Marine Litter (HELCOM 2015).

2.1.1 Assessing existing measures

29 existing policy measures and best practices from Sweden, Denmark, Finland, Lithuania, Poland and Germany were assessed. As shown in Table 2, the corporate initiative QMilk scored the highest in the Top 15 of existing measures and practices. This start-up uses casein, a protein obtained at the end of the production cycle of milk, as a source for biodegradable polymers. Zero waste products produced by Qmilk include packages, toothbrushes, medical technology, childrens' toys, and life-style products. Furthermore, it enriches body care products such as peelings, make up, tooth paste and shower gel with QMilk-microbeads, avoiding harmful synthetic microbeads.

Within the Top 15 of existing measures, there are also others targeting the substitution of products and the change of product characteristics. Such measures lead to the avoidance of specific litter items often found in the marine environment (i.e. balloon strings, caps or food containers). Marine Clean (Lithuania), ranked third, designs new products including edible packaging. This, combined with networking at national and EU level for legislative change, seems promising. MOLOK and the Product design studio, "Tomorrow Machine," ranked lower due to a smaller geographical impact.

Additionally, a broad range of applications that propose biodegradable plastics as a suitable solution are developed by research and industry (e.g. the nova-Institute, BASF or Metabolix). Products are called Ecovio F Mulching Film, Bio-Fed Plant clip and suggest substitutes for plant pots or tree protection. All these measures fall under design tools implementable by guidelines or legally binding approaches (not yet existing). However, it has to be kept in mind that those biodegradable polymers can only be degradable in composting conditions, not in the sea with lower temperatures (UNEP 2015).

The "no special fee" system⁸ for port waste reception facilities is ranked second and, until 2002, had to be implemented in accordance with the port reception facility directive.⁹ However, there are still differences between individual harbours with respect to the content and details of individual waste management plans and the cost recovery systems for the disposal of the ship waste. Waste management depends on the role of the local legal and regulatory requirements of authorities as

⁸ Elements of the „no special fee“ (NSF) system are: the fee is irrespective of the use of the port reception facility (PRF) and the delivery right is included; all ships contribute and the polluter pays always; it is independent of the volume. The NSF provides a transparent fee and the financial contribution from ships are used only for PRF purposes.

⁹ Directive 2000/59/EC.

well as the participation of other affected stakeholders like the service providers in the harbours. Therefore, the evidence of effectiveness is correlated with the preciseness of obligations for exceptions and the management systems on land. Importantly, there is a data-collection system for all ports in Sweden and Germany which reports annually to the national or Federal administration.

Table 2: Best ranked measures and practices implemented in the Baltic Sea region

Rank	Measure	Total Score	Life cycle stage
#1	Q-Milk	18.3	Design & Production
#2	“No special fee” system for Port Waste Reception Facility	17.35	Collection & Waste transfer
#3	Marine Clean	17.0	Design & Production
#4	Keep Denmark Clean	16.75	Disposal, Recovery & Recycle
#5	Keep Sweden Tidy	16.35	Clean-up
#6	Composites Europe 2014/2015	16.0	Collection & Waste transfer
#7	Garbage deposit at festivals	15.85	Collection & Waste transfer
#8/9	MOLOK – deep collection of waste	15.75	Design & Production
	Keep Denmark Tidy	15.75	Clean-up
#10	“Sisti Biitsi” (Beach clean-up)	15.35	Clean-up
#11	Separation and recycling of materials from fishing trawls and nets	15.3	Disposal, Recovery & Recycle
#12	Press campaign for reduction of plastic use on islands	14.8	Use & Consumption
#13	Yksikään pelletti ei karkaa (pellet loss)	14.75	Design & Production
#14	Public events for awareness raising: canoe rally	14.55	Use & Consumption
#15	Product design studio “Tomorrow Machine”, project: This Too Shall Pass	14.5	Design & Production

Keep Denmark Clean, Keep Sweden Tidy, Composites Europe and the Garbage deposit in festivals received similar scores, addressing at least two or more items in the Top 5 of marine litter items. Keep Denmark Clean scored higher due to its connection to land-based municipal waste management and the linkage between awareness raising and active support of reuse and recycling of soft drink bottles and cans. Other “Keep Tidy” measures only focus on public awareness campaigns with a view on clean-ups, the last and lowest scored stage in the product-to-waste cycle.

Evidence of effectiveness is in most cases moderate, because of a lack of data on the quantitative reduction of marine litter. Although linked to the lowest stage in the product-to-waste cycle, beach clean-ups like 'Sisti Biitsi' receive relatively higher scores based on the fact that tourism is a strong driver of marine litter in the Baltic Sea region and on the assumption that the collected waste is

managed properly Separation and recycling of materials from fishing trawls and nets have a relatively high impact due to its potential broad geographical scope and by the evidence of its effectiveness.

The Top 15 measures show relatively small ranking differences and mainly cover sustainable product development, waste management infrastructure and responsible citizen behaviour. The measures are rarely related to informed consumer choice or political willingness. Overall, the existing measures seem quite weak as they are not addressing the main regional drivers of marine litter. However, the measures related to design and production are promising. Here, the region seems to have strong competencies.

Out of the 29 assessed measures, six are awareness campaigns (other public events not counted). They are all ranked relatively low due to lack of evidence. One exception is the media campaign for reduction of plastic-use on islands, due to its direct link to municipal waste management. Awareness campaigns are meant to change human behaviour, assuming that citizens (consumers) decide purely rationally, weighing the pros and cons of alternatives. Empirical research and marketing practices, however, indicate that people make decisions in different ways, using instead quick judgements and emotional responses (Umpfenbach 2014). This implies that information campaigns need to consider the strength of the habit of people and how to break it as a different starting point.

2.1.2 Assessing additional measures

As is evident from the previous section, there are several examples of existing good policy measures and practices in the Baltic Sea area. In addition, the Member States and HELCOM have defined a number of additional measures and practices, and areas where options for further action should be explored. Furthermore, in the CleanSea report on legislative barriers (Altvater et al. 2013) additional measures have been discussed, some of which have been assessed here as well. Altogether, **32 measures** have been evaluated and the 15 highest ranked measures are presented in Table 3.

The **HELCOM RAP**, published in 2015, acknowledges plastics as the main fraction of litter and draws attention to the break-down of macroplastics into smaller fragments (microplastics). Household waste, shipping, fisheries and industries are described as main drivers (HELCOM 2015). The HELCOM RAP relies on the nine member countries to contribute to its regional implementation coordinated by the Pressure Working Group. Further work will be based on fundamental principles such as sustainable consumption and production, as well as the application of the waste hierarchy.

According to the PoMs included in the analysis, the existing measures are not sufficient to achieve GES in the Baltic. In order to tackle this shortcoming, the **Swedish PoM** gives priority to the investigation and promotion of best available techniques as well as research and development of additional techniques in waste water treatment plants to prevent microparticles entering the marine environment. Furthermore, it promotes **best** practices for waste management within the fishing sector, including waste management on board as well as at harbours and dealing with nets lost. The initiators of “Keep Sweden Tidy” will take the lead in an EU project called “Blastic” (Plastic waste pathways into the Baltic Sea).¹⁰

The German government is also of the opinion that additional measures are needed to achieve GES. All measures in the **German PoM** aim at reducing the release of hazardous waste into the marine environment. Some are also linked to bringing levels of hazardous waste (including microparticles) in marine organisms close to zero and to reducing other negative ecological effects to a minimum. This

¹⁰ Swedish information on relevant planned and on-going activities contributing to the implementation of HELCOM Recommendation 36/1 ; INF 5-10, PRESSURE 3-2015.

means that the substitution of hazardous substances in the Top 10 litter items found in the Baltic Sea region such as cigarette butts and hygienic articles (cotton swabs etc.), has priority. Furthermore, the PoMs suggest connecting single measures of start-ups with established industry. Industry shall be included for the identification of cost-efficient alternatives. However, there is still no political support of small entities. Furthermore, the PoMs are stressing an exchange of information across country borders for spreading existing knowledge and research throughout the region.

The additional measures provide a **quite balanced range** of options for the ‘product-to-waste cycle’ stage. Most of the additional measures are linked to the stage of collection and waste transfer, such as the inclusion of marine litter in relevant waste management plans and programmes. The proper implementation of ISO standard 21070:2011 in relation to port reception facilities is ranked highly due to its potential impact in the whole Baltic Sea region. Collection and waste transfer score highly because these measures target the main drivers and weaknesses. As outlined in the institutional barrier study (Altvater et al. 2013), weakness within the institutional framework is the lack of litter issues included in transboundary riverine action plans and river basin management plans. These aspects are mentioned in the current RAP. A shortcoming is that the RAP does not mention the significant differences between waste policies at the municipal level and a lack of cooperation between administration and stakeholders, and consequently no measures are suggested.

Design and production measures in the Top 15 focus on sustainable packaging and producers’ responsibility. Regarding recycling and reuse, the ranking includes innovative technologies such as opto-electronic sorting systems and mechanical-biological processing plants. Importantly, only two awareness measures are ranked high due to the low proof of effectiveness. However, they are linked to education programmes reaching a broad field of society at schools and education centres for specific sectors.

2.1.1 Addressing drivers and barriers

As Figure 2 shows, the majority of the 29 assessed measures and practices address **cultural drivers and industry**. Although important for the region as well, tourism is tackled far less. Only a few measures target the fisheries sector or the marine transport sector. There are no measures addressing specifically the agricultural sector. The additional measures planned inter alia by the Member States are showing a similar pattern. Positively, there are many more measures foreseen for all relevant drivers except for agriculture which is however not seen as strong driver. Especially industry related drivers are considered with more ambition.

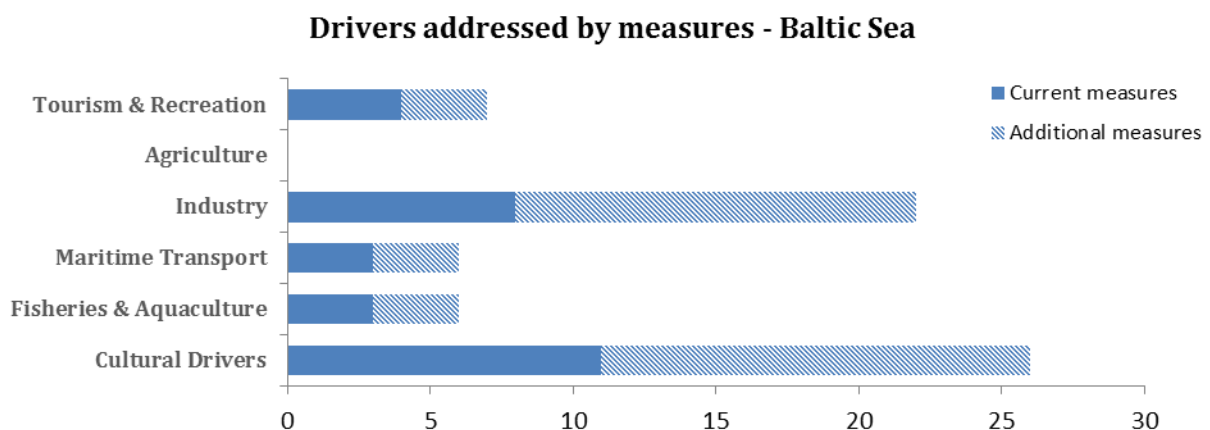


Figure 2: Key drivers and associated measures – Baltic Sea

Table 3: Best ranked additional measures and practices considered for the Baltic Sea region

Rank	Measure	Source	Total score	Life cycle stage
#1	Encourage, based on existing labels such as the EU Ecolabel and the Nordic Ecolabel, exchange with international environmental certification schemes	HELCO M RAP	17.6	Use & Consumption
#2	Define and implement appropriate instruments and incentives to reduce the use of plastic bags	HELCO M RAP	17.3	Collection & Waste Transfer
#3/4	Address landfills or dumpsites including historic ones	HELCO M RAP	16.6	Collection & Waste transfer
	Establish a dialogue and negotiate on solutions with business and industry to develop design improvements and to reduce over-packaging	HELCO M RAP	16.6	Design & Production
#5/6/7	Reduction of the input of plastic waste into the marine environment (development of existing waste treatment systems, improvement of sustainable product and packaging designs)	PoM DE	16.05	Design & Production Collection & Waste transfer
	Modification/substitution of products to reduce the negative impact of marine litter on the environment and find alternative materials	PoM DE	16.05	Design & Production
	Innovative technologies: Opto-electronic sorting systems, mechanical and mechanical-biological processing plants, and incineration centres with combined heat and power generation (cutting-edge technology for municipal solid waste)	--	16.05	Disposal, Recovery & Recycle;
#8/9/ 10	Promote Extended Producer Responsibility Strategies requiring producers to be responsible for the entire life-cycle of the product (voluntary measure)	HELCO M RAP	15.6	All
	Implementation of the ISO standard (ISO201070:2013) in relation to port reception facilities.	HELCO M RAP	15.6	Collection & Waste transfer
	HELCOM Contracting Parties to seek cooperation with River Basin Commissions in order to include impacts of litter on the marine environment from riverine inputs	HELCO M RAP	15.6	Collection & Waste transfer
#11	Include marine litter in relevant waste management plans and programmes including municipal waste plans	PoM SE	15.05	Collection & Waste transfer
#12	Linking the topic of marine litter to learning objectives, curricula and teaching material	PoM DE	14.75	Awareness
#13	Reduction of waste from the fisheries sector (education and development of systems and processes)	PoM DE	13.35	Awareness
#14	Reduction of plastic waste by local regulatory mandatory requirements (e.g. polluter-pays-principle for pathways of plastic, stricter requirements for events)	PoM DE	13.25	Prevention/ Collection & Waste transfer
#15	Best available techniques to prevent sewage/storm water related waste emissions (2016)	PoM SE	13.05	Prevention/Collect- ion, Waste transfer

The existing measures mostly address the barrier of insufficient collection, reuse and recycling (see Figure 3), signalling that the Member States are aware of the inadequate number and capacity of recycling facilities for municipal waste. Uncertainties concerning the further development of the EU legislation are an important reason the main players in the market for environmental technology do not make major investments in research and development to enable the transition to a circular economy (Wilts et al. 2014).

In the Baltic Sea area, there still exist limited consumer awareness and information measures to support recycling practices. Also, persistent littering and fly-tipping is common. Therefore, additional measures for awareness raising and educational programmes seem necessary. However, several new measures will focus on eco-design and substitution of plastic materials.

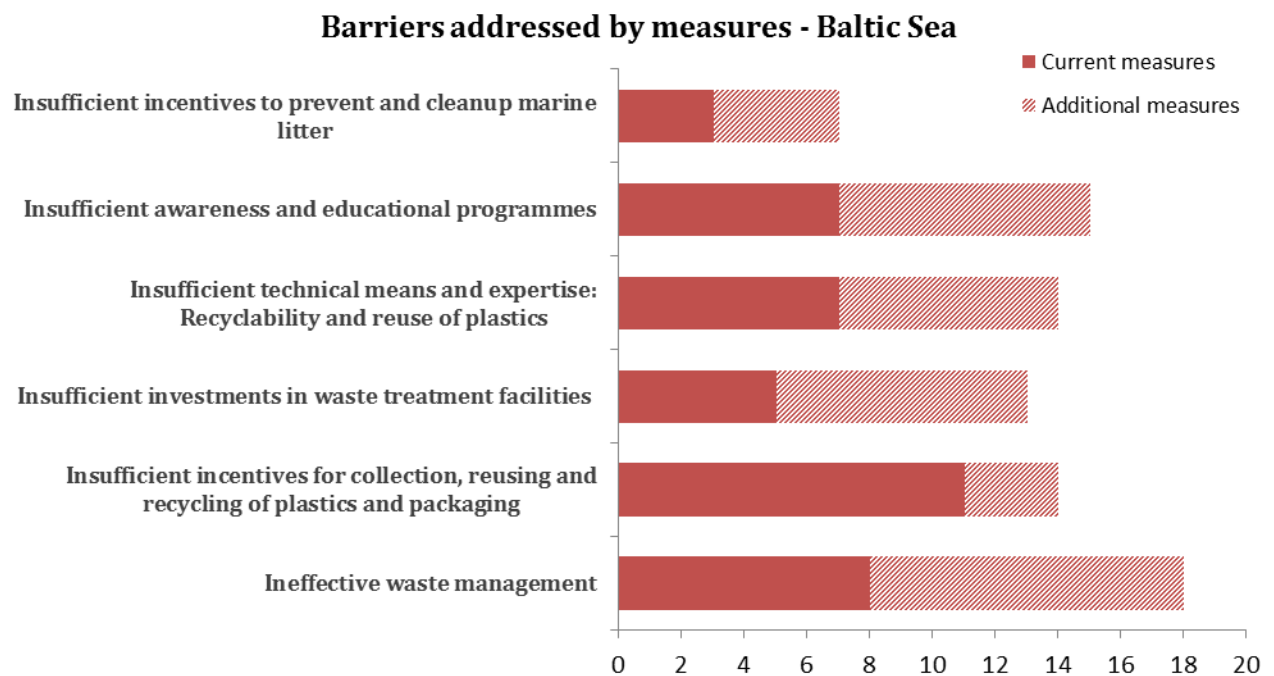


Figure 3: Key barriers and associated measures – Baltic Sea

Looking at the additional measures it is obvious that the main focus is still on this stage of collection and waste transfer (see Figure 4). The stages of design and production as well as use and consumption will be covered by several planned measures.

From the 29 existing policy measures and best practices assessed, almost none has a legal basis. Instead, most of them fall under the category of co-management or voluntary measures. From the additional measures planned, the expectation is that a relatively higher number will be legally based.

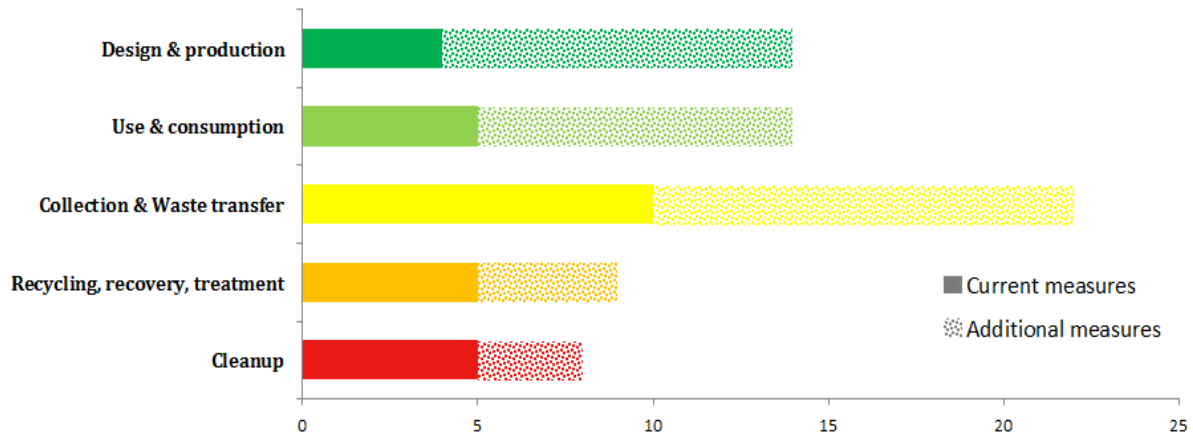


Figure 4: Life-cycle stages and associated measures - Baltic Sea region

2.1.2 Developing a regional policy mix

As our analysis shows, there are several policy measures and best practices in place in the Baltic Sea region. In addition, a variety of new measures are planned that should address the most obvious gaps. However, a closer look reveals that many measures, especially those linked to the higher stages of the waste hierarchy, are implemented in a limited number of countries only (especially Sweden, Denmark and Germany). However, innovative approaches need to be spread among Member States with **transfer of experiences**, information and capacity building. **Political commitment** has to be strengthened to upscale and implement the existing and foreseen measures in the whole region. This has to be backed by compliance mechanisms and **control of effectiveness**.

The identified gaps in the current policy framework of the Baltic Sea region show a need for increased effort related to specific regulatory approaches, such as:

- Promote **prevention** of waste by designing effective behaviour change interventions;
- Develop specially designed **legislation for eco-innovation** to foster the first stage of the waste hierarchy, design and production, and start-ups;
- Develop **local regulatory mandatory requirements to reduce plastic waste**, e.g. stricter approval processes for event organiser to manage waste properly;
- Further develop regulatory framework and **strengthen control**, including bans and fees with a focus on certain types of marine litter (e.g. cigarette butts, single-use products, etc.);
- Create binding obligations for national administrations to include the marine litter topic into national school **education programmes**.

In addition, voluntary measures that showed to be effective for the region can be **scaled-up**. For example, intensified dialogue and networking with fishermen to show win-win cases such as recycling of ghost nets could be more effective than prosecution and fines. In addition, successful measures and practices from other regional seas (e.g. Courtauld Commitment, Green Deals, “fishing for litter” initiatives, etc.) could be adopted.

New types of measures could be:

- The inclusion of marine litter as part of the Environmental Impact Assessment in the process of permitting/licensing;
- The use of industry self-monitoring to increase its reliance on business monitoring and reporting their plastic (polymer) discharges.

Focusing on the Top 10 of marine litter items found in the Baltic Sea region, it is evident that the existing measures and practices cover these quite adequately or are expected to do so in the near future. However, there is a need for additional measures to prohibit littering on beaches, especially focused on cigarette butts and plastic bags, as well as littering the marine environment with fishing gear. The resulting policy mix for the Baltic Sea region is included in Annex 1.

2.2 The Black Sea region

This section focuses on the marine region of the Black Sea. It assesses the policy measures and best practices addressing marine litter that are applied in the region. The Regional Action Plan on Marine Litter (RAP-ML) for the Black Sea region is still under development.

2.2.1 Assessing existing measures

As part of the policy assessment, **25 currently implemented measures and practices** were evaluated for the Black Sea region. They were clustered in four types of activities: clean up, awareness, prevention, and collection and recycling. The policy instruments that received the highest scores (Top 3) when considering all criteria and weighting schemes were the cooperative practices and measures, followed directly by the waste-management practices and measures (total score – 14.25).

Cooperation between responsible institutions, on one hand, and between institutions and relevant stakeholders, on the other hand, are recognised as potentially effective to reduce marine litter in the region. This result is also in line with key stakeholder opinions that such practices are particularly effective for the region. Such initiatives are directly targeting the key drivers and barriers that have an impact on marine litter – tourism and recreation, municipal waste management, and insufficient awareness of the problem. It should be noted that only a few practices, clustered in prevention and collection and recycling, had evidence for a moderate quantitative reduction in marine litter, impacting the relative high rate for cooperation and waste management practices.

Considering the theoretical impact only, the highest scores were equally attributed to clean-up activities and cooperation between responsible institutions, while the overall effectiveness of waste management practices scored rather low, suggesting an important role for the additional weighing options and thus revealing a potential for such measures to be scaled-up. When the product life cycle was considered, the result did not change much from the theoretical impact rating, showing again highest rates for cooperation between institutions followed by clean-up activities, despite the fact that clean-ups address the lowest stage of the product life cycle. In addition, none of the implemented practices and measures was found to address the highest stage of the product life cycle development - design and production - revealing a considerable gap in the current policy state of affairs in the Black Sea region.

Table 1: Best ranked measures and practices implemented in the Black Sea region

Rank	Measure	Total score (all criteria)	Life cycle stage
#1	Cooperation between institutions - Bulgaria (e.g. BSBD, RIEWs, Maritime Administration)	20.08	Use and consumption; Collection & Waste transfer; Disposal, Recovery & Recycle; Clean-up.
#1	"Round table" on improving the ecological status of the Black Sea waters at the shores of Pomorie, Bulgaria	20.08	Use and consumption; Collection & Waste transfer; Disposal, Recovery & Recycle; Clean-up
#3	Cooperation between institutions (Sozopol Municipality, Bulgaria)	19.33	Collection & Waste transfer; Disposal, recovery, recycle; Clean-up

2.2.2 Assessing additional measures

Despite the continuous efforts on the Bulgarian and Romanian side to strengthened political commitment in the Black Sea marine region, a Regional Action Plan (RAP) for the Black Sea region has not been drafted yet. This is mostly due to the **complex political situation and insecurity in the region** that strongly affects the priorities of the surrounding countries. As Bulgaria and Romania are the only EU Member States in the Black Sea region, their national PoMs are being drafted in support of the MSFD and irrespective of RAP absence. Currently, the PoMs are being developed within the project "Technical and administrative support for the joint implementation of the MSFD in Bulgaria and Romania – Phase II". The finalisation of the PoMs and the stakeholder consultations on the proposed measures are forthcoming.

Using the same criteria as for the implemented practices and measures, **14 additional measures** were evaluated, screened from the preliminary list in the frame of PoMs in a transboundary context for Bulgaria and Romania. Below are rated the foreseen measures that directly address marine litter (Table 5)

From the measures addressing other descriptors and not directly marine litter, the highest score was attributed to the creation of management plans for existing of Natura 2000 zones that take requirements of the MSFD into account and include both national and common targets (Total score – 19.33). The high ranking of this measure is related to the geographical scale of its foreseen impact and its regulative character.

2.2.1 Addressing drivers and barriers

From the evaluation of current measures, it can be concluded that the implemented measures address the main drivers for the Black Sea region - tourism & recreation and cultural drivers; however, the results suggest that the intensity and effectiveness of these measures are currently insufficient to have measurable positive impacts on the reduction of marine litter (see Figure 5).

Table 2: Best ranked additional measures and practices considered for the Black Sea region

Rank	Measure	Total score (all criteria)	Life cycle stage
#1	Development of Regional Marine litter Action Plan (joint methodology for quantifying the marine litter, identification of sources, prosecution of offenders, etc.)	20.0	Use & Consumption; Collection & Waste transfer; Disposal, Recovery & Recycle; Clean-up;
#2	Implementation of good practice concerning the processing and disposal of waste, including waste from ships.	18.0	Use & Consumption; Collection & Waste transfer; Disposal, Recovery & Recycle; Clean-up;
#2	Annual awareness raising campaigns addressed to business (commercial, beach users, fishermen, etc.) and public (tourists, students, children, etc.) related to consequences on the marine environment caused by marine litter and the need of waste recycling	17.8	Design & Production; Use & Consumption; Collection & Waste transfer; Disposal, Recovery & Recycle; Clean-up;
#2	Regular (annual) campaigns for encouraging and promoting clean-up activities and improved Marine litter monitoring on voluntary basis	15.8	Use and Consumption; Collection & Waste transfer; Disposal, Recovery & recycle; Clean-up;
#2	Control of the activities of collection and transportation of ship waste and domestic waste from shipping, including wastewaters	14.6	Collection & Waste transfer; Disposal, Recovery & Recycle; Clean-up;

The foreseen measures envisage further management of key drivers in the region, adding considerable focus on the fisheries and aquaculture sector and on industrial activities that have not been properly addressed by the existing measures.

In respect to barriers addressed by the implemented measures, the assessment showed somewhat predominance of the insufficient awareness campaigns and educational programmes, followed by the insufficient financial incentives to prevent and clean-up marine litter. Slightly lower were rated the insufficient incentives for collection, reusing and recycling of plastics and packaging as well as ineffective waste management. It is interesting to note that the ratio between the barriers addressed by the currently implemented measures remains similar with that of the proposed new measures, reinforcing slightly the awareness campaigns and educational initiatives together with measures targeting the insufficient financial incentives to prevent and clean-up marine litter and the insufficient incentives for collection, reusing and recycling of plastics and packaging (see Figure 6)

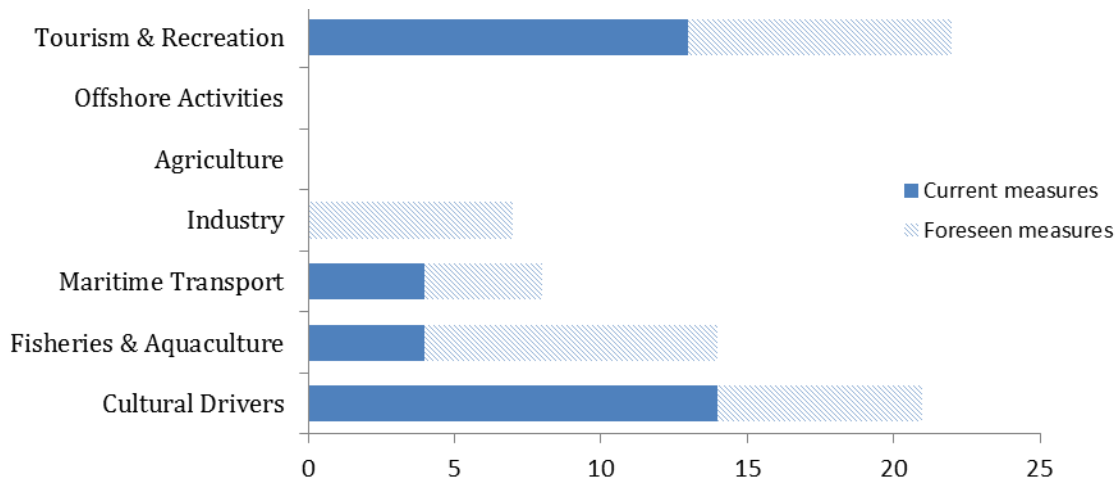


Figure 5: Key drivers and associated measures – Black Sea

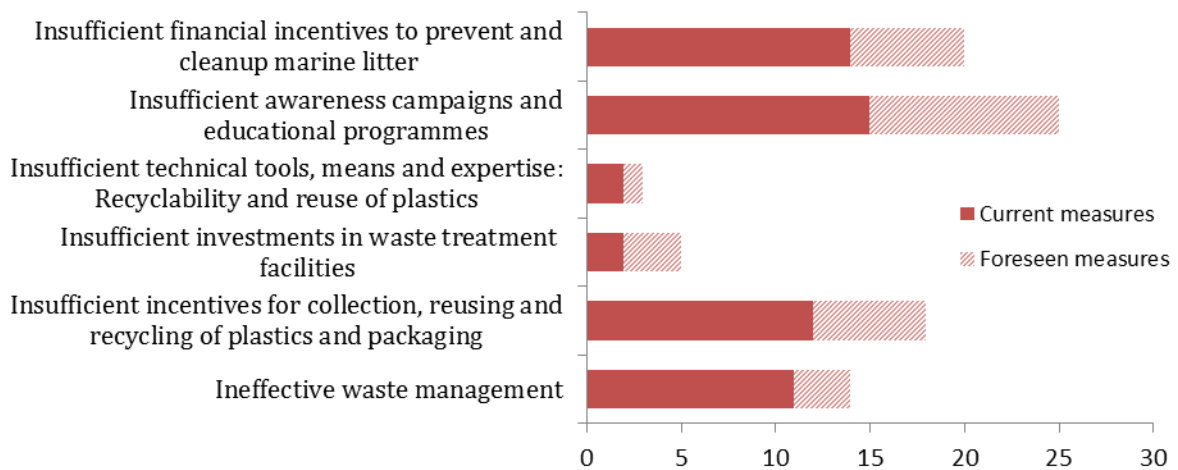


Figure 5: Key barriers and associated measures – Black Sea

When considering the waste hierarchy and the product stages of development, the evaluation of current measures showed lack of effort to address the marine litter problem at the earliest stages of the product life cycle – design and production and use and consumption. This omission seems to be recognised during the process of PoM development, now giving considerable emphasis on measures targeting the stage of use and consumption and, hence, towards positive behavioural changes in society, while the foreseen measures at design and production stage still seem quite underrepresented. In line with the current assessment, key stakeholders consider it important to give priority on measures targeting the recycling and recovery stage of product development (including strict regulations) and to further increase efforts towards awareness and involvement of businesses and society as a main consumer (key stakeholder consultations, Bulgaria 2015).

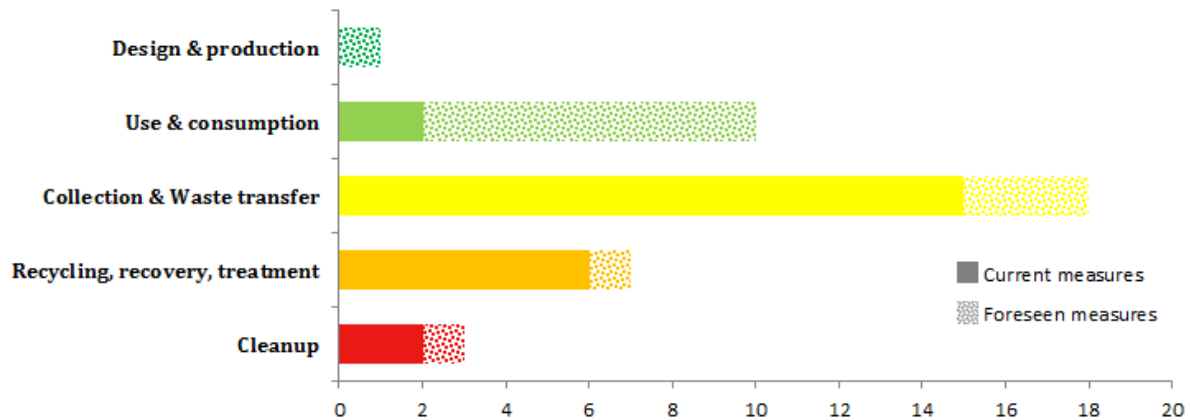


Figure 6: Life-cycle stages and associated measures - Black Sea region

Further, the assessment revealed that most of the currently implemented measures positively impacting marine litter in the Black Sea region are soft and voluntary measures, while legally binding measures are in fact lacking. While the analyses on the gaps and barriers of the policy framework in the region showed that European policy framework and regulations are adequately transposed by Bulgaria and Romania on a national level, the enforcement and the control of measures derived from the policy framework should still receive substantial amounts of effort and political commitment towards adopting measures that directly address marine litter.

2.2.2 Developing a regional policy mix

Based on the policy analysis and identified gaps in the current policy framework for the Black Sea marine region, it can be concluded that in parallel with strengthening the political commitments in the region, increased effort should be allocated on specific regulatory measures, such as:

- Further development of regulation framework and **strengthening of control**, including bans and fees with a focus on certain types of marine litter (e.g. cigarette butts, single-use products, etc.)
- Promote **prevention** of waste and increase **waste management** efforts

Additionally, to reduce marine litter it is essential to scale-up voluntary types of measures that showed to be effective for the region and to adopt successful measures and practices from other regional seas (e.g. green deals, port-reception fees, “fishing for litter” initiatives, etc.). The next challenge after implementation of such measures would be to further monitor their effectiveness.

Such **measures and practices** may include:

- **Transfer of knowledge** and adoption of good practices from other regional seas in **all stages of the production cycle** and across the waste hierarchy; improve regional and inter-regional cooperation with responsible authorities on achieving positive impact of marine waters state
- Improve **public awareness** and **stakeholder involvement** on marine litter issue. Businesses have to be actively involved and recognised as important stakeholders with capacity to influence the earliest stages of the ‘product to waste cycle’ – design and production and packaging - and to potentially bring financial support to relevant marine litter initiatives.

- Improve **institutional capacity** and build-up specific expertise on marine litter within the administration.

The resulting policy mix for the Black Sea region is included in Annex 2.

2.3 The Mediterranean Sea region

This section focuses on the marine region of the Mediterranean Sea. It assesses the policy measures and best practices addressing marine litter that are applied in the region. Most of these measures are also relevant in the context of the Regional Action Plan on Marine Litter for the Mediterranean Sea (UNEP/MAP 2013).

2.3.1 Assessing existing measures

45 measures, which were either already in place within the Mediterranean area or are being considered for the near future (e.g. within the UNEP MAP Regional Plan on Marine Litter Management in the Mediterranean (MED RAP))¹¹³, were analysed. The different types of both current and regional measures indicate a predominance of soft, voluntary approaches in the current implemented measures addressing marine litter, while the regional measures proposed, e.g. in the RAP, show a more balanced combination of regulatory and non-regulatory measures.

From the 11 implemented examples evaluated, two experiences stood out as being particularly relevant and potentially effective to reduce marine litter in the region: the pilot on waste prevention, recovery and recycling schemes in the tourist destination of Halkidiki (Greece), implemented through an incentive-based public-private partnership; and the Motril fishing waste management system (Spain), which not only includes a *Fishing for Litter* component but also facilitates the collection of waste generated by the fishing sector itself.

Table 6: Best ranked measures and practices implemented in the Mediterranean Sea region

Rank	Measure	Total Score	Life cycle stage
#1	Waste management schemes in mass tourism destination (Greece) of Halkidiki	19.5	Collection & Waste transfer; Disposal, Recovery & Recycle
#2	Motril fishing waste management system (inc. <i>Fishing for Litter</i>)	18.3	Collection & Waste transfer; Clean-up
#3	MARLISCO awareness activities	17.8	Use & Consumption; All stages

The high ranking of these two measures is related to the fact that they directly address marine litter (as a removal action of litter that is caught during normal fishing operations) or have a strong influence in preventing specific types of waste from entering the marine environment. Both these measures address key economic drivers in the Mediterranean, namely tourism and recreation, and fishing, which can be major sources of frequently found marine litter items, such as beverage and food packaging and fishing gear. Although these initiatives are **not implemented in a top-down regulatory manner**, they are deemed to address particularly relevant barriers identified for the Mediterranean, such as ineffective waste management; insufficient incentives for collection and recycling; and insufficient awareness and educational programmes. The *Motril*

¹¹³ http://195.97.36.231/dbases/CoPDecisions/2013_IG21_CoP18/13IG21_09_Annex2_21_07_ENG.pdf

project is specifically successful in this last aspect, as fishermen become also active actors in preventing inappropriate disposal of fishing waste in the sea.

2.3.2 Assessing additional measures

Table 7 presents the **Top 16 of best scored measures** after analysis of the proposals contained in the MED RAP; the measures identified by EU Mediterranean States as having potential for further coordination (Volkaert et al. 2015); and the PoM of France – the only Mediterranean PoM available at the time of this analysis. Voluntary initiatives that involve different key sectors, such as fishermen in the *Fishing for Litter* programme, citizen engagement in beach waste management through *Adopt-a-Beach* concept or encouraging the retail sector to adopt measures to reduce plastic packaging are among the most promising initiatives contained in the MED RAP. In *Fishing for Litter*, fishermen voluntarily bring ashore any litter that is accidentally collected in their nets, during normal fishing operations. *Adopt-a-Beach* concept involves local communities (groups and individuals) in “adopting” a coastal stretch and take part in beach clean-ups and surveys to monitor coastal pollution.

2.3.1 Addressing drivers and barriers

Most of the implemented measures identified in the Mediterranean seem to address inappropriate behaviour of consumers and professionals, e.g. when disposing waste (Figure 8) through non-regulatory, bottom-up approaches and related to awareness and education (Figure 9). This type of behavioural “cultural drivers” is also targeted broadly by new measures being considered at the regional level, but these seem to have a particular intense focus on either prevention through improved collection of waste or direct removal of marine litter (Figure 9, shaded colours; and Figure 10). Furthermore, **the need to implement more effective, regulatory-based approaches** is recognised in regionally coordinated plans and proposals.

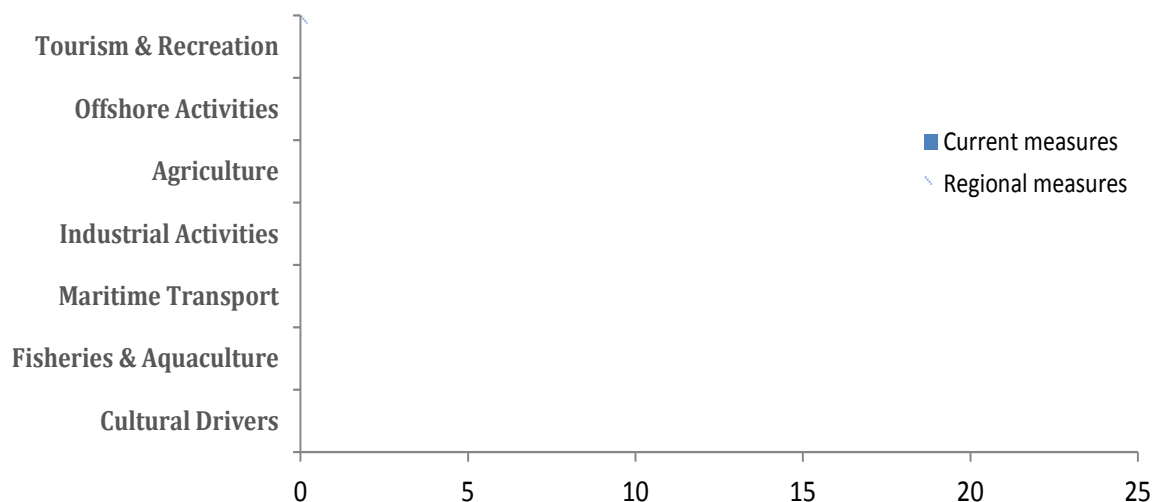


Figure 8: Key drivers and associated measures – Mediterranean Sea

Table 7: Best ranked additional measures and practices considered for the Mediterranean Sea region

Rank	Measure	Source	Total score	Life cycle stage
#1	Fishing for Litter	MED RAP and MED Coord. Actions	19.7	Collection & Waste transfer; Clean-up
#2	Adopt-a-Beach	MED RAP and MED Coord. Actions	19.0	Use & Consumption; Collection & Waste transfer; Disposal, Recovery & Recycle; Clean-up
#3	Voluntary agreements with retailers to reduce plastic bags and packaging (e.g. bulk products a, refillable containers)	MED RAP	18.7	Use & Consumption
Rank	Measure	Source	Total score	Life cycle stage
#4	Recovery and recycling systems for litter collected by fishermen and promote their use to generate value	PoM France	18.4	Collection & Waste transfer; Disposal, Recovery & Recycle
#5	Reasonable costs for Port Reception Facilities or No-Special-Fee-System	MED RAP and MED Coord. Actions	18.0	Collection & Waste transfer
#6	National ML Clean-up Campaigns on a regular basis	MED RAP	18.0	Clean-up
#7	Include ML in the national waste prevention plan and contribute to its implementation	PoM France	17.4	Design & Production; Disposal, Recovery & Recycle
#8	Educational programme on ML to obtain recreational seafarers permit	MED Coord. Actions	17.3	Use & Consumption;
#8	Coordinated Clean-up Day for the MED Region, incl. promotion and awareness in media	MED Coord. Actions	17.0	Use & Consumption; Clean-up
#10	Effective Implementation of MARPOL Annex V	MED Coord. Actions	17.0	Collection & Waste transfer

Rank	Measure	Source	Total score	Life cycle stage
#11	Obligation for boat rental services to provide awareness material on ML and appropriate waste disposal facilities	MED Coord. Actions	16.4	Use, & Consumption; Collect-ion & Waste transfer
#12	Best practice guide for managing and disposal waste in coastal zones	PoM France	16.4	Collection & Waste transfer
#13	Explore option of fishing gear marking to indicate ownership and material alternatives for nets, pots, traps	MED RAP	16.3	Use & Consumption; Collection & Waste transfer
#13	Programme of regular removal of ML in accumulation and/or sensitive/protected areas	MED RAP and MED Coord. Actions	16.3	Clean-up
#15	Promotion and coordination of clean-ups at river mouth area	MED Coord. Actions	15.1	Clean-up
#15	Inclusion of ML as part of Environmental Impact Assessment in the process of permitting/licensing	MED Coord. Actions	15.1	Use & Consumption

The two most important economic drivers for the Mediterranean are tourism and recreation, and maritime transport. However, these two sectors do not seem to be sufficiently addressed by the measures currently in place. The MED RAP and other regional coordinated measures being discussed by Mediterranean Member States reinforce slightly the efforts to tackle tourism-related litter, e.g. through encouraging initiatives such as *Adopt-a-Beach*. They also seem to tackle the gap of policies on maritime transport, namely through an effective enforcement of MARPOL Annex V, proposing reasonable costs for port reception facilities or “no-special-fee” and considering obligation for ships leaving EU territory to discharge their waste. Relevant sectors that remain insufficiently addressed in respect to marine litter are aquaculture, agriculture and industrial activities, in general.

Awareness raising initiatives but also clean-ups or prevention of direct input of litter in the sea, through strategies to encourage collection, mainly in maritime sectors, are the main focus of Mediterranean measures and, in particular, the ones being considered at the regional level (Figure 9). On the other hand, fewer measures enable and/or encourage the reuse and recycling of plastics, at all phases of production, use and treatment.

Considering the waste hierarchy which favors prevention (e.g. through reduction of waste and reuse of products) in relation to later stages of disposal and remediation, it is evident that there is clearly a stronger incidence of measures related to removal of litter from the coast and the sea than of those that target design and production (Figure 10). Stronger policies and initiatives at earlier stages of the life cycle of products, e.g. with efforts on reusability and recyclability of products, are therefore needed.

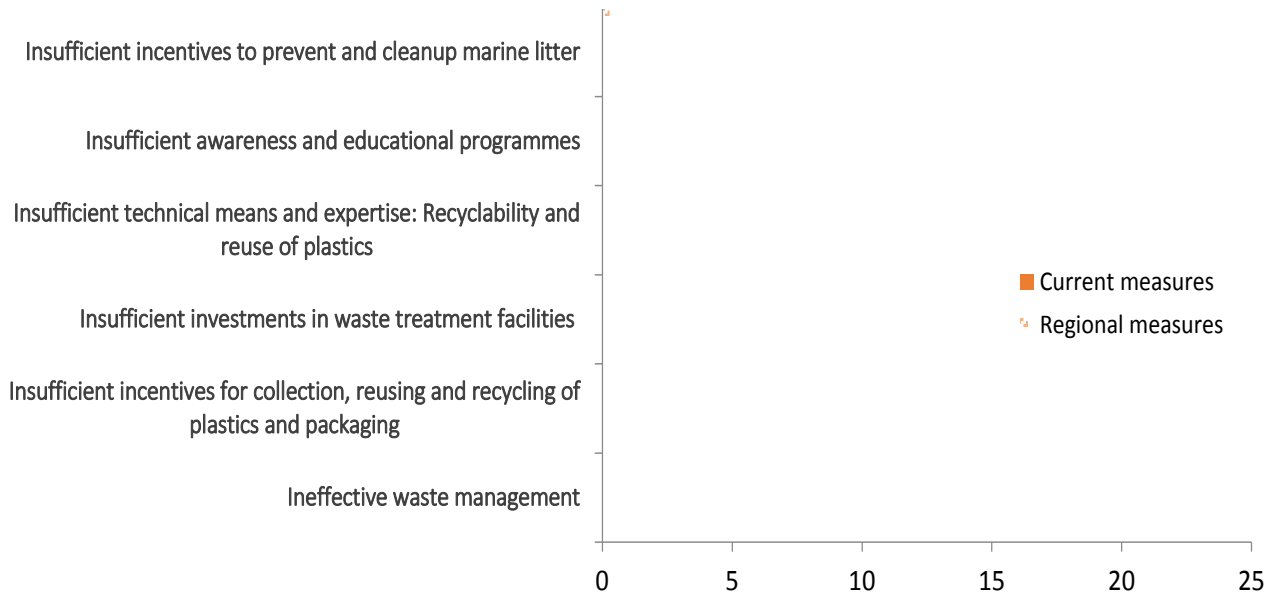


Figure 9: Key barriers and associated barriers – Mediterranean Sea

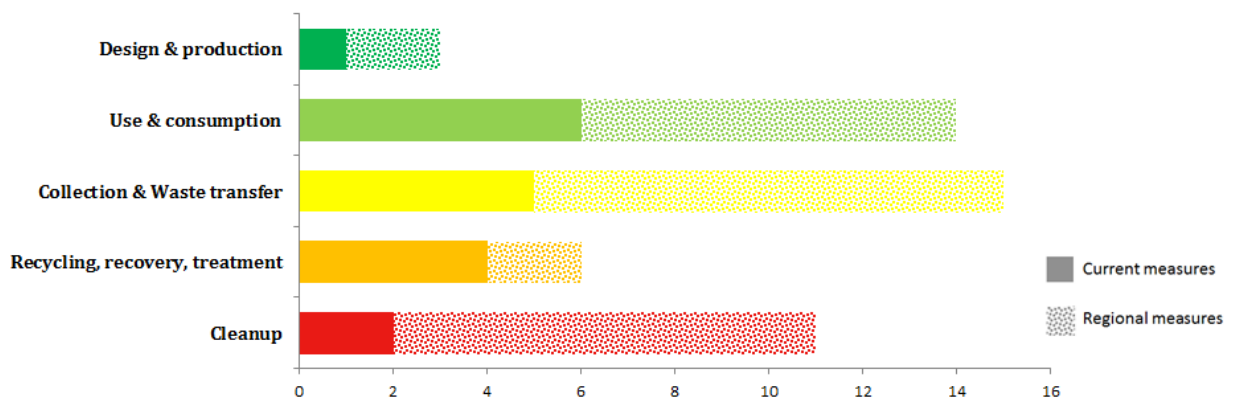


Figure 10: Life-cycle stages and associated measures - Mediterranean Sea

2.3.1 Developing a regional policy mix

Annex 3 provides an overview of the highest ranked implemented and foreseen measures for the Mediterranean in relation to the top marine litter items and the key source sectors they directly address, across the life-cycle stages of products. Furthermore, it includes additional measures from other regions that scored highly in the MCA or have been put forward during the Mediterranean stakeholder workshop. These can address specific management gaps for this region, identified during the described analysis, namely:

- A lack of measures that **address earlier stages of design & production**;
- Lack of measures that **address litter originating from aquaculture, agriculture and general industrial activities**, but also more effective measures that target tourism & recreation as generators of marine litter;

- Stronger focus on **waste prevention** and improvement of collection, in particular relating to specific, most common items; promotion of recyclability and improvement of recycling rates;
- The need of **stronger regulatory measures**;
- More focus regarding **specific categories of litter**, such as smoking-related items (e.g. cigarette butts), single-use packaging and service items (e.g. drink bottles and cans, plastic straws and cutlery, food containers and wrappers).

The resulting policy mix for the Mediterranean Sea region is included in Annex 3.

2.4 The North-East Atlantic region

This section focuses on the North-East Atlantic marine region, and particularly on the Greater North Sea subregion. It assesses the policy measures and best practices addressing marine litter that are applied in three countries in the region, including Belgium, the Netherlands, and the UK. Most of these measures and practices are also relevant in the context of the Regional Action Plan on Marine Litter (OSPAR Commission 2014).

2.4.1 Assessing existing measures

The assessment focused on **74 existing policy measures and best practices**). As shown in Table 8, the Fishing for Litter project scored the highest in terms of effectiveness. This project was implemented several years ago in Belgium, the Netherlands and the UK. At least one hundred ships (trawlers) of the Dutch fishing fleet are now participating. What makes the Fishing-for-Litter activities even more successful is their link to a land-based infrastructure for sorting of the waste items and for recycling of the different fractions. Importantly, the results of Fishing-for-Litter are regularly monitored and annually reported upon.

Several other measures and practices scored similarly high in terms of their potential for marine litter reduction as Fishing for Litter, but scored lower because of the type of litter addressed or evidence on their effectiveness. The British Courtauld Commitment was ranked second, with its lower score mainly due to the indirect connection between this programme and marine litter reduction, as it focuses on food and beverage packaging in the broadest sense. The Plastic Cycle Chain Agreement from the Netherlands achieved a similar score as the Courtauld Commitment. This **multi-stakeholder partnership** with more than 75 participants, from all stages in the product life cycle, has the potential of achieving a breakthrough in closing product cycles of plastics, but it is too early as yet to be certain of its success, with the evidence still being scarce.

Many well-scoring measures and practices relate to **extended producer responsibility and certification systems**. The latter include, for example, Green Key certification for beach recreation facilities and the Responsible Fishing scheme. Measures and practices in the category of coordinated action also performed relatively well. This category includes multi-stakeholder initiatives that aim for shared goals and have common targets and timetables, such as the Beat-the-Microbead campaign, the Healthy Seas fishnet recycling and the Boskalis Beach Cleanup Tour.

The four measures and practices with the lowest rankings in the assessment (Marine Safety Awareness course, Propre Vacances, Supporter of Clean and The Sea is not a Dump) are similar in that they focus on awareness raising, but any clear evidence is missing on their effectiveness in terms of reducing marine litter.

Table 8: Best ranked measures and practices implemented in the North-East Atlantic region

Rank	Measure	Total Score	Life cycle stage
#1	Fishing for Litter	19.4	Collection & Waste transfer
#2/3	Courtauld Commitment	18.4	Design & Production
	Plastic Cycle Chain Agreement	18.4	Design & Production
#4	Healthy Seas fishnet recycling	18.1	Disposal, Recovery & Recycle
#5	Green Key certification	17.4	Use & Consumption
	Responsible Fishing Scheme	17.4	Collection & Waste transfer
#7	My Beach initiative	17.2	Clean-up
#8/9	Fishnet recycling	16.8	Disposal, Recovery & Recycle
	Boskalis Beach Clean-up Tour	16.8	Clean-up
#10	Beat-the-Microbead	16.4	Design & Production
#11/12	Beachwatch Big Weekend	16.1	Clean-up
	Coastwatch Campaign	16.1	Clean-up
#13	Adopt a Beach	15.9	Clean-up
#14	Packaging Covenant 2013-2022	15.8	Design & Production
#15	Schone Maas Limburg	15.5	Clean-up
	Thames 21	15.5	Clean-up

2.4.2 Assessing additional measures

The OSPAR Regional Action Plan for Marine Litter (RAP-ML) acknowledges shipping, fisheries and recreation as the main drivers of marine litter in the region (OSPAR 2014). The RAP-ML defines actions at a general level and distributes tasks to the Member States. For example, under the heading of ‘develop best practice in relation to the fishing industry’, Sweden and the United Kingdom are given the lead to develop a project to promote best practice in this sector. Under ‘education and outreach’, Germany is given the task to establish a database of good practices and share this database with other Regional Seas Conventions. To stimulate synergy, the Member States have committed themselves to link their national programmes of measures to the RAP. The Netherlands and Germany have a coordinating role in the OSPAR process of implementation.

As a consequence of the general formulation of the OSPAR measures, the assessment in this section focuses on the national PoMs. The national PoMs of Belgium and the Netherlands are similar in that they distinguish between existing and additional measures. The latter are considered a necessary extra step on top of the existing measures, as the latter are **deemed not sufficient to achieve the MSFD goals**. The UK PoM focuses mainly on the proper implementation

of waste and anti-littering legislation (DEFRA 2015).¹² Besides these existing measures and practices, the UK has not planned any additional measures.

New measures in the **Belgian PoM** focus on improving waste management by the professional and recreational fisheries sectors and in marinas. Fishnet recycling is one of the priority areas as well as bunkering companies that are supplying ships in ports and on waterways. Alternative materials will be explored for dolly rope (*spekking* in Flemish) and lead sinkers used in recreational fisheries.

The Dutch government is also convinced that additional measures are necessary to achieve GES (see also Piet et al. 2014). In line with its pragmatic approach, the measures in the **Dutch PoM** are linked to marine litter items most often found on Dutch beaches (Dagevos et al. 2013)¹³ and the measures to be put in place. In addition, it prioritises addressing cigarette butt pollution and microplastics. The expectation is that the extra measures in the Dutch PoM may result in a potentially significant quality improvement of the marine waters at relatively low cost (Wienhoven & Verheijen 2014).

Most of the Dutch additional measures are brought together under the heading of the so-called “Green Deals” that are voluntary agreements with the sectors concerned (shipping, fisheries and beach recreation) serving multiple objectives related to marine litter reduction. Another important pillar is the upscaling of the Clean River Maas approach to other river basins, such as the Rhine and the Scheldt. Issues that need further exploration are alternatives for dolly rope (*pluis* in Dutch) and for lead sinkers in recreational fisheries, and sources of microplastics other than cosmetics.

In sum, the assessment focused on six additional policy measures and best practices and two options for further exploration (see Table 9). In conjunction with their early stage, they all have similar low scores on the criterion of evidence. Most promising in this category seems the Dutch multi-stakeholder Green Deals for the shipping, fisheries and beach recreation sectors, respectively. These deals have been concluded in late 2014 and are in the process of being implemented. They score high on the criterion of relative importance because they specifically target the main causes of marine litter in the Greater North Sea area.

¹² Marine litter top 8 in the UK (SAS 2014): plastic bags, fishing lines, plastic urdles, cigarette butts, crisp and sweet wrappers, cotton bud sticks, plastic bottles and drink cans.

¹³ Marine litter top 10 in the Netherlands: (Plastic) nets and ropes from fisheries, pieces of plastic and polystyrene, plastic bags, plastic caps and lids, packaging of chips and sweets and lolly sticks, balloons, plastic beverage bottles, wood < 50 cm, plastic bottles and food packaging, including fast food wrappers, and plastic industrial packaging and cover material.

Table 9: Best ranked additional measures and practices in the North-East Atlantic region

Rank	Measure	Source	Total score	Life cycle stage
#1/2	Green Deal fisheries waste	PoM NL	17.1	Disposal, Recovery & Recycle
	Green Deal shipping waste	PoM NL	17.1	Disposal, Recovery & Recycle
#3/4	Green Deal beach recreation waste	PoM NL	15.8	Collection & Waste Transfer
	Alternative for dolly rope (in explorative stage)	PoM NL and PoM BE	15.8	Use & Consumption
#5/6	The Ocean Clean-up	PoM NL	14.8	Collection & Waste transfer
	Upscaling Schone Maas approach	PoM NL	14.8	Collection & Waste transfer
# 7	Alternative for lead sinkers (in explorative stage)	PoM NL and PoM BE	12.8	Use & Consumption
#8	Reducing balloon releases	PoM NL	11.8	Use & Consumption

2.4.3 Addressing drivers and barriers

The analysis shows that the current 74 measures and practices in the Greater North Sea subregion mainly address cultural drivers and industry (see Figure 11). To a lesser extent, they tackle waste problems related to the key sources of marine litter problems in this region, including fisheries, tourism and recreation, and maritime transport. Importantly, the newly planned measures and those to be explored especially target these specific sectors.

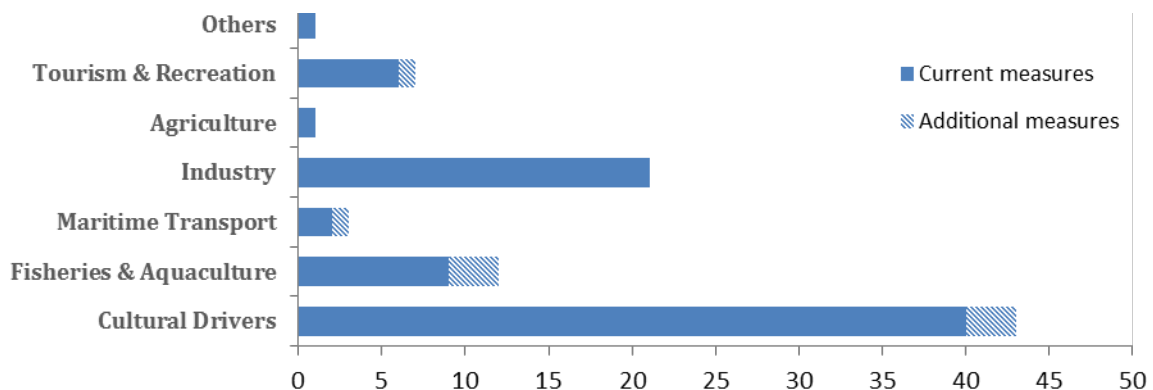


Figure 7: Key drivers and associated measures – North-East Atlantic

According to the classification by Kontogianni et al. (2013), the barriers to marine litter reduction have relatively less weight in the Greater North Sea subregion than in other regions. However, in comparison, barriers related to reuse and recycling, awareness and education, and prevention should get more attention than technical tools and waste management. According to the analysis, most of the current measures and practices **address the lack of awareness campaigns and educational programmes, and insufficient reuse and recycling** (see Figure 12). However, measures and practices providing incentives to prevent marine litter are less well developed and require additional effort.

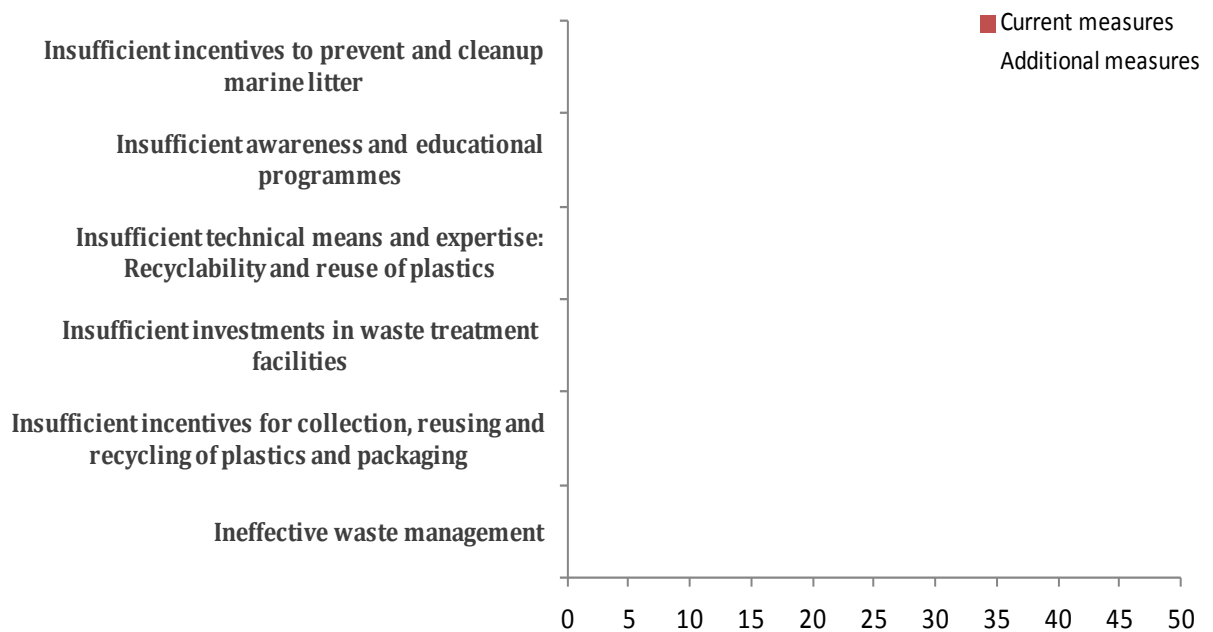


Figure 8: Key barriers and associated measures – North-East Atlantic

Focusing on the waste hierarchy, more than one third of practices and measures in the Greater North Sea area focus on clean-up (see Figure 13). The categories are relatively well represented. Considerably fewer practices and measures address collection and waste transfer. The obvious reason is that there already exists a good waste management infrastructure in the region.

The majority of practices and measures address cultural drivers and industry. The shipping industry is less well covered. The barriers these measures attempt to address are insufficient awareness campaigns and education programmes and insufficient collection, reuse and recycling.

From the 74 existing policy measures and best practices being assessed, almost none of them have a legal basis. Most of them fall under the category of voluntary instruments.

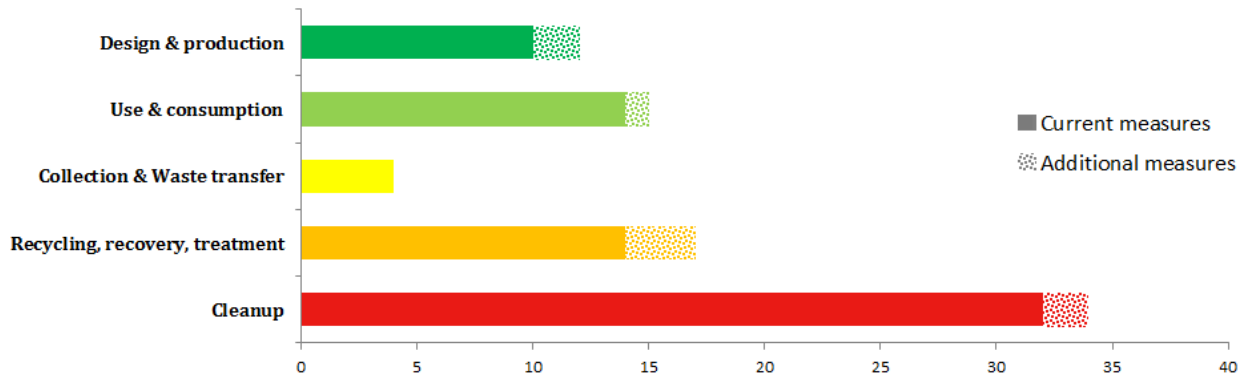


Figure 9: Life-cycle stages and associated measures – North-East Atlantic

2.4.4 Developing a regional policy mix

Evidently, there are *already many examples of existing good policy measures and best practices* in the Greater North Sea area, and some additional ones are planned where the needs for an extra effort are high. The major challenge in the Greater North Sea area is now *to upscale these existing and additional measures and practices* and to *implement them more widely* and evenly in all Member States in the region. In addition, a major effort is needed to monitor these measures and practices for their effectiveness.

Focusing on the top 10 items found in the Greater North Sea subregion, it is evident that the existing measures and practices cover them quite adequately or are expected to do so in the near future. However, there is a need for additional measures to prohibit littering on beaches, especially focused on cigarette butts, balloons and plastic bags.

Additional measures that could *strengthen the preventative approach* and have a longer time horizon relate to stimulating enhanced corporate responsibility and environmental liability, marine-friendly innovation and product development, and smart packaging. Policy instruments that may serve as catalysts for such developments are the well-targeted spending of EU structural funds and the greening of public procurement. Finally, an *urgent appeal on citizens to deal more responsibly with waste* could be strengthened via educational activities aiming to achieve an anti-littering culture. More coercive measures, such as putting fines on undesired behaviour and mandatory participation in clean-up activities, could be effective, particularly in the short-term.

The resulting policy mix for the North-East Atlantic region is included in Annex 4.

3 A European portfolio of policy options for marine litter reduction

This final chapter integrates the results from the four regional assessments made in the previous chapter, by developing an EU-wide portfolio of policy options for marine litter reduction. Section 3.1 defines the strategic considerations underlying this portfolio. Section 3.2 presents the resulting portfolio consisting of a mix of regulatory and voluntary measures. Section 3.3 focuses on options for improving the EU legislative framework. Section 3.4 revisits the concept of the ‘product-to-waste cycle’.

3.1 Strategic considerations underlying the portfolio of policy options

The choice of specific regulatory and voluntary measures in the portfolio has been based on the strategic considerations that were identified as crucial during the assessment of measures in the previous chapter. These considerations are as follows.

Address the most important marine litter issues first

The assessment of measures showed that major positive impacts are most likely to be achieved when the **focus is on specific marine litter types**. However, several of the most important **litter items** are not appropriately addressed as yet, such as cigarette butts, packaging, and single-use items (e.g. drink bottles and cans, plastic straws and cutlery, food containers and wrappers). Here, aside economic instruments, stronger regulatory measures such as a ban on plastic cotton sticks or the restriction of the selling of bottled water in sensitive areas close to beaches or estuaries are an option. The support of innovation by national and regional strategies, the consequent legislative effort to substitute materials, a broader applicability and interpretation of the Eco-Design Directive, as well as eco-labelling are further possibilities to tackle the problem of harmful litter items.

Focus on the early stages of the ‘product-to-waste cycle’

Targeting the first two stages of the **product-to-waste cycle** – design and production as well as use and consumption – can be expected to have relatively high impacts because of its retroactive effects across the subsequent stages. However, the analysis showed that prevention as well as design and production are currently addressed to a lesser extent than the other stages. Importantly, moving the emphasis in the product-to-waste cycle to the early stages will have as a consequence that major efforts have to be made in the field of innovation policy, by tackling issues of uncertainty, long-term payoff (because of long development time) and appropriating the benefits amongst contributing actors. In this respect, public and private stakeholders may take advantage of the momentum created by the recent adoption of the Circular Economy Package¹⁴, which aims to guide the transition from a linear to a circular economy.

Use existing regulatory instruments more effectively

The EU legislative framework for dealing with waste in general and marine litter specifically is in principle highly developed. Major pieces of relevant legislation include the Marine Strategy Framework Directive, the Waste Framework Directive, the Packaging Directive, the Water Framework Directive, and the Port Reception Facilities Directive. However, there is certainly room

¹⁴ See EU action plan for the Circular Economy, COM (2015) 614/2, http://ec.europa.eu/priorities/jobs-growth-investment/circular-economy/docs/communication-action-plan-for-circular-economy_en.pdf

for improvement. First, the existing EU legislation needs to be interpreted and implemented more consistently and evenly in all Member States. Second, several legislative acts need to be amended and fine-tuned to the needs in specific sectors. Suggestions of the latter have been done in studies by e.g. Acoleyen et al. (2013), and Sherrington et al. (2016). Third, new opportunities for taking effective measures could materialise by explicitly recognising the marine litter issue in other relevant EU legislation, for example the Cosmetics Regulation, the Eco-Design Directive, the Environmental Liability Directive, and REACH.

Upscale best practices to other geographical levels

Most of the measures taken in the four marine regions have a **limited geographical scope**, as they mainly apply to the local or national level. If measures would be upscaled and implemented more widely, their impact may increase significantly. However, it has to be kept in mind that measures that are successful in one region may not have the same impact in other regions, and therefore need to be adjusted to local contexts and circumstances. At the same time, there exist many commonalities between the four regions, which justify increased mutual cooperation to exchange information and learn from each others good and best practices. Such cooperation may perhaps require new joint institutional processes and a better use of existing regional institutions.

Facilitate sectoral partnerships and voluntary agreements

The majority of measures taken in the four regions have a **voluntary nature**, which means they are not legally binding and government has a less prominent role. These measures vary from local, one-issue approaches to overarching, sectoral agreements. Although private stakeholders often have the lead in such initiatives, the does not mean that government should not be involved. On the contrary, the role of government has proven pivotal in the success of voluntary measures through the provision of targets in the context of broader regulatory frameworks, but also in terms of providing access to resources and people, and in some cases financial support. It is therefore of major importance that Member States create institutional settings that facilitate sectoral partnerships and voluntary agreements, especially in the sectors that are the main drivers of marine litter. Such settings should also include adequate mechanisms for monitoring.

3.2 A European portfolio of policy options

Taking the regional policy mixes into account as well as the strategic considerations mentioned above, a choice has been made of specific regulatory and voluntary measures that taken together could make a significant contribution to marine litter reduction in the European seas. Table 10 visualises the resulting mosaic of policy options. They are organised in terms of specific sectors, which can play key roles in mitigating marine litter in combination with the stages of the product-to-waste chain. Measures may be initiated not only by authorities but also by industry and other interest groups.



Table 10: Portfolio of policy options for marine litter reduction in the EU

MIX OF POLICY INSTRUMENTS & INITIATIVES TO ADDRESS KEY SOURCES					
	Design & Production	Use & Consumption	Collection & Waste transfer	Treatment & Recycling	Clean-up
Fisheries & Aquaculture	<p>Innovative alternatives for fishing gear (e.g. dolly rope) based on neutral, biodegradable materials^{2,3}</p> <p>Innovative alternatives for aquaculture gear based on neutral, biodegradable materials⁵</p>	<p>Use of alternative materials for fishing gear (e.g. clay octopus pots)³</p>	<p>Fishing for Litter – collection of litter accidentally caught during fishing operations and appropriate sorting and treatment (eg. Netherlands; <i>Motril Project</i>, Spain)^{2,3,4}</p>		
		<p>Use of alternative materials in aquaculture (e.g. cotton mussel socks)⁵</p>	<p>Collection and removal of old or abandoned nets for recycling and incorporation in new products (e.g. <i>HealthySeas</i> Initiative) (e.g. PoM France)³</p>	<p>Green Deal within fisheries sector to reduce waste (eg. PoM Netherlands)</p>	
Shipping		<p>Best practices for waste minimization/ (e.g. UK, Scotland)</p>	<p>Effective Implementation MARPOL^{3,4}</p>		
	<p>Alternative materials to non-degradable plastic (e.g. Q-Milk, Germany)</p>	<p>Inclusion of ML as part of the Environmental Impact Assessment in permits/licenses⁴</p>	<p>Reasonable costs or No-Special-Fee for Port Reception Facilities^{3,4}</p>	<p>Port seabed clean-up by scuba divers (Bulgaria)</p>	
Industries	<p>Improvement of sustainable product and packaging design (e.g. PoM Germany)</p>				<p>Removal of macro-waste before disposal of dredged sediments in the sea (e.g. PoM France)</p>
	<p>Voluntary agreements with retailers & suppliers to reduce packaging and waste, including selling products in bulk and reusing containers³ (e.g. Courtauld Commitment, PoM UK)</p>	<p>Plastic Cycle Chain Agreement to achieve a circular economy for plastics (e.g. PoM Netherlands)</p>			



	Extended Producer Responsibility Strategies requiring producers to be responsible for the entire life-cycle of the product ¹		
Agriculture		National schemes for collecting and recycling of used agricultural plastics (e.g. APE, France)	
Tourism & Recreation		Obligation for maritime tourism operators to provide educational material on marine litter and disposal facilities for litter ⁴	
		Certification and awards of service providers to include specific criteria on single-use, disposable items and on prevention of ML (e.g. Green Key) ¹	
		Waste schemes (prevention, collection & recycling) in tourism sites through incentive-based public-private partnerships (e.g. Greece)	
		Cooperation for establishment of Deposit-Refund Schemes for bottles, containers and cans ¹	
		Ban single-use plastic items and certain packaging from certain areas (e.g. recreational beaches, protected areas)	Deposit Refund Schemes for food and drink containers in Festivals (e.g. Germany, Denmark, Sweden)
		Green Deal beach recreation sector to reduce beach recreation waste (POM Netherlands)	
		Community-based waste management , clean-up and monitoring of beaches and coastlines (e.g. <i>Adopt-a-beach; Keep Denmark Tidy</i>) ³	
		Reduction of plastic waste by local regulatory mandatory requirements (e.g. polluter-pays-principle for pathways of plastic, stricter approval requirements for event organiser) ¹	

Legend:

- **Regulative & Procedural (e.g. legislative, licenses)**
- **Cooperative (e.g. voluntary agreements)**
- **Persuasive (e.g. awareness campaigns, labelling)**
- **Technological innovation and improvement of infrastructure**



- 1 – HELCOM RAP
 - 2 – OSPAR RAP
 - 3 – MED RAP
 - 4 - Project for joint implementation of MSFD in the MED, Phase II (ENV.D.2/FRA/2012/0017)
 - 5 – Stakeholders workshops (e.g. Venice, Madrid)
- Implemented measures that can be extended
 - New measures (e.g. proposed in Stakeholders workshops)

3.3 Improving the EU legislative framework

Marine litter is mainly a non-marine issue. Therefore ***moving towards GES means going much beyond the scope of the MSFD***. Marine litter needs to be embedded in other relevant legislation and be *addressed by policy instruments and initiatives that deal with previous stages of product-to-waste cycle*. Although we need a variety of bottom-up and top-down approaches, involving different sectors and actors, there is a range of laws in place that can be better enforced and harmonized and further adjusted to incorporate targets related to prevention of marine litter. One of the major challenges in all four EU sea regions is to ***implement existing legislation consequently*** and evenly in all Member States in the region.

Considering the measures analysed, only a fraction corresponds to regulative instruments, while all others refer to co-management, awareness raising and voluntary approaches. Reality shows the insufficiency of this approach. There is a need for a small number of new, targeted legislation.

The impacts of environmental policy instruments on the reduction of marine litter may depend more on ***design features*** than on the type of instrument chosen (Kemp & Pontoglio 2011). Relevant aspects of design and implementation are stringency and predictability and the differentiation with regard to the industrial sector. More relevant aspects for implementation are the ***possibilities for monitoring compliance and discovering non-compliance*** as well as enforcement (inspection and penalties for non-compliance) and the combination with other instruments of policy.

Box 2 provides an overview of the main ***aspects of how to improve the existing legislation***.

Box 2 - Improving a fragmented legal framework to address marine litter will require:

- 1) Marine litter is reflected across policies that affect its prevention
- 2) Stronger implementation and enforcement of existing legislation including mechanisms for monitoring or compliance
- 3) Targeted new legislation
- 4) Defining a robust sustaining model and guiding principles embedded in policy options
- 5) Stronger collaboration at all levels of governance (geographically: within countries, within regions, between EU and non-EU states, between coastal and non-coastal member states; and institutionally).

Embed marine litter prevention in existing legislation

It has to be kept in mind that the driving forces behind generation of marine litter are to a large extent the same drivers as those of waste production. Marine litter is a direct reflection of how well waste prevention and management systems work but intervention should start well before the products become waste:

- **Classify the most harmful plastic waste as hazardous:** Already partly existing, the consequent classification of the most harmful plastics, including those that cannot be reused or recycled, as hazardous waste within the EU regulations REACH (European Chemicals Regulation)¹ and CLP (Regulation on Classification, Labelling and Packaging of substances and mixtures)² would be a large step into the right direction. This could be achieved by **amending the list of waste pursuant** to the Waste Framework Directive as well as establishing new lists in all Member States. A focus should be on the most harmful plastics, such as PVC, polystyrene, polyurethane and polycarbonate, making roughly 30% of production (Rochman & Browne 2013).
A **change in plastic categorization** would ensure producers' and polluters' direct liability according to national environmental damage acts and the Directive on compensation for environmental damage.³ Liability government funds could support the direct cleanup of affected habitats.
- **Align operational targets with targets of marine litter: Specific aspects are addressed in various pieces of legislation,** like the Waste Framework Directive with its 2015 separate plastic waste collection target or its 50% household waste collection target by 2020. The Packaging and Packaging Waste Directive also has a specific target on plastic waste. Ideally these policies should follow a **holistic approach** to the marine litter problem acknowledging the interconnectedness of different stages of the product to waste cycle. On the other hand it has to be careful with holistic approaches. Experiences show that it is **often too difficult** for governments **to achieve full integration** across sectors and jurisdictions. As a first step therefore, **existing sectoral legislation** on chemicals, waste, or packaging should be linked to the waste hierarchy taking into account the drivers of marine litter of their sector.
- **Adjust existing legislation to prevent marine litter:** For example, an effective way to reduce emissions and input by microparticles is the **precise legal definition and classification** of synthetic microparticles as chemical ingredients in relevant national legislation. If necessary, legislation has to be amended or adapted to identify the most important sources of microplastics and propose measures in order to reduce their input. Also, the inclusion of marine litter as part of **Environmental Impact Assessments** as pre-condition for permits and licences in the shipping, leisure and tourism sector is an example for linking sectoral approaches to the waste hierarchy. Similarly, the Water Framework Directive could be enhanced by introducing litter as an indicator, and making it compulsory to include litter issues in transboundary riverine actions plans and river basin management plans.

¹ EC 1907/2006.

² This Regulation aligns previous EU legislation on classification, labelling and packaging of chemicals to the GHS (Globally Harmonised System of Classification and Labelling of Chemicals). Its main objectives are to facilitate international trade in chemicals and to maintain the existing level of protection of human health and environment.

Enforce existing legislation

Improvement and implementation of existing waste legislation like the Waste Framework Directive could be enhanced by more explicitly introducing the concept of product-to-waste cycle, with a special focus on marine litter. The EU could generally strengthen enforcement measures to enable Member States to take legal action against an organisation or specific sectors when they do not comply with the law. The past has shown that the normal ***infringement process has little effect*** on Member States.⁴ An extension of the infringement system by grouping related complaints thematically under Article 2 of the Treaty of the European Union (TEU) would enable the Commission to rise infringement to the level of a systematic breach of basic values (Scheppelle 2013). If the Court of Justice of the European Union (CJEU) confirms the systemic element of the infringement action, compliance should be assessed as well. Additionally, continuous systemic infringement could bring the Commission to expand its range of sanctions beyond the current set. Fines levied through an Article 260 TFEU (Treaty on the Functioning of the European Union) action might be collected by withholding some portion of the Member States' EU funding streams until the Member State complies. The power to cut funds could be given to the Commission through secondary legislation rather than treaty reform (Scheppelle 2013).

Establish new legislation

New ways should be explored and in some cases new regulation created that aims to achieve GES by going beyond the MSFD. An example is the recent EU Plastic Bag Directive, which requires Member States to take measures to reduce substantially the consumption of lightweight carrier plastic bags, aiming at an 80% reduction of its consumption in 10 years. The ***prohibition of microbeads*** would be another new option. Extended producer responsibility in all stages of the waste hierarchy, enshrined by EU law, could be installed at national level and to different items relevant for marine litter. This underlines the need of more regulation with a link between environmental and technology policies. The EU could also ***establish legislation defining maximum residue levels*** of micro-plastics contamination for fish and other seafood, which can give rise to environmental and human health effects. Of course, there is a need for a harmonized methodology to define these levels within the EU.

Innovation policy is especially needed for the creation of radical innovations whose uncertainty, long-term payoff (because of long development time) and problems of appropriating the benefits amongst contributing actors, work against their development. Eco-innovation is therefore calling for regulatory and co-management measures, raising questions about the ***proper balance of different tools***.

Bring principles to life and move towards a circular economy

The choice of policy options and the design of new regulations need to be oriented and supported by an overarching vision (e.g. circular economy) and reflect a series of fundamental, guiding principles. ***Legal principles*** offer points of convergence, linking governance and law and provide an ethical framing necessary to link these elements with more specific measures and tools (Houghton 2014).

⁴ The Commission can take action if a MS fails to incorporate EU directives into its national law and to report to the Commission what measures it has taken, or is suspected of breaching Union law. If no solution can be found at an early stage, the Commission can open formal infringement proceedings and eventually refer the MS to the European Court of Justice. See http://ec.europa.eu/atwork/applying-eu-law/index_en.htm.

Existing principles relevant for marine litter include:

- a) Polluter pays principle;
- b) Sustainable and equitable use (Freestone 2008; IUCN⁵);
- c) Precautionary approach (Freestone 2008; IUCN⁶; Elferink 2012);
- d) Ecosystem approach (Freestone 2008; IUCN⁷; Elferink 2012).

The implementation of these principles in practice is in an early stage. Currently, they are mostly theoretical constructs merely mentioned in preambles and lack interpretations at more concrete levels in order to encourage reflexive governance processes. A **statement of principles** within the marine litter problem would be a constructive step towards a more holistic policy framework and should be included in the operative sections of existing or new legal instruments. Principles like the precautionary principle could offer points of convergence in the emerging marine litter regime and could also address regulatory as well as implementation gaps. They can help to make law a more powerful tool which promotes sustainable use and the achievement of GES.

Additionally existing EU policies such as extended producer responsibility and integrated product policy should be implemented more widely and consistently. **Extended producer responsibility** is already part of the Waste Framework Directive. **Widening the scope of this principle** would internalize costs for recycling in all products on national levels. In parallel, liability laws could be extended to ensure that producers are responsible for the costs of production as well as disposal, contributing to ensure that the system has capacity to deal with the products placed in the market in the most environmental and safe way. A side effect could be, for example, that producers avoid the production of hazardous waste like polystyrene insulating panels with hazardous waterproofing against fungi as used for buildings. Instead they would be pushed to develop alternatives for waterproofing.

Integrated product policy as defined by the EU aims to support the realisation of environmental product innovations and thus to achieve a broad reduction of all environmental impacts throughout a product's life cycle. As such it does not directly refer to marine litter. However, the tools that are used to achieve its objectives are largely similar to those that may be effective for marine litter reduction, as they include economic instruments, substance bans, voluntary agreements, environmental labelling and product design guidelines. Therefore, marine litter policy could benefit from the experiences with integrated product policy.

Connecting the four marine regions to combat marine litter

As outlined in Chapter 2, every European sea region needs its own specific approaches towards less marine litter. Nevertheless, several marine litter related issues in the four seas regions can be efficiently handled in a similar way by cooperation that involves all states in the region and have an extended scope to non-EU states. This requires **cooperation both intra- and intersectorally** as well as **between the sectoral and the regional seas agreements**.

At the **macro-regional level**, the goal is to strengthen cooperation to become better prepared as a region towards the impacts of marine litter. The added value of macro-regional cooperation is the

⁵ Available at: (http://cmsdata.iucn.org/downloads/10_principles_for_high_seas_governance___final.pdf) [accessed 13.04.14]. [27] Oude Elferink Alex G. Governance principles for areas beyond national

⁶ Ibid.

⁷ Ibid.

exchange of knowledge and experiences to learn from each other, and the use of synergies leading to cost and time savings. In the CleanSea project, stakeholders and national representatives from the North-East Atlantic and Baltic Sea regions stated that there is no need for new institutions as such, but for new institutional processes and a better use of existing institutions.

Clustering existing activities in working groups or platforms, especially *on horizontal issues*, i.e. between sectors, as well as developing new networks of experts would increase the effectiveness and the impact of those activities in a meaningful way. Such topic specific cooperation would prevent overlapping and duplication of efforts and create synergies.

The impacts of marine litter show regional differences. For that reason, some challenges of marine litter need *regional approaches of cooperation* between countries or between a small number of countries. This cooperation can relate to research and management cooperation, for example in the fisheries and recycling sectors in the Baltic Sea related to the problem of ghostnets. Joint risk management efforts might further need to be based on the identification of common threats (e.g. by undertaking mutual risk assessments) and must be in line with each country's objectives to combat marine litter. A good starting point is to identify areas relevant to action in which there has been *transboundary cooperation* (e.g. river basin management) and seek to involve the managing authorities in their policy.

The issue of microparticles

Marine microplastics correspond to a considerable fraction of marine litter and are defined by plastic items or fragments smaller than 5mm.⁸ They can enter the marine environment due to losses during handling or transportation of small product units (e.g. plastic resin pellets) or because they were incorporated in the composition of products (e.g. cosmetic) which are then washed off. These are generally referred to as "primary microplastics". Various synthetic polymers such as polyethylene (PE), polypropylene (PP), polystyrene (PS), polyethylene terephthalate (PET), and polyvinyl chloride (PVC) are used.⁹ "Secondary microplastics" are formed by chemical and physical ageing and degrading processes of products such as plastic bags and plastic bottles, both in land or the sea. Secondary microplastics constitute one of the main sources of microplastics in the environment.¹⁰

It is extremely difficult to directly address secondary microplastics, except to prevent their emission (e.g. synthetic fibres, microparticles from tires) or recover the larger plastic items that originate them. However, it is possible to deal directly with primary microplastics, e.g. by preventing their entrance in the environment or by substituting them with alternative materials. Here, we provide some examples of measures that prevent primary microplastics and discuss further actions needed. There are a variety of planned measures in the pipeline, proposed by Regional Action Plans or PoMs (see Box 3). The most direct way to deal with the problem of primary microplastics is to prevent their application as an ingredient in the products concerned. The European Commission is considering to issue a ban on microplastics in cosmetic products.¹¹

⁸ See <http://marinedebris.noaa.gov/discover-issue/types-and-sources>;
<http://www.oceanhealthindex.org/news/Microplastics>; <http://www.beatthemicrobead.org/en/science>

⁹ See website of the Federal Institute for Risk Assessment:
http://www.bfr.bund.de/en/questions_and_answers_on_microplastics-192775.html

¹⁰ *Ibid.*

¹¹ Council of the European Union, Environment, 10876/13, 18.6.2013.

Such a ban could be appropriate as a follow up to its Green Paper on a European Strategy on Plastic Waste in the Environment¹², and could be effectuated by amending the Cosmetics Regulation.¹³

There is a ***need for more preventive measures, more detailed definitions, targets, and the differentiation of types of plastic***. There are industrial approaches available, however, for example, the zero pellets initiative needs to back their approaches with reliable numbers and target setting.

There exist also some approaches to foster start-up innovation for preventing plastics in the product phase and connect green technology start-ups with investors and sponsors via platforms and awards (like the StartGreen Award¹⁴).

To avoid secondary microplastics in the environment, the more actively ***legislative support of technological innovations***, such as a filter system for washing machines may be effective.

Box 3: Measures and policies to deal with microplastics

Existing initiatives:

- ***Operation Clean Sweep***: initiative from Plastics Producers to prevent the loss of plastic pellets during handling and transport, by encouraging adoption of good practices in the Industry
- ***Beat the Micro Bead***: NGO initiative which provides an app that allows consumers to scan personal care products to check for the presence of plastic microbeads.

Other approaches being considered in some regions:

- Evaluate products and processes that include primary and secondary microplastics, such as fibres from clothing, and assess if they are covered or not by legislation. These activities can result in influencing the legal framework or the identification of other measures.
- End-of-pipe solutions to prevent emission (e.g. filters in washing machines, improvement of sewage and storm water treatment to retain microparticles);
- Encourage industry to research on the substitution of products and to develop alternatives, improve products to prevent the release of microplastics (e.g. EPS, paints, detergents and cosmetics)

¹² COM(2013) 123 final.

¹³ Regulation 1223/2009 on cosmetic products, OJ L342, 22.12.2009.

¹⁴ <http://www.start-green.net/award>

3.4 Revisiting the ‘product-to-waste’ cycle

Many fundamental drivers of marine litter are related to waste production and trade as well as the phenomenon of “*cheaponomics*” referring to the fact that prevalent lifestyles are built on a mountain of ecological, financial and societal debt (Carolan 2014). As shown by the regional policy mixes for top items and key sectors/sources developed in Chapter 2, there is a wide variety of policy instruments to prevent waste and marine litter. These can be applied to the various stages of the life-cycle of products, from the conceptual design and manufacturing to collection and recycling. Furthermore, because these steps are interlinked, interventions at one point of the cycle will affect also subsequent stages and even feedback in previous ones. A **consistent integration** is therefore needed if we intend to move towards closing the loop of production-use-recycling and thus reducing the probability that part of these products and materials end up in natural environments.

In this section we consider some aspects related to specific stages of the product-to-waste cycle that can help moving towards a circular economy.

Product & Design

This is the stage that will determine how long-lasting, repairable, recyclable and/or degradable a certain item will be in the socio-economic system in which it is made available and, in some cases, how likely it is that the product will end-up in the natural environment (e.g. products that are designed to be washed off, such as body scrubs). Companies have therefore a major role and should be encouraged to choose less harmful options, made responsible for the product design choices they make and ensuring these are safe, in terms of both human and environmental impacts (see Box 4).

Ecodesign regulations (e.g. Ecodesign Directive), for example, can foster more resource-efficient products by setting rules to improve the environmental performance of products and requiring the design to consider the subsequent stages of the life-cycle of the product (e.g. **Cradle-to-cradle concept**, Braungart & McDonough 2002).

Green Public Procurement that favours certain business and type of products can also work as effective stimulators of innovation towards more environmentally friendly, resource-efficient markets.

Sustainability goals should also be implemented in **bilateral or international trade agreements** like the planned TTIP¹⁵ to have holistic concepts regarding the sustainable use of resources in place. Currently a scattered system of approaches is in place. No EU member state has a comprehensive answer to the challenges, i.e. there are some company statements about sustainability in the global economic and investment world but at the same time many bilateral or trilateral agreements do simply focus on growth without mentioning any sustainability aspects.

¹⁵ Transatlantic Trade and Investment Partnership, ec.europa.eu/trade/policy/in-focus/ttip/index_de.htm

Use & Consumption

A considerable part of the waste that ends up in the sea corresponds to short-lived, single-use, non-degradable packaging and service items, in particular in areas with intense coastal tourism. Measures that discourage the use of more problematic items, but instead **promote the use of alternatives** and **encourage proper waste disposal** will have a major role in preventing marine litter. Although consumers play a central part on this topic, their role will be limited by policies and infrastructures in place that affect what people can buy/use and how they can dispose of it. On the other hand, as in the previous life-cycle stage, measures targeting retailing or use will likely have implications both upstream (e.g. design & production) and downstream (e.g. recycling and treatment).

For instance, the consumer response when buying products will depend whether more sustainable alternatives are available, are affordable and provide clear and trustful information on the characteristics of the product. At this level, consumer behavior can be influenced e.g. by restricting the availability (e.g. bans) and reducing affordability of less sustainable products (e.g. taxes) or providing some sort of benefit that encourages more responsible choices. However, as citizens, we are heavily influenced by other people and social norms and the impact of information can be overridden by social pressure and marketing (Austin et al. 2011). This highlights the **importance to target design, production and retailing**, and make use of other incentives at the consumption phase that lead to a better prevention and management of waste.

Target the existing pattern of irresponsible consumer behaviour

In all four marine regions, the majority of existing measures is targeting **cultural drivers** and mainly consists of non-regulatory, bottom-up approaches, related to awareness and education. In addition, new measures are being considered with a focus on either prevention or direct removal of marine litter. However, there is a commonly recognized need to adopt regulatory-based approaches to support **informed consumer choice and responsible citizen behavior**. Such behavioral change interventions have to take into account **individual and social aspects** as well as the contexts in which they take place (Darnton & Horne 2013). Evaluation of behavioral change projects showed that even when working in groups, people only made small, easy, simple changes. They refused changes if this would require to change their lifestyle or complex actions (Defra 2008). This suggests to aim for **replacing existing harmful practices** with more environmentally-friendly ones that only require incremental behavioral change. To trigger such substitution, certain elements of the unsustainable practices could be

Box 4 - Corporate responsibility and sustainable product development

Reversing the burden of proof, companies could be made responsible for taking care that their products are safe, in terms of both human and environmental impacts (responsibility for the whole life cycle). The **German Sustainability Code (GSC)** provides a common set of criteria for companies of all sizes and legal forms to measure and compare their sustainability performance. GSC declaration of conformity is a standardized document that may make small business more appealing to financial institutions, and therefore more likely to receive funding. In addition, it allows them to demonstrate their environmental performance to investors and consumers in a transparent way.

restricted while providing attractive alternatives. An example is the reduction of plastic packages for food or non-food products and the offer of an incentive if people bring their own bags and bins to transport their products. Alternatively, cotton bags and long-lasting bins could be sold. This approach could finally lead to a major reduction of plastic packaging and even to package-free markets like “Unverpackt”.

Collection, Recycling & Recovery

Improving waste management infrastructure and practice

Regarding the *evidence of effectiveness* for regulatory and co-management measures the assessment showed that very few measures are evidently strong for reducing marine litter according to literature. Here, a *stronger focus on waste prevention and improvement of collection*, in particular relating to specific, most common items throughout a marine region is needed. The promotion of recyclability and improvement of recycling rates is also necessary. In this respect, effective waste management measures are backed by control on compliance and monetary incentives like the free port reception facilities in Sweden or activities like Keep Denmark Clean which directly link collection of land-based waste through citizens with the manufacturers and recycling companies making the way of waste transparent to all sides. In addition, innovative recycling technologies have to be taken into consideration (Box 5).

The recently published EU Action Plan for a Circular Economy¹⁶ proposes *inter alia* mandatory product design and marking requirements to make repairability, durability and upgradability easier for electronic displays. This approach could be transferred to the plastic waste cycle.

Adapting commercial waste ordinances

In line with discussions of the Circular Economy approach, existing commercial waste ordinances, or their establishment have to be pushed. An example we can learn from is the new German law on old electrical devices which foresees that first treatment and disposal of pollutants has to take part in Germany. It is not allowed to export electrical waste and hazardous waste to developing countries. Transferred to plastic waste more recycling material would be available and the export of hazardous plastic waste forbidden. This measure would *stop an outflow of raw materials* which, on the one hand are no longer available for the supply of the national industry afterwards, and, on the other hand generally are at risk of being lost due to non-existent recycling infrastructures in customer countries. Considering this, future planning of collection and recovery structures should to be *extended beyond the national scope*.

¹⁶ COM (2015) 614/2, http://ec.europa.eu/priorities/jobs-growth-investment/circular-economy/docs/communication-action-plan-for-circular-economy_en.pdf

Favouring recycling over incineration

The current imbalance between recycling and incineration needs to be mitigated. Currently in a **“battle of waste”** established techniques of thermal recovery are still relied upon heavily, whereas material recycling is economically uncompetitive in many areas (Wilts et al. 2014). Stopping to provide subsidies for waste incineration should be taken into consideration. **Material recycling needs to become competitive**, as compared with thermal recovery, to ensure sufficient input of the right quality of materials. More research on recycled materials is necessary to help the further development of the circular economy.

Box 5 - Innovative technologies in recycling

While in some countries a considerable part of municipal waste is recycled, in others landfilling is still the prevailing final treatment. Innovative methods for recycling that address some of the existing limitations (e.g. downcycling in mechanical recycling of plastics) need to be developed and its establishment as a key practice supported. **Chemical recycling of plastics** breaks down polymers into its monomers and other basic chemicals, which can then be re-polymerised into new plastics, with equal quality. Several technologies have been elaborated by major chemical companies. The expectation is that only large-scale recycling facilities will be economically viable.

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Annex 1: Policy Mix for the Baltic Sea region

Considering frequently occurring marine litter items, across the different stages of the 'product-to-waste cycle' at which interventions can be made

Legend:

Implemented Measures that can be extended

Foreseen Measures (POM)

New measures (e.g. innovative or from other regional seas (RSs))

Regulatory measures

Soft/co-management measures

Sources:

- 1 – HELCOM RAP
- 2 – Proposals from former CleanSea reports, CleanSea Stakeholder Workshop Baltic Sea
- 3 – POM Germany
- 4 – POM Sweden
- 5 – Other EU region
- 6 – cross-regional (e.g. USA)



POLICY MIX BALTIC SEA					
	Design & Production	Use & Consumption	Collection & Waste Transfer	Treatment & Recycling	Clean-up
Smoking related items	Substitution of cigarette butts (cellulose-acetate) through natural materials ⁴	Smoking ban on beaches ⁵	Higher penalties for improper disposal of cigarette butts ^{2/5}	Community-based waste management, clean-up and monitoring of beaches (e.g. <i>Adopt-a-Beach, My Beach</i>) ⁵ Green Deal beach recreation sector to reduce beach recreation waste ⁵	Keep Europe Clean ⁶
Caps/lids	Voluntary agreements with retailers & suppliers to reduce packaging and waste, including selling products in bulk and reusing containers (e.g. <i>Courtauld Commitment, UK</i>) ⁵	Certification and awards of service providers to include specific criteria on single-use, disposable items and on prevention of ML (e.g. <i>Green Key</i>) ⁵	Community-based waste management, clean-up and monitoring of beaches (e.g. <i>Adopt-a-Beach, My Beach</i>) ⁵	Community-based waste management, clean-up and monitoring of beaches (e.g. <i>Adopt-a-Beach, My Beach</i>) ⁵	
Foam sponge	Extended Producer Responsibility Strategies requiring producers to be responsible for the entire life-cycle of the product ¹				



String & cord		Environmental assessment of requirements to reduce balloons in the public ⁴ Ban on balloons⁵	Message in our bottle ⁶	'Jutbakken' (large waste bins on beaches) ⁵	
	Substitution of plastic string for balloons by natural materials ⁴	Community-based waste management, clean-up and monitoring of beaches, e.g. <i>Keep Europe Clean⁶; Keep Denmark Tidy²; Keep Sweden Tidy²</i> (Denmark, Sweden)	Green Deal beach recreation sector to reduce beach recreation waste ⁵		
Plastic bags	Extended Producer Responsibility Strategies requiring producers to be responsible for the entire life-cycle of the product ¹	Ban on oxo-degradable carrier bags ⁵	Refillable containers for food (Germany, Denmark, Sweden)	Awareness campaigns to encourage supermarkets for recycling containers (Denmark)	Community-based waste management, clean-up and monitoring of beaches, e.g. <i>Keep Europe Clean⁶; Keep Denmark Tidy²; Keep Sweden Tidy²</i> (Denmark, Sweden)
		Voluntary agreements with retailers & suppliers to reduce packaging and waste, including selling products in bulk and reusing containers ¹	New plastic bags recovery routes ²	Composites Europe 2014/2015 ² (Germany)	
		Zero Plastics to Landfills ⁵	Plastic Cycle Chain Agreement to achieve a circular economy for plastics (e.g. PoM Netherland) ⁵		



<p>Food packaging incl. fast food containers</p>	<p>Product design studio project: This Too Shall Pass (packaging has the same life plan as the food they contain)²</p>	<p>Ban single-use products (e.g. from certain areas)^{2,3}</p>	<p>Garbage deposit refund scheme on festivals² (Germany, Denmark)</p>	<p>Awareness campaigns to encourage supermarkets for recycling containers⁵</p>	
	<p>Voluntary agreements with retailers & suppliers to reduce packaging and waste, including selling products in bulk and reusing containers (e.g. Courtauld Commitment, UK)⁵</p>	<p>Certification and awards of service providers to include specific criteria on single-use, disposable items and on prevention of ML (e.g. Green Key)⁵</p>	<p>Cooperation for establishment of Deposit-Refund Schemes for bottles, containers and cans¹</p>	<p>Zero Plastics to Landfills⁵</p>	<p>Clean River approaches⁵</p>
	<p>Green Deal beach recreation sector to reduce beach recreation waste⁵</p>	<p>Community-based waste management, clean-up and monitoring of beaches, e.g. <i>Keep Europe Clean</i>⁶; <i>Keep Denmark Tidy</i>²; <i>Keep Sweden Tidy</i>² (Denmark, Sweden)</p>	<p>Message in our bottle^{2, 6}</p>	<p>Composites Europe 2014/2015²</p>	
<p>Bottle caps</p>	<p>Voluntary agreements with retailers &</p>	<p>Plastic Cycle Chain Agreement to achieve a circular economy for plastics (e.g. PoM Netherland)⁵</p>	<p>Cooperate on the</p>	<p>Clean River approaches⁵</p>	



	<p>suppliers to reduce packaging and waste, including selling products in bulk and reusing containers (e.g. <i>Courtauld Commitment</i>, UK)⁵</p>	<p>establishment and/or further development of deposit refund systems for bottles, containers and cans,¹</p>	
	<p>Alternative materials for single-use straws⁵</p> <p>Re-usable straws^{1/3/5}</p>	<p>Certification and awards of service providers to include specific criteria on single-use, disposable items and on prevention of ML (e.g. <i>Green Key</i>)⁵</p> <p>Don't provide straws with the drink by default⁵</p>	
<p>Culery, trays & straws</p>	<p>Extended Producer Responsibility Strategies requiring producers to be responsible for the entire life-cycle of the product¹</p>	<p>Garbage deposit refund scheme on festivals² (Germany, Denmark)</p>	
	<p>Ban single-use products (e.g. from certain areas)⁵</p>	<p>Community-based waste management, clean-up and monitoring of beaches, e.g. <i>Keep Europe Clean</i>⁶; <i>Keep Denmark Tidy</i>²; <i>Keep Sweden Tidy</i>²(Denmark, Sweden)</p>	
<p>Fishing & aquaculture gear</p>	<p>Alternative for all kind of nets^{1/3/5}</p>	<p>Higher penalties for improper disposal of fishing gear (backed by communication strategy)²</p>	<p>Jutbakken¹ (large waste bins on beaches)⁵</p> <p>Clean-up actions of beaches (e.g. <i>Boskalis Beach Clean-up Tour</i>)⁵</p> <p>Fishing-for-Litter⁵</p> <p>Collection and removal of old or abandoned nets for recycling and incorporation in new products (e.g. <i>HealthySeas Initiative</i>)⁵</p>



	Green Deal fisheries sectors to reduce fishing waste ⁵			
	Extended Producer Responsibility Strategies requiring producers to be responsible for the entire life-cycle of the product¹			
Snack packets & Lolly sticks	Voluntary agreements with retailers & suppliers to reduce packaging and waste, including selling products in bulk and reusing containers (e.g. <i>Courtauld Commitment</i> , UK) ⁵	Community-based waste management, clean-up and monitoring of beaches (e.g. <i>Adopt-a-Beach</i> , <i>My Beach</i>) ⁵ ;	Community-based waste management, clean-up and monitoring of beaches, e.g. <i>Keep Europe Clean⁶</i> ; <i>Keep Denmark Tidy²</i> ; <i>Keep Sweden Tidy²</i> (Sweden, Denmark)	
	Plastic Cycle Chain Agreement to achieve a circular economy for plastics (e.g. PoM Netherland) ⁵		Sweden <i>Tidy²</i> (Sweden, Denmark)	
		Certification and awards of service providers to include specific criteria on single-use, disposable items and on prevention of ML (e.g. <i>Green Key</i>) ⁵	Zero Plastics to Landfills ⁵	
	Product designed for reuse ^{2,3}		Community-based waste management, clean-up and monitoring of beaches, e.g. <i>Keep Europe Clean⁶</i> ; <i>Keep Denmark Tidy²</i> ; <i>Keep Sweden Tidy²</i> (Denmark, Sweden)	
General	Modification/substitution of products to reduce the negative impact of marine litter on the environment and find alternative materials ³	Reduction of plastic waste by local regulatory mandatory requirements (e.g. polluter-pays-principle for pathways of plastic, stricter approval requirements for event organiser) ³		Regular removal of ML in accumulation and sensitive areas ^{1,2}
	Plastic Cycle Chain Agreement to achieve a circular economy for plastics (e.g. PoM Netherland) ⁵			Clean-ups at river mouth area ²
	Reduction of the input of plastic waste into the marine environment (development of existing waste treatment systems, improvement of sustainable product and packaging designs) ³	Establish a dialogue and negotiate on solutions	During revision of municipal waste plans:	Coordinated Clean-up Day for the Region ⁵
				Dive Against



<p>with business and industry to develop design improvements and to reduce over-packaging¹</p>	<p>identify and highlight how waste management can contribute to reducing the emergence of marine litter and establish objectives for such work⁴</p>	<p>Debris²</p>
<p>QMIik² Eco Design Refills⁶</p>	<p>Linking the topic of marine litter to learning objectives, curricula and teaching material³</p>	<p>Regular clean-up campaigns^{1,2}</p>
<p>Awareness raising activities on marine litter and potential solutions (e.g. MARLISCO)⁵</p>		
<p>Encourage, based on existing labels such as the EU Ecolabel and the Nordic Ecolabel, exchange with international certification schemes¹</p>	<p>Improved storm water management¹</p>	<p>Recover macro-waste before disposal of dredged sediments^{2,4}</p>
<p>Assess the importance of the contribution of upstream waste flows to the marine environment and identify suitable solutions¹</p>		



Annex 2: Policy Mix for the Black Sea region

Considering frequently occurring marine litter items, across the different stages of the 'product-to-waste cycle' at which interventions can be made

Legend:

Implemented Measures that can be extended
Foreseen Measures (PoM)
New measures (e.g. innovative or from other RSS)
CleanSea Stakeholder Workshops Black Sea
Regulatory measures
Soft/co-management measures

Sources:

- 1- PoM (transboundary context - Bulgaria and Romania)
- 2- Stakeholder workshops
- 3- Other EU region
- 4- Elsewhere



POLICY MIX BLACK SEA					
	Design & Production	Use & Consumption	Collection & Waste transfer	Treatment & Recycling	Clean-up
Cigarette butts		Ban smoking on beaches ³ (France)			
Snack packets, lolly sticks, straws	Alternative materials for single-use straws Re-usable straws				
Drink bottles	Voluntary agreements with retailers & suppliers to reduce packaging and waste, including selling products in bulk and reusing containers (e.g Courtauld Commitment, UK; MED RAP)		Cooperation for establishment of Deposit-Refund Schemes for bottles, containers and cans (inc. lids) ³		
Caps/lids					
Drink cans				Cleaning of unguarded beaches - collected waste is used for art ²	
Small plastic bags	Voluntary agreements with retailers & suppliers to reduce packaging and waste, including selling products in bulk and reusing containers (e.g Courtauld Commitment, UK; MED RAP)				
Food containers		Certification and awards of service providers to include specific criteria on single-use, disposable items and on prevention of ML (e.g. Green Key) ³			
Cups		Ban single-use products (e.g. from certain areas) ⁴		Cleaning of unguarded beaches - collected waste is used for art ²	



Clothing	
Bottle caps	<p>Cleaning of unguarded beaches- collected waste is used for art²</p> <p>Cooperation for establishment of Deposit-Refund Schemes for bottles, containers and cans³</p>
	<p>Plastic Cycle Chain Agreement to achieve a circular economy for plastics (PoM Netherlands)³</p>
	<p>"Round table" on improving the ecological status of the Black Sea waters Cooperation between institutions (Bulgaria)²</p> <p>Voluntary beach clean-up (e.g. Coastwatch Constanta; <i>Let's do it, Romania!</i>/Europe)</p>
	<p>Inclusion of marine litter and its impacts in waste management plans (HELCOM)³</p> <p>Cleaning of unguarded beaches- collected waste is used for art</p>
	<p>Development of Regional Marine Litter Action Plan (joint methodology for quantifying the marine litter, identification of sources, prosecution of offenders, etc.) (PoM BG&RO)</p>
	<p>Zero Plastics to Landfill³ (Spain, OSPAR RAP)</p> <p>Regular removal of ML in accumulation and sensitive areas³ (MED RAP)</p>
	<p>Regular (annual) campaigns for encouraging and promoting clean-up activities and improved Marine litter monitoring on voluntary basis (PoM BG&RO)</p>
	<p>Waste management in port facilities</p> <p>Port seabed clean-up by divers²</p> <p>Sea surface marine litter cleaning (e.g. Turkey)</p> <p>Marine litter waste collection and management organised by boats, Turkey</p> <p>STH Harem Beach cleaning rehabilitation and conservation project (e.g. Turkey)</p> <p>"My Black Sea" awareness campaign</p> <p>Awareness raising activities about the issue of marine litter and potential solutions (e.g. Marlisco)</p> <p>Annual awareness raising campaigns addressed to business (commercial, beach users, fishermen, etc.) and public (tourists, students, children, etc.) (PoM BG&RO)</p>
General	



Annex 3: Policy Mix for the Mediterranean

Considering frequently occurring marine litter items, across the different stages of the 'product-to-waste cycle' at which interventions can be made

Legend:

Implemented Measures that can be extended
Foreseen Measures (e.g. RAP, PoMs)
New measures (e.g. innovative or from other RSS)
CleanSea Stakeholder Workshop MED
Regulatory measures
Soft/comanagement measures

Sources

- 1 – MED RAP
- 2 – Project for joint implementation of MSFD in the MED, Phase II (ENV.D.2/FRA/2012/0017)
- 3 – Stakeholders' Workshop (Venice, October 2015 and Madrid, November 2015)
- 4 – PoM France
- 5 – OSPAR Area or RAP
- 6 – HELCOM Area or RAP
- 7 - Elsewhere (e.g. USA)



POLICY MIX MEDITERRANEAN						
	Design & Production	Use & Consumption	Collection & Waste transfer	Treatment & Recycling	Clean-up	
Smoking related items	Eco-design: Biodegradable cigarette filters ³	Ban smoking on beaches (e.g. France)	Higher penalties for improper disposal of cigarette butts ³	Awareness raising and modes to collect cigarette butts (e.g. stray distribution in beaches)		
	Voluntary agreements with retailers & suppliers to reduce packaging and waste, including selling products in bulk and reusing containers (e.g. Courtauld Commitment, UK) ^{1,5}		Cooperation for establishment of Deposit-Refund Schemes for bottles, containers and cans ⁶			
Plastic bottles		Drinkable water publically available for refills ³				
	Ban on oxo-degradable carrier bags					
Plastic Bags	Voluntary agreements with retailers & suppliers to reduce packaging and waste, including selling products in bulk and reusing containers (e.g. Courtauld Commitment, UK)					
Aluminium drink cans		Cooperation for establishment of Deposit-Refund Schemes for bottles, containers and cans ⁶				



Food wrappers & containers	<p>Ban polystyrene packaging^{3,7}</p>	<p>Certification and awards of service providers to include specific criteria on single-use, disposable items and on prevention of ML (e.g. Green Key)</p>	
	<p>Voluntary agreements with retailers & suppliers to reduce packaging and waste e.g. products in bulk and reusing containers (e.g Courtauld Commitment, UK)^{1,5}</p>	<p>Ban single-use products⁷ (e.g. from certain areas)</p>	
Plastic cups & cutlery		<p>Certification and awards of service providers with specific criteria on single-use, disposable items and ML prevention (e.g. Green Key)</p>	
	<p>Design & market Re-usable straws</p>	<p>Straws are only provided with drink upon request³</p> <p>Ban single-use products⁷ (e.g. from certain areas)</p>	
Straws	<p>Voluntary agreements with retailers & suppliers to reduce packaging and waste, including selling products in bulk and reusing containers (e.g Courtauld Commitment, UK)^{1,5}</p>		
	<p>Ban of plastic cotton-bud sticks</p>		<p>Improvement of Waste Water Treatment Plants to retain microplastics and fibres from urban and industrial effluents³</p>
Sanitary waste	<p>Awareness campaigns for proper disposal of sanitary waste; <i>Bag it and Bin it, Don't Flush it.</i> UK)⁵</p>		



Fishing/ aquaculture gear	Innovative alternatives for aquaculture gear based on neutral, biodegradable materials³	Use of alternative materials in aquaculture (e.g. cotton mussel socks)³ Use of alternative materials for fishing nets, pots & traps¹	Explore possibility of gear marking¹	Collection and removal of old or abandoned nets for recycling and incorporation in new products (e.g. HealthySeas Initiative)²
	Extended Producer Responsibility strategies, following waste hierarchy: reusability, durability, recyclability of products but also less resources and toxicity^{1,3}	Voluntary agreements with retailers & suppliers to reduce packaging and waste, including selling products in bulk and reusing containers (e.g Courtauld Commitment, UK)^{1,5}		
General		Plastic Cycle Chain Agreement to achieve a circular economy for plastics (POM Netherlands)⁵		Recycling companies that up/downcycle difficult-to-recycle items (e.g. coffee-capsules - Tassimo Brigade, UK)⁵
	Sustainable Procurements to encourage markets for products with recycled plastic¹		Sustainable Procurements to encourage markets for products with recycled plastic¹	Regular removal of ML in accumulation and sensitive areas^{1,2} Removal of macro-waste before disposal of dredged sediments in the sea^{2,4}
		Zero Plastics to Landfill (OSPAR RAP)^{1,5}	Coordinated Clean-up Day for the MED Region^{1,2}	
	Inclusion of marine litter in waste management plans^{4,5}		Dive Against Debris (seafloor clean-up by	



	Awareness raising activities on marine litter and potential solutions (e.g. MARLISCO)	scuba-divers)
	Certification and awards of service providers to include specific criteria on single-use, disposable items and on prevention of ML (e.g. Green Key)	Adopt-a-beach – community-based waste management, clean-up and monitoring of beaches ^{1,2}



Annex 4: Policy Mix for the North-East Atlantic region

Considering frequently occurring marine litter items, across the different stages of the 'product-to-waste cycle' at which interventions can be made

Legend:

Implemented Measures that can be extended

Foreseen Measures (e.g. RAP, POMs)

New measures (e.g. innovative or from other RSS)

Regulatory measures

Soft/comanagement measures

Sources:

- 1 – OSPAR RAP
- 2 –POM Belgium
- 3 - POM The Netherlands
- 4 - POM The UK



POLICY MIX NORTH-EAST ATLANTIC				
Design & Production	Use & Consumption	Collection & Waste transfer	Treatment & Recycling	Clean-up
String & cord	Ban on release of balloons ³	Green Deal to reduce beach recreation waste ³		'Jutbakken' (large waste bins on beaches) ³
Caps/lids		Community-based waste management, clean-up and monitoring of beaches e.g. <i>Adopt-a-Beach⁴, My Beach³</i>		
	Voluntary agreements with retailers & suppliers to reduce packaging and waste, including selling products in bulk and reusing containers (e.g. Courtauld Commitment, UK) ⁴			
	Plastic Cycle Chain Agreement to achieve a circular economy for plastics ³	Green Deal to reduce beach recreation waste ³		
Cotton bud sticks	Alternative for plastic cotton bud sticks			
	Awareness campaigns for proper disposal of sanitary waste, including labeling (e.g. <i>Bag it and Bin it, Don't Flush it, UK⁴</i>)			
Snack package and lolly-sticks		Certification and awards of service providers to include specific criteria on single-use, disposable items and on prevention of ML (e.g. Green Key) ³		
	Voluntary agreements with retailers & suppliers to reduce packaging and waste, including selling products in bulk and reusing containers (e.g. Courtauld Commitment, UK) ⁴	Plastic Cycle Chain Agreement to achieve a circular economy for plastics ³		
Rope		Community-based waste management, clean-up and monitoring of beaches e.g. <i>Adopt-a-Beach⁴, My Beach³</i>		
		Green Deal to reduce shipping waste ³		'Jutbakken' (large waste bins on beaches) ³
		Green Deal to reduce fishing waste ³		



<p>Nets & pieces of nets</p>	<p>Innovative alternatives for fishing gear (e.g. dolly rope) based on neutral, biodegradable materials^{2,3}</p>		<p>Green Deal to reduce fishing waste³</p> <p>Collection and removal of old or abandoned nets for recycling and incorporation in new products (e.g. <i>HealthySeas Initiative</i>)³</p>		<p>'Jutbakken' (large waste bins on beaches)³</p> <p>Collection and removal of old or abandoned nets for recycling and incorporation in new products (e.g. <i>HealthySeas Initiative</i>)³</p>
<p>Food containers</p>	<p>Plastic Cycle Chain Agreement to achieve a circular economy for plastics³</p>	<p>Certification and awards of service providers to include specific criteria on single-use, disposable items and on prevention of ML (e.g. Green Key)³</p>	<p>Green Deal beach to reduce beach recreation waste³</p>		
<p>Drink bottles</p>	<p>Voluntary agreements with retailers & suppliers to reduce packaging and waste, including selling products in bulk and reusing containers (e.g. Courtauld Commitment, UK)⁴</p>	<p>Certification and awards of service providers to include specific criteria on single-use, disposable items and on prevention of ML (e.g. Green Key)³</p>	<p>Community-based waste management, clean-up and monitoring of beaches e.g. <i>Adopt-a-Beach</i>⁴, <i>My Beach</i>³</p>	<p>Green Deal to reduce beach recreation waste³</p>	
<p>Plastic bags</p>		<p>Ban on plastic bags</p>		<p>Green Deal to reduce beach recreation waste³</p>	
<p>Cigarette butts</p>		<p>Smoking ban on beaches</p>		<p>Green Deal to reduce beach recreation waste³</p>	
<p>General</p>	<p>Plastic Cycle Chain Agreement to achieve a circular economy for plastics³</p>		<p>Community-based waste management, clean-up and monitoring of beaches e.g. <i>Adopt-a-Beach</i>⁴, <i>My Beach</i>³</p>	<p>Green Deal to reduce beach recreation waste³</p>	<p>Collection of ML removed during normal fishing operations - <i>Fishing-for-Litter</i>^{1,2,3,4}</p>
					<p>Clean River approaches^{3,4}</p> <p>Voluntary Beach Clean-up actions (e.g. <i>Boskalis Beach Clean-up Tour</i>)³</p>

