Issue Paper to the "International Conference on Prevention and Management of Marine Litter in European Seas"

- Final Version -

16th May 2013

Contact information: support@marine-litter-conference-berlin.info

Status box

Title: Issue Paper to the "International Conference on Prevention and Management of Marine Litter in European Seas"

Version: Final Version **Date:** 16th May 2013

Past Versions:
- Pre-Draft Version V1: 9th January 2013 (first commenting round with RSC)
- Draft Version V2: 13th February 2013 (second commenting round)
- Draft Version V3: 12th March 2013 (third commenting round)
- Version to be discussed at the conference: 27th March 2013
- Final Draft: 26th April (final commenting round)

Author(s): Eduard Interwies, Stefan Görlitz (InterSus - Sustainability Services), Aleke Stöfen (University of Trier), Jan Cools, Wim van Breusegem (Milieu), Stefanie Werner (UBA), Leo de Vrees (COM)

With contributions from: Thomas Dworak, Maria Berglund (Fresh Thoughts Consulting), Tatjana Hema (UNEP/MAP-MEDPOL Program Officer), Irina Makarenko (Permanent Secretariat to the Bucharest Convention), Mikhail Durkin (HELCOM), Samuli Korpinen (HELCOM), Monika Stankiewicz (HELCOM), John Mouat (OSPAR), Lex Oosterbaan (OSPAR), Darius Campbell (OSPAR), Wim van Urk (ICG MSFD co-convener), Richard Thompson (University of Plymouth)

Summary: The role of the present Issue Paper to the "International Conference on Prevention and Management of Marine Litter in European Seas" was to establish for the conference´s participants a common "starting point", from where discussions could be taken forward to approach the conference´s main goal: facilitating the establishment or further development of Regional Action Plans (RAPs) on marine litter in the regional seas or Regional Sea Conventions (RSCs) of European waters.

The Issue Paper evolved over the course of several rounds of commenting (see the track of the past versions above), eliciting the expert knowledge of the RSCs, and will be finished after another round of commenting in the wake of the conference itself. The paper has been submitted to the EU Marine Directors in May 2013.

Contact: support@marine-litter-conference-berlin.info

Executive summary

The role of the present Issue Paper to the "International Conference on Prevention and Management of Marine Litter in European Seas" was to establish for the conference´s participants a common "starting point", from where discussions could be taken forward to approach the conference´s main goal: facilitating the establishment or further development of Regional Action Plans (RAPs) on marine litter in the regional seas or Regional Sea Conventions (RSCs) of European waters.

To accomplish this role, the Issue Paper was designed partly as an "open document" - containing a factual part describing:

- the political background of the conference and its embedding into international obligations and strategies (Chapter 1),
- the up-to-date regional knowledge about impacts, amounts, consistency and sources of marine litter in European waters (Chapters 2.1 and 2.2),
- overall aims and guiding principles of combating marine litter including the relevance of target setting (Chapter 2.3), and
- the existing framework for actions and initiatives to reduce marine litter inputs into the marine environment globally, European and regional wise (Chapter 3).

These sections are followed by the presentation of a "toolbox", presenting successful actions, measures and initiatives, which will be expanded after the conference (Chapter 4 and Annex I and II). Another section suggests possible questions regarding the data situation in the respective regional sea as well as possible steps to be taken to get closer to a RAP on marine litter. These include possible operational targets and concrete measures and actions which were discussed and agreed on at the conference (customized to each regional sea/Regional Sea Convention) (Chapter 5).

The aim of this last chapter is not to impose certain steps, operational targets and measures upon the participants (RSC representatives, CPs, stakeholders, NGO), but to show which steps could be taken to take the issue of preventing and reducing litter in the marine environment further. As such it led to fruitful discussions at the conference resulting in a common understanding on which next steps to focus on within the different regions.

The present final version of the Issue Paper (as of April/May 2013) contains several changes and modifications which resulted from the debates and discussions at the conference (especially in the course of the Breakout Sessions). These changes concern mainly the chapters 2.3.2 which reflects the discussion on target setting and chapter 5 on the establishment and further development of regional action plans.

Content

Acronyms

CP(s)	Contracting Party (Parties).
EcoQO	Ecological Quality Objectives.
GES	Good Environmental Status.
HELCOM	Helsinki Commission.
ICG ML	Intersessional Correspondence Group Marine Litter.
ICZM	Integrated Coastal Zone Management.
IMO	International Maritime Organization.
IUCN	International Union for Conservation of Nature.
IUU fishing	Illegal, unreported and unregulated fishing activities.
KIMO	Kommunenes Internasjonale Miljøorganisasjon (Local Authorities International Environmental Organisation).
MEDPOL	Program for the Assessment and Control of Pollution in the Mediterranean Region.
MoU	Memorandum of Understanding.
MS	Member State(s).
MSFD	Marine Strategy Framework Directive.
OSPAR	Previously named Oslo (dumping at sea) and Paris (land-based sources of marine pollution) Conventions
QSR	Quality Status Report.
RAP(s)	Regional Actions Plan(s).
RSC(s)	Regional Sea Convention(s).
TFEU	Treaty on the Functioning of the European Union.
TSG ML	Technical Subgroup on Marine Litter.
UNEP/MAP	UNEP Mediterranean Action Plan.

1 Background and role of the Issue Paper

The present Issue Paper to the "International Conference on Prevention and Management of Marine Litter in European Seas" was developed jointly by the German Federal Environment Agency (UBA), the European Commission (EC) and their respective consultants (InterSus - Sustainability Services; Fresh-Thoughts Consulting; Milieu). The authors were supported by representatives from the four European Regional Seas Conventions (RSCs), from HELCOM for the Baltic Sea, the Black Sea Convention for the Black Sea, OSPAR for the North-East Atlantic, and from UNEP/MAP for the Mediterranean.

The Issue Paper evolved over the course of several rounds of commenting by the RSCs, which ensured the incorporation of their expert knowledge and will be finished after another round of commenting in the wake of the conference itself. The paper is to be submitted to the EU Marine Directors in May 2013.

The Issue Paper served as input to the conference, and proposed questions to be discussed there. Hereby, the focus lay strongly on supporting a) the establishment or b) further development and achievement of coherence of Regional Action Plans (RAPs) on marine litter for the regional seas. The Issue Paper furthermore presents best practice examples and commitments including contact points to reduce the input of marine litter into the sea, or to reduce the amount of litter already present in the marine environment. Through this the conference supported RSCs in the identification and implementation of programs of measures specifically aiming at combating marine litter.

It was envisioned that the Issue Paper and the conference itself helped to practically move ahead with reducing marine litter in the marine environment, and reduce its inputs.

As such, the Issue Paper supports EU Member States (MS) and Contracting Parties (CPs) to the RSCs in the implementation of the EU Marine Strategy Framework Directive (MSFD), and contributes to implementing the Honolulu Strategy. It further facilitates the development of an EU contribution to the Rio + 20 obligation:

“We further commit to take action to, by 2025, based on collected scientific data, achieve significant reductions in marine debris to prevent harm to the coastal and marine environment."

Last not least, it is envisaged that the Issue Paper, and the conference, create new connections and bonds between people, and in doing so supports various actors and stakeholders in the fight against marine litter.

2 Marine Litter in European Waters/Understanding the problem

The Issue Paper follows the MSFD Task Group 10 report´s definition of marine litter (European Commission/JRC/Ifremer/ICES 2010):

> *"Marine litter is any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment...Marine Litter consists of items that have been made or used by people and deliberately discarded or unintentionally lost into the sea and on beaches, including such materials transported into the marine environment from land by rivers, draining or sewage systems or winds. For example, marine litter consists of plastics, wood, metals, glass, rubber, clothing or paper etc. This definition does not include semi-solids remains of for example mineral and vegetable oils, paraffin and chemicals that sometimes litter sea and shores ".*

In this Issue Paper, the terms "marine litter" and "marine debris" are used interchangeably.

2.1 Impacts of Marine Litter

Ecologic impacts of marine litter

To follow up on considerations carried out by the MSFD GES TSG Marine Litter in their 2011 report (JRC IES 2011), establishing and isolating the extent of harm caused by marine litter at a population, community or ecosystem level will be difficult to confirm because of the wide range of factors affecting this level of biological organization. Nevertheless it seems inevitable that especially the broadly documented impacts of entanglement and ingestion will alter the biological and ecological performance of individuals. A number of negative effects have been reported, including compromising an individual`s ability to capture and digest food, sense hunger, escape from predators, and reproduce as well as decreasing body condition and compromising locomotion, including migration. Ingestion of micro-particles[1] with microplastics being of particular concern is an upcoming and emerging issue as it can provide a pathway for transport of harmful chemicals (CBD 2012). Hence it is essential to consider harm at the individual level, and estimating the numbers of individuals affected is likely to offer the most feasible and representative conclusions about biological impacts. Further input from known sources and items regularly found should be prevented, although current knowledge about harm on biota as outlined below should be applied in order to prioritize and target actions.

The majority of reported encounters by individual marine organisms were with plastic litter. This means in terms of litter type or use that rope and netting accounted for 57 % of encounters followed by fragments (11%), packaging (10%), other fishing related litter (8%) and micro-particles (6%) (CBD 2012). Accounting for around one tenth of the entire litter in the world`s oceans derelict or discarded fishing gear ranks as an especially problematic marine litter. These estimated 640.000 tons of fishing gear lost, abandoned or discarded annually may continue to fish for years and even decades, a process referred to as ‘ghost’ fishing (Cheshire et al., 2009).

[1] "Micro-particles" refer to marine litter particles consisting of any material; plastics, however, are of the greatest concern (see COM(2010) 5956).

In the following section major impacts of marine litter are generally described. In addition selected recent European findings are shortly described with a focus on the issue of ingestion as a dedicated indicator under the MSFD requirements.

Ingestion and entanglement

Encounters with marine litter were reported for 663 species (CBD 2012). Over half of the species (about 370) were associated with entanglement in and ingestion of marine debris, representing a more than 40% increase since the last review in 1997, which reported 247 species for these two major impact categories (Laist 1997). At least 43 % of existing cetacean species, all species of marine turtles, approximately 44 % of the world's seabird species, and many species of fish have been reported to ingest marine litter (Katsanevakis 2008, CBD 2012). According to the 1998 U.S. Marine Mammal Commission´s last published report in 1999, 136 marine species have been reported in entanglement incidents, including six of the seven species of sea turtle, 51 out of the world´s 312 species of seabirds, and 32 species of marine mammals. Of the 120 marine mammals species listed on the IUCN list, 54 (45 %) were reported to have interacted (ingestion and/or entanglement) with marine litter. About 15% of the species affected through entanglement and ingestion are in the IUCN Red List. It is clear from these numbers, that numerous individuals have died or become harmed as a consequence of entanglement and ingestion encounters with marine litter. It is however likely, that a much larger number of individuals are comprised by sub-lethal effects that have not been fully reported (CBD 2012). For example, litter on beaches has been shown to adversely affect the ability of turtle hatchlings to reach the Mediterranean Sea with two of three turtles having contact with litter on their way to reach the water (Triessnig et al. 2012).

In the North Western Mediterranean Sea the average ratio between micro-particles and mesozooplankton weights was 0.5 for a whole survey and might induce a potential confusion for zooplankton feeder (Collignon et al. 2012). An experimental study evaluated the consequences of microplastic accumulations in blue mussels detecting e.g. pathological transformations in cells of the digestive glands (Moos et al. 2012). Plastic contamination was found to be high in Nephrobs in the Clyde Sea. 83 % of the animals sampled contained plastics (predominantly filaments) in their stomachs. Raman spectroscopy indicated that some of the microfilaments identified from gut contents could be sourced to fishing waste. Nephrops fed fish seeded with strands of polypropylene rope were found to ingest but not to excrete the strands (Murray & Cowie 2011). In the English Channel 504 fish of 10 species were examined and plastics found in the gastrointestinal tracts of 36.5 %. All five pelagic and all five demersal species had ingested plastic (Lusher et al. 2013). Ingested debris was found in 3.1% of 862 elasmobranchs caught in the Eastern Ionian Sea during deep-water long-line surveys (Anastasopoulou et al. 2013).

The most comprehensive data set available is that on northern fulmars. The analysis of stomachs of beached fulmars in the Southern North Sea show that 95 % contain plastics, in average 35 pieces (Franeker et al. 2011). Stomach analyses of Icelandic fulmars confirm that plastic pollution thus appear to link to regions of intense human coastal and marine activities, suggesting substantial current inputs in those areas (Kühn & Franeker 2012). A study by Rodriguez et al. 2012 evaluated intergenerational transfer of ingested plastic in Cory´s Shearwaters while evaluating the gut content of dead fledglings stranded by light pollution on Canary Islands. 83% of birds were affected, containing in average 8.0 pieces per bird. In three of 12 analyzes in abdominal adipose of oceanic seabird (short-tailed shearwaters) higher-brominated congeners (polybrominated diphenyl ethers

(PBDEs)) were detected, which are not present in the natural prey (pelagic fish). The same compounds were present in plastic–derived chemicals from ingested plastics to the tissue of marine-based organisms (Tanaka et al. 2013).

Results from 371 dissections of leatherback turtles show that more than a third of the animals feed on plastics. The loggerhead which is proposed as the most suitable indicator species for ingestion in the Mediterranean Sea is known to regularly ingest e.g. fish hooks, rubber, aluminum, foil, tar, ropes and monofilament line (Tomas et al 2002). Samples of 107 stomachs, 100 intestines and 125 scats of harbor seals from the Netherlands were analyzed for the presence of plastics. Incidence of plastic was 11% for stomachs, 1% for intestines, and 0% for scats. Younger animals, up to 3 years of age, were most affected (Rebolledo et al 2011). In each of 19 analyzed samples of faces from harbor and grey seals in the German Lower Saxony Wadden Sea micro-particles mainly from granular origin and fibres were found ranging from some milligram to a few grams per sample (personal comment Liebezeit in Werner 2012). In a study by Fossi et al. 56 % of surface neustonic/planktonic samples in the Mediterranean contained microplastic particles. The highest abundance (9.63 items/m^3) was found in the Portofino MPA (Ligurian Sea). High concentrations of phthalates (DEHP and MEHP) were detected in the neustonic/planktonic samples. The concentrations of MEHP found in the blubber of stranded fin whales suggested that phthalates could serve as a tracer of the intake of micro-particles.

Direct harm or death is in general more frequently reported in reports of entanglement than of ingestion. The data, however, should be interpreted with caution as they are likely to be biased by differences in the frequency of reporting, since entanglement is much more visible and therefore recorded in comparison to ingestion which requires a *post mortem* to confirm (CBD 2012). The decline of deep water sharks in North Atlantic has been linked to ghost fishing in the North Atlantic (Large et al., 2009).

A study by Votier et al. (2010) investigated the use of plastics as nesting material by northern gannets for the years 1996-1997 and 2005-2010 in the third largest gannet colony in the world (Grassholm, Whales) with approximately 40.000 pairs of gannets breed. On average gannet nests contained 469.91 g (range 0-1293 g) of plastic, equating to an estimated colony total of 18.46 tons (range 4.47-42.34 tons). The majority of nesting material was rope made from synthetic fibres (83%), followed by netting (15%), packaging (2%) and a very small proportion of other plastics (<1%). The associated levels of mortality were assessed as well. On average 62.85 ± 26.84 (range minima 33-109) birds were entangled each year, totaling 525 individuals over eight years, the majority of which were nestling. During the 2005 breeding season all samples nets of the colony´s 200 breeding pairs at the island of Helgoland contained plastic litter in the nest construction material. A study by Bond et al. (2012) assessed the prevalence and composition of fishing gear debris in the nets of northern gannets and found a relation to fishing effort. Whereas in 1992 plastic litter items were included in 39.3% of 466 Kittiwake nests in the Bulbjerg colony at the Jammerbugt in Northwest Denmark, in 2005 57.2% of 311 nests contained plastic litter (Hartwig et al. 2007).

Sightings records and a photo identification catalogue from a haul out site in southwest England were used to establish entanglement records for grey seals. Between 2004 and 2008 the annual mean entanglement rates varied from 3.6 % to 5%. Of the 58 entanglement cases, 64% had injuries, that were deemed serious. Of the 15 cases where the entangling debris was visible, 14 were entangled in fisheries materials (Allen et al. 2012).

A recent study described a case of mortality of a sperm whale related to the ingestion of large amounts of marine litter in the Mediterranean Sea. The results show how these animals feed in waters near an area completely flooded by the greenhouse industry, making them vulnerable to its waste products if adequate treatment if this industries waste is not in place (Stephanis et al. 2013).

Other ecological impacts

Other known impacts of marine litter include alteration, damage and degradation of benthic habitats (Katsanevakis et al., 2007) such as coral reef and soft sediment abrasion from derelict fishing gear or smothering from macro- and micro-particles on sandy sediments in the intertidal zones (Katsanevakis et al., 2007, Richards, 2011). Litter can disrupt the assemblages of organisms living on or in the sediment (Chiappone et al., 2002). Micro-particles and litter fragments on beaches have been reported to alter the porosity of the sediment and its heat transfer capacity (Carson et al. 2011). Furthermore marine litter items can assist in alien species invasions (Barnes and Milner, 2005).

Economic and social impacts

Information on the economic impacts of marine debris is relatively scarce. Some reports indicate the economic impacts of marine litter on coastal communities (Brink et al. 2009; Mouat et al. 2010). For example, UK municipalities spend approximately €18 million each year removing beach litter; a 37% increase in cost over the past 10 years. Similarly, removing beach litter costs municipalities in the Netherlands and Belgium approximately €10.4 million per year. One of the major economic issues driving the need for clean-up operations is the aesthetic impact on tourist beaches.

The direct costs to the fishing industry are also important, including: loss of fish stocks due to ghost fishing ; spoiled catches through contamination with debris, but also with paint and oil; damage to nets and to propellers, entangled in litter, resulting in lost operating time and time spent cleaning nets.

Given that the coasts and oceans provide food and tourism opportunities, aesthetic, economic and environmental issues caused by marine debris can have wider social impacts, especially where the livelihood and health of local coastal communities are affected (Tinch et al. 2012).

In particular, marine debris can affect human health and safety (Brink et al. 2009; Mouat et al. 2010):

- Solid waste associated with sewage such as sanitary towels, condoms and cotton buds, degrades the quality of the bathing water and may present a health risk;
- Hazardous materials such as medical wastes, syringes, glass and other sharp and/or dangerous (munitions) items that are washed-up on beaches result in direct risks to beachgoers. Swimmers, divers and snorkelers can become entangled in submerged or floating debris;
- Contamination of food is a concern where commercially important fish and shellfish have ingested (micro) plastics. At present however, there is no evidence of an associated risk for human health;
- Entanglement of propellers and other direct damage to vessels has resulted in a substantial number of marine rescues: marine litter therefore also presents a safety issue for mariners.

2.2 Sources, Amounts, Composition and Monitoring of Marine Litter in European Waters

This section describes the present knowledge base regarding marine litter in European waters, i.e. drawing on the most actual literature sources and project reports (both peer-reviewed and not peer-reviewed, long and short term (snapshot) data series) to present the current knowledge of amounts and composition of marine litter, as well as the most probable (and most important) sources.

Most relevant sources and studies describe amounts of marine litter in terms of "number of items", as most data stems from monitoring beach litter. Volumes (in kg or m^3) are also stated in some studies, although rarely. This is relevant, since the "number of items" (and resulting percentages regarding most prevalent marine litter types) do not necessarily reflect the importance of the items in terms of impacts. Additionally, all monitoring results depend very much on the specific circumstances prevailing on the day of the survey (i.e. weather condition including wind direction, timing of the last survey or cleaning event etc.) and in the area (i.e. currents, distance to sources etc.), making data aggregation and up-scaling difficult. The following section therefore reflects the current knowledge as well as the most significant data gaps. Whereas most of the significant data gaps apply in general and to all regional seas, a list of top gaps for each regional sea have been prepared and are listed in the respective regional section. Hence, the conclusions drawn from the range of results should be seen as being indicative for the major sources of marine litter in the respective region.

The data presented in this section mostly reflects the regional focus of the conference, i.e. sub-regional data is only included in cases where no other data was available, or in cases where the study/survey explicitly mentions the possibilities for up-scaling the results.

Sources of marine litter are categorized according to the OSPAR Pilot Project on Monitoring Marine Beach Litter (OSPAR 2007), where indicator items were identified and used for the following sources:

- Fishing, including aquaculture.
- Galley waste (non-operational waste from shipping, fisheries and offshore activities).
- Sanitary waste/Sewage-related waste.
- Shipping, including offshore activities (operational waste).
- Tourism and recreational activities.

In studies or surveys where different source categories where used, an explanation is included.

2.2.1 North-East Atlantic

To compile the following information, the OSPAR Checklist (see Annex III) was used as a starting point for the identification of sources of marine litter to look at. Source descriptions were elaborated upon by examining available literature (especially regarding amounts, composition and materials).

Amounts: Beach litter is assessed on a regular basis in the NE Atlantic region, due to well-organized and intensive monitoring activities on reference beaches (in principle: non-tourist beaches) since 1998. On an average, 712 items/100m stretch of beach were recorded (OSPAR 2010). However, due to changing circumstances, marine litter concentrations vary. Generally, there are higher concentrations of beach litter in the northern than in the southern regions (OSPAR 2007, 2009; OSPAR 2010).

There is less information on litter on the sea floor: the amounts vary greatly, from 1-193 items/km² in the North Sea (UNEP 2009) to 0-101.000 items/km² (Galgani et al. 2000), as current and sea floor topography strongly influence the dispersal and accumulation of sea floor litter. Various national "Fishing for Litter" activities also resulted in data on sea floor litter, but the data is regarded as of local importance (JRC IES 2011), although impressive: 190 fishing vessels from the Fishing for Litter programs in the North Sea and Celtic Sea areas remove hundreds of tons of litter from the seafloor every year.

Surveys in Belgian waters using a neuston net (which "catches" small particles as well) found 3.9 items/km² (Claessens et al. 2012), whereas the Ökoinstitut (2012) states an amount of 150-2.400 small items/m³ for floating litter in the North Sea. OSPAR´s EcoQO Fulmar Monitoring reports trends of marine litter composition found in the stomachs of dead Northern Fulmars (less industrial plastics in the last decade, but increased amounts of consumer waste; slightly decreasing trend in the southern North Sea, slightly increasing trend in northern regions; see below for additional information).

Material: The available data clearly demonstrates a predominance of plastic marine litter on beaches, with an average of 65-75% of items found, up to 95% on beaches in France (ARCADIS 2013a; OSPAR 2007, 2009; UNEP 2009; Fleet 2003, 2009); on the sea floor, the percentage of plastics exceed 50% of items (European Commission/JRC 2010; Save the North Sea 2004). The Fulmar monitoring suggests the English Channel as the region with the highest proportion/abundance of plastics in the amount of floating litter (Franeker et al. 2011) - on average, 60% of the Fulmars have more than the level set for the EcoQO.

Items: Regarding items found in surveys on beaches, data varies as well, although two groups of items are predominant in all surveys –rope/nets/cords on the one hand, and on the other hand packaging materials and small (<50cm) pieces of plastic, including plastic bags, plastic bottles and caps/lids; in various proportions, these two groups of items are always predominant - in ARCADIS 2013 (plastic pieces, packaging material and caps/lids combined represent the most prominent group, followed by ropes; upcoming elements: plastic pellets, balloons, cigarette butts and fireworks debris), Öko-Institut 2012/UNEP 2009 (plastic pieces, packaging material and caps/lids 31%, rope/nets 16%) and OSPAR 2007, 2009 (rope/nets 30%, packaging items 28%); there is few data on (micro)plastic pellets, but they are present; there is an equal amount of short-life single use items as long lasting products.

Sources: The items found most often indicate maritime activities[2] and coastal recreational and tourism activities as the predominant sources of marine litter in the NE Atlantic. Accordingly, all surveys and literature sources place these two on top of the list: in ARCADIS (2013a) based on a case study supported by a single survey nearby the harbor of Oostende, each source accounts for around 40% of marine litter; in UNEP 2009 and OSPAR 2007, 2009, coastal recreational and tourism activities are held accountable for 35%, and maritime activities for 16%; without providing concrete figures, Fleet (2003, 2009) indicates maritime activities as the single most important source of marine litter in the North Sea. Cefas benthic marine litter data support the suggestion that around 50 % of litter in the North Sea originates from maritime activities which are mainly related to the fishing sector (Cefas 2012). Although figures vary slightly, it has to be stated that both sectors/activities account for approximately 30-40% of the marine litter items found in the overall region (this number is even higher in parts of the North Sea; marine industries are a much more prevalent source in the NE Atlantic than in the other three regional seas). Household-related/municipal solid waste accounts for approximately 7-10% of litter items found (ARCADIS 2013a, UNEP 2009).

Other sources to be considered are discharge of untreated municipal sewage, including storm water (including seasonal overflows), riverine transport of waste from landfills or other sources along rivers and other inland waterways (canals), industrial facilities, solid waste from landfills, and untreated waste water and municipal landfills (waste dumps) located at the coast (land-based).

Main data gaps:

- amounts and consistency/composition and transport, origin and environmental impacts of marine litter on the sea floor and in the water column/floating litter.
- amounts, sources and environmental impacts of micro-particles.
- quantitative information on socio-economic impacts of marine litter, especially regarding socio-economic benefits provided by the marine environment (tourism/recreation, provision of food and products, etc.).
- input from rivers.
- environmental impacts of marine litter in the ecosystem and population levels.

[2] Fishing vessels; merchant shipping, ferries and cruise liners; pleasure crafts; offshore oil and installations; fish farm installations.

Source (Literature)	Items/Consistency (beaches; top five)	Type of material	Sources	Amounts (kg and/or items per area)
ARCADIS (2013a; (Oostende/ North Sea)	Rope (407 items) Plastic/polystyrene pieces >2,5cm (264 items) Caps/lids (184 items) Crisp/sweets packets and lolly sticks (84 items) Construction materials (83 items) Others (723 items)	Beaches: Plastics: 76%	Marine activities (combined): 40% Recreational & tourism activities (combined; land- and sea-based): 40% →Coastal/beach tourism: 26,2% Fishing: 11,9% Recreational boating: 10% Household-related waste: 10% Shipping: 9,8% Ports: 8% Other maritime industries: 7,6%	
Claessens et al. (2012) (Belgium)				Floating Litter: 3.9 items/km² (neuston net, i.e. including small particles)
Öko-Institut (2012; figures mainly from UNEP 2009; MSC 2007)	Cigarette butts/filters: 16% Food package: 12,7% Caps/lids: 12,4% Rope: 8,1% Nets: 8,0% Others: 16,6%	Beaches: Plastics: 76,7% Sanitary: 4,5% Wood: 4,9% Paper/cardboard: 3,8%	Shoreline/recreational activities: 35% Ocean/waterways activities: 14% Dumping (land): 7% Dumping (sea): 2% Non-sourced: 42%	Data for the North Sea Beach: 10 - 345kg/100m; 200-3.073 items/100m Floating Litter: 150-2.400 items/m³ Litter on the sea floor: 1-193 items/km²
Fleet (2003; Wadden Sea, 1991 - 2002), Fleet (2009)		Beaches: Plastics: 60%	Main source: Shipping, fisheries and offshore installations (German and Dutch beaches) (cited in Öko-Institut 2012; no figures)	
OSPAR Beach Litter Monitoring (OSPAR 2007, 2009)	Rope/nets: 30% Packaging items: 28%	Beaches: Plastics: 44-95% (Northern North Sea: 80%; France: 95%)		Beach: 542 items/100m -->more in the northern regions than in southern regions.
UNEP (2009; basically a summary of OSPAR 2007 and 2009; MSC 2007)	Plastic/polystyrene pieces <50cm: ca. 90.000 items Rope/cord/nets <50cm: ca. 45.000 items Cotton bud sticks: ca. 20.000 Plastic caps/lids: ca. 20.000 Crisp/sweets packets and lolly sticks: ca. 15.000	Beaches: Plastics/polystyrene: 75% Sanitary: 7,4% Paper/cardboard: 4,4%	Shoreline/recreational activities: 35% Ocean/waterways activities: 14% Dumping (land): 7% Dumping (sea): 2% Non-sourced: 42%	
Galgani et al. (2000)				Seabed litter: 0-101.000 items/km²

Save the North Sea (2004)		Sea floor Plastics: 38-55% Metal: 13-23% Rubber: 9-25% Wood: 10-11%		
JRC IES 2010		Seafloor: >50% plastics		
JRC IES 2011		Beach: 75,3% plastics/polystyrene		
OSPAR (2010)		Beaches: 65% plastics		Beaches: 712 items/100m on average
Cefas (2012)			50% maritime activities, mostly fisheries.	

Table 2.1: Amounts, composition and sources of marine litter in the North-East Atlantic

2.2.2 Black Sea

Amounts: There is very limited data on amounts of marine litter in the Black Sea. The surveys performed yet are restricted to very local conditions, and no aggregated information is available. In UNEP (2009), some of the results of these local surveys are presented, stating that vessel-based transect surveys found between 6.6 and 65.7 items/km² of floating litter, and beach surveys in Turkey recorded between 60 and 1.400 kg litter per km (average 385 kg/km), and between 0.085 to 5.058 items per m^2 (Topcu et al. 2012).

Materials: Similar data situation applies to the main materials found, with ARCADIS (2013b) being an exception by stating that their results from the Constanta case study (65% of items found were made of plastics) are indicative for the whole Black Sea region. Topcu/Öztürk (2010) and Topcu et al. (2012) state that artificial materials are predominant on Turkish beaches.

Items: Only three sources refer to the main items found in the Black Sea region, but the results are coherent: disposable packaging and short life or single use plastic goods (i.e. bottles, bags, crisp/sweets packaging, cans, caps/lids) are predominant (UNEP 2009, ARCADIS 2013b; Topcu et al. 2012).

Sources: Local surveys and studies (BSC 2007, UNEP 2009, Topcu et al. 2012) state municipal waste/sewage and badly managed landfills as the most important source of marine litter, followed by marine transport and ports and recreational activities in coastal areas (Topcu et al.2012 found only a small share of litter originating from tourism/recreation); IUU fishing activities are also mentioned to be important, and due to a general lack of data, the importance of transboundary and riverine sources is unknown. Contrary, ARCADIS 2013b concluded from the items found at beaches near Constanta that recreational and tourism activities (both land- and sea-based) represent the most important source, with a huge amount of litter originating from recreational fishing (45%), followed by household and sanitary sources. In ARCADIS 2013b, there is no indication that shipping/ports are a major source (only 8%).

Main data gaps:

- amounts and composition of marine litter in the whole regional sea/data which can be used to aggregate/scale-up to the RSC level.
- IUU fishing activities and their importance for marine litter generation.
- maritime activities and their importance for marine litter generation (information is not coherent here).
- importance of riverine and transboundary sources.
- clarification of the importance of recreational fishing for marine litter generation (the ARCADIS-Study states a share of 45% of litter generation).
- socio-economic impacts (costs) of marine litter.

Source (Literature)	Items/Consistency (beaches; top five)	Type of material	Sources	Amounts (kg and/or items per area)
ARCADIS (2013b; Constanta/ Black Sea)	Packaging (combined): 70% Packaging (consumer goods combined): 48% Drinking bottles (594 items) Crisp/sweets/chips packaging (583 items) Plastic/polystyrene pieces >2,5cm (393 items) Drink cans (310 items) Caps/lids (295 items) Others (1.066 items)	Beaches: Plastics: 65%	Recreational & tourism activities (combined; land-based and sea-based): 59% Households (combined: including sanitary waste, waste collection & transport; landfills): 28% Recreational fishing: 45,6% General household: 19,8% Recreational boating: 10% Dumpsites/landfills: 5,2% Professional marine activities: 8% Coastal/beach tourism: 2,9%	
UNEP (2009) and Black Sea Commission (2007), cited in ARCADIS (2013)			1. Municipal waste/sewage (household waste) 2. Marine transport and ports (shipping waste) 3. Recreation activities in coastal area (litter produced by local population and tourists) 4. River run-off	
UNEP (2009)	Experts: 1. Plastic wares (bottles, bags, etc.) 2. Paper and carton (including various packaging materials and cigarette butts) 3. Food wastes 4. Metal objects (tins and cans, scrap metal) 5. Rubber goods (including old tires)		Primary sources of marine litter ranked according to the experts' scores: 1. Municipal garbage/sewage (household waste) 2. Marine transport and ports (shipping waste) 3. Recreation activities in coastal area (litter produced by local population and tourists) 4. River run-off	Data very localized, no summary. Floating litter: 6,6 and 65,7 pieces/km^2 in the Ukrainian Black Sea and Kerch Strait; vessel-based transect surveys. Beach litter (Turkey): from 58,4 kg/km to 1.395,1 kg/km (average 385, 7 kg/km).
Topcu et al. (2012) and Topcu/Öztürk (2010)	Unidentifiable (eroded) items: 52% Identifiable litter: beverage packaging (19%), foam/sponge particles (9%), ropes (5%) and nylon packaging (4%) (bags, food wrappings, etc.).	62.7% hard plastic, 15.8% soft plastic, 4.4% synthetic fibers, 4.3% Styrofoam, 3.9% polyurethane.	1. Land-based litter (no specification) 2. Shipping Recreation and fisheries have only a small share (2% and 0,5%, respectively).	0.085 to 5.058 items per m^2

Table 2.2: Amounts, composition and sources of marine litter in the Black Sea

2.2.3 Baltic Sea

Amounts: The data situation in the Baltic Sea regarding marine litter is good, although no region-wide, harmonized and statistically-based monitoring has been carried out (common guidelines exist - HELCOM Recommendation 29/2 - but are not applied region-wide). As such, however, the data is difficult to compare, and the figures vary widely. As regards beach litter, the survey in the MARLIN project (2013) provided comparable results for beached litter in Estonia (88 items/100m), Latvia (111 items/100 m), Finland (227 items /100 m) and Sweden (100 items/100m). The high amount of litter in Finland was notable and this was also noted in the specific survey of cigarette buds (16 m-2, compared to <1 m-2 in the other countries). The result from Finland is similar to the survey two decades ago by Tuomisto (1994): 260 items/100m. In addition, HELCOM (2007) reported an average number of 20 items/100m, reaching up to over 1000 items; other sources report 6-16 items/100m stretch (UNEP 2009; HELCOM 2009), 4-1.200 items/100m (UNEP 2009, Ocean Conservancy/ICC 2002-2006), and up to 700-1.200 items/100m near sources (HELCOM 2009). Only two sources state figures for litter on the sea floor (Ocean Conservancy/ICC 2002-2006: 44-208 items/km²) and floating litter (Galgani et al. 2000: 1,26 +/- 0,82 items/ha). The amount of micro-particles in water column has been surveyed in Sweden by Noren and Magnusson (2010) and KIMO (2007) and in Finland by Setälä et al. (unpublished). In Sweden, the concentrations ranged from 340 to 14620 >10 µm fibres m-3 (2.8 fibers of >300 µm per m3 in average) and from 760 to 104.780 non-fibres m-3 of the same size (2.5 non-fibers of >300 µm per m3 in average). In Finland, the recent survey in 2012 found similar concentrations of fibres and "other particles". Of the Swedish micro-particles, 23% were plastic and the majority of organic material (Noren/Magnusson 2010, Kinell et al. 2012).

Materials: With regard to material found, the sources are very consistent (see table below), indicating a share of plastics in the marine litter found in the Baltic Sea of 50-60% (both in terms of items and weight, if stated). The recent surveys in Estonia, Finland, Latvia and Sweden have shown that plastics are the main material on the beaches (56%), followed by glass and ceramics (11%), paper and cardboard (9%), metal (7%) and foamed plastic (6%) (MARLIN project 2013).

Items: Surveys on the sea floor found 36% plastic bottles (Galgani et al. 2000), but most data is available for beaches; here, however, the information varies: plastic bottles seem to be a prevalent item in the WWF Naturewatch Baltic surveys (WWF 1998-2005; around 30-40% of all items found), whereas in other surveys, the figures are considerable lower (6,5% in Ocean Conservancy/ICC 2002-2006; not even listed as a separate category in ARCADIS 2013c); cigarette butts, on the other hand, account for 37,4% in the ICC surveys, and were the fifth most item found in ARCADIS (2013c); in the latter report, cotton bud sticks were the most prominent item gathered, although participating stakeholders expressed the notion that this high amount might be due to an exceptional event (i.e. leakage through sewerage system, cargo loss). Generally, however, it can be stated that discarded short-life or single use goods are the main constituent of marine litter in the Baltic (mostly sanitary and household-related waste, as well as bottles, food and snack packaging and cigarette butts). The number of discarded or lost fishing nets ("ghost nets") has recently been assessed in a WWF Poland study (2011), estimating that in 2005 – 2008 the number of lost cod gillnets amounted from 5500 to 10000 annually; in this case, however, data to set this number in relation to other regional seas or other litter items is not available. Nevertheless, fishing nets and micro-particles (fibers and remnants of car tires) are assumed to be important groups of marine litter (HELCOM 2013).

Sources: The items found indicate consumer sources as the most important source of marine litter in the Baltic Sea; the literature states a high share of household-related waste (ARCADIS 2013c; 48%, including sanitary waste) and waste generated by recreational/tourism activities (mostly land-based: ARCADIS 2013c 33%, Ocean Conservancy/ICC 58%; and without providing figures, UNEP 2009 and HELCOM GEAR 2012 state that shoreline activities and recreational activities on beaches and rivers are the most important sources of marine litter in the Baltic Sea). Litter from industrial or maritime sources is less important than in the NE Atlantic, with the probable exception of the fishing industry (HELCOM 2013). The role of commercial shipping decreased during the last decades possibly due to relatively good availability of port reception facilities. Unclear is the source of micro-particles, though the items (e.g. remnants of car tires) point to land-based road traffic as a major contributor.

Main data gaps:

- amounts and consistency/composition, and transport, origin and impacts of marine litter on the sea floor and in the water column (floating litter, micro-particles).
- the importance of sanitary wastes for marine litter generation.
- long-term trend information.
- transfer of toxic chemicals with micro-particles, and toxicity of marine litter.
- environmental impact of marine litter on the ecosystem level.
- socio-economic impact (cost) of marine litter.
- input pathways of marine litter, especially regarding micro-particles (role of cosmetics, textile fibres, ash and road traffic) and inputs from rivers.

Source (Literature)	Items/Consistency (beaches; top five)	Type of material (beaches, if not mentioned otherwise)	Sources	Amounts (kg and/or items per area)
ARCADIS 2013c; Riga/Baltic Sea)	Cotton bud sticks (294 items) Small plastic bags (i.e. freezer bags) (163 items) Crisp/sweets packets (142 items) Plastic/polystyrene pieces >2,5cm (135 items) Cigarette buds (104 items) Others (383 items)	Plastics: 51%	Households (combined: including sanitary waste, waste collection & transport): 48% Recreational & tourism activities (combined; land- and sea-based): 33% Sanitary/toilet sources: 29,1% Coastal/beach tourism: 24,5% General household: 12,5% Professional marine activities: 12% Waste collection/transport: 6,6% Recreational boating: 6,2%	
HELCOM GEAR 2012/HELCOM 2007				Beaches (on average): appr. 20 items/100m
Öko-Institut (2012; figures mainly from UNEP 2009; original data: Ocean Conservancy/ICC 2002-2006 and Coastwatch Estonia 1999 - 2006)	Cigarette butts/filters: 37,4% Caps/lids: 8,8% Food package: 7,7% Beverage bottles (plastic): 6,5% Beverage bottles (glass): 5,9% Others: 15,9%	Plastics: 56% (UNEP: 52%) Glass: 19% Metal: 16% Paper/Cardboard: 8%	Shoreline activities Recreation activities (on beaches/rivers)	Beach: 0,4 - 66kg/100m ; 4-1.200 items/100m Litter on the sea floor: 44-208 items/km²
Ocean Conservancy/ICC 2002-2006 (cited in UNEP 2009 and HELCOM GEAR 2012)			58% recreational and tourism activities	Beaches: 4-181 items/500m or 2-328 kg/500m
WWF (Naturewatch Baltic 1998 – 2005; cited in UNEP 2009, Öko-Institut 2012 and ARCADIS 2013c)	Plastic Bottles: 40% (UNEP: 31-43%) Glass bottles: 18% Cans: 14% Bags (paper and plastic): 10% (UNEP: 19-27%, only plastic)	Plastics (including plastic bags): 50-63%		ca. 30-50 items/500m coastline (figure found in UNEP 2009)
UNEP 2009 (a summary of the document: "Marine Litter in the Baltic Sea Region: Assessment and priorities for response: HELCOM, 2009)	See other fields.	See other fields.	Data not useful: only locally.	Near sources (i.e. shipping routes, public beaches, rivers): 700-1.200 items/100m coastline Other parts: 6-16 items/100m coastline

Tuomisto (1994; Finland; cited in UNEP 2009)		Plastics: 54%		Average: 11 kg (260 pieces)/100 m of coastline (from a minimum of 1 kg (21 pieces)/100m to a maximum of 45 kg (691 pieces)/100 m).
Galgani et al. (2000; cited in UNEP 2009)	Sea floor: plastic bottles (36%)			Floating Litter: 1,26 +/- 0,82 items/ha (trawling)
Keep Sweden Tidy (2012)		Plastics 55,8% Ceramics 10,8%		136,7 items >2,5cm/100m 0,8 cigarette butts/10m²
WWF Poland (2011)				5170 fishing nets lost in 2009.
MARLIN project (2013)		Finland only: Plastics 65% Paper/cardboard 11% Metal 10% Glass/ceramics 9% Wood 8%		Sweden: 100 /100m Finland: 227/100m Estonia: 88 /100m Latvia: 111 /100m
Noren (2010), Hav (2013)	Micro-particles	Organic 62% Plastic 23% Non-identified: 15%		Fibres (>10µm): 340-14640 m-3 Non-fibrous (>10µm): 760-104780 m-3

Table 2.3: Amounts, composition and sources of marine litter in the Baltic Sea

2.2.4 Mediterranean

Amounts: Data on amounts of marine litter (for all three types) in the Mediterranean is generally limited and shows great variations. Additionally, information is mostly restricted to the northern regions. For floating litter, data varies greatly, although an average of 2,1 items/km² has been reported (UNEP/MAP 2008). Other sources state amounts, but without a reference area (Öko-Institut 2012). For litter on the sea floor, the figures range from 0 to 8.500 items/km² (Öko-Institut 2012; UNEP 2009), and for beaches between 640 and 23.100 items/100m.

Materials: All sources report high amounts of plastics in floating and beach litter, as well as in litter on the sea floor. On beaches, percentages range from 37-83% (UNEP 2009; ARCADIS 2013d; JRC IES 2011). The Barcelona Provincial Government (cited in ARCADIS 2013d) reports 35% of beach litter to be plastic packaging (by weight; by volume, the figure increases to 80%). UNEP (2009) reports a similar share of plastics (60-83%) in floating litter, and in litter on the sea floor (36-90%).

Items: Three categories of items seem to be most prominent on the beaches in the northern part of the Mediterranean - sanitary items (mostly cotton bud sticks: foremost item found in ARCADIS 2013d), cigarette butts and cigar tips (29-37% of items found; Öko-Institut 2012, UNEP 2009 and UNEP/MAP 2008), as well as packaging items and bottles (third category in ARCADIS 2013d, around 20-25% in Öko-Institut 2012, UNEP 2009 and UNEP/MAP 2008). Fishing gears and traps are considered to be of importance as well (UNEP/MAP 2013).

Sources: Items found indicate a predominance of land-based litter, stemming mostly from recreational/tourism activities (40% in ARCADIS 2013d, >50% in Öko-Institut 2012 and Ocean Conservancy/ICC 2002-2006). Household-related waste, including sanitary waste, is also of great relevance (40% in ARCADIS 2013d); the amount of litter originating from recreational/tourism activities greatly increases during the tourism season. Smoking in general seems to be a significant problem in the Mediterranean, as several surveys suggest (UNEP 2009; UNEP/MAP 2008). Also, the fishing industry is of significance (UNEP/MAP 2013), as well as shipping (the latter especially off the African coast).

Main data gaps:

- amounts and composition, and transport, origin and impacts of marine litter on the sea floor (especially in the deep sea) and in the water column (floating litter).
- impacts and amounts of micro-particles.
- socio-economic impacts of marine litter.
- amounts and impact of abandoned/lost fishing gear.
- importance of shipping activities for the generation of marine litter.
- riverine inputs.

Source (Literature)	Items/Consistency (beaches; top five)	Type of material	Sources	Amounts (kg and/or items per area)
ARCADIS 2013d; Barcelona)	Cotton bud sticks (829 items) Plastic/polystyrene pieces >2,5cm (405 items) Crisp/sweets/chips packaging (317 items) Other sanitary items (225 items) Charcoal (201 items) Others (1027 items) Ports: 1: Crisp/sweets packets and lolly sticks 2: cigarette butts 3: cotton bud sticks	Beaches: Plastics: 50% (Plastic packaging on beaches by weight: 35%; by volume: 80%; Barcelona Provincial Government, cited in ARCADIS) Ports: 29% plastics, 22% wood, 21% organic matter	Recreational & tourism activities (combined; land- and sea-based): 40% Households (combined: including sanitary waste, waste collection & transport; landfills): 40% Coastal/beach tourism: 32,3% Toilet/sanitary: 26,2% General household: 11,2% Waste collection/transport: 6% Recreational boating: 5,6%	
Öko-Institut (2012; figures mainly from UNEP 2009)	Cigarette butts/filters: 29,1% Caps/lids: 6,7% Beverage cans: 6,3% Beverage bottles (glass): 5,5% Cigarette lighters: 5,2% Others: 26,2%	Beaches: 37-80% plastics Floating: 60-83% plastics Sea-floor: 36-90% plastics	Recreational/shoreline activities: >50% -->increase in tourism season	Beach: 1 - 314kg/100m (640-23100 items/100m) Litter on the sea floor: 7-47kg/km²; 0-8.500 items/km²
UNEP/MAP (2009; Data from ICC 2002-2006; cited in ARCADIS 2013d)	Cigarette butts/filters: 27% Cigar Tips: 10% Plastic bottles (2l or less): 9,8% Plastic bags: 8,5% Aluminium beverage cans: 7,6%			
UNEP 2009 (summary of the document "Marine litter in the Mediterranean Region" (UNEP/MAP 2008)	Cigarette butts/filters: 27% Cigar Tips: 10% Plastic bottles (2l or less): 9,8% Plastic bags: 8,5% Aluminium beverage cans: 7,6%	Floating: 83% plastics	Beach litter: Shoreline and recreational activities: 52% Smoking-related activities: 40% Ocean/waterways activities: 5%	Floating litter: average 2,1 items/km², varying greatly. In kg: 230,8 kg/km² ranging from 0,002 to 2.627 kg/km²
Ocean Conservancy/ICC 2002-2006 (cited in UNEP/MAP 2008)			Beach litter: Shoreline and recreational activities: 52% Smoking-related activities: 40% Ocean/waterways activities: 5%	
JRC IES (2011)		Beach: 83% plastics/polystyrene		

Table 2.4: Amounts, composition and sources of marine litter in the Mediterranean

2.2.5 Similarities and differences between the regional seas

Based on the sources listed in the tables above, key similarities and differences between the European regional seas regarding marine litter are as follows:

- The share of plastics in marine litter surveys is high in all European seas, clearly exceeding 50% in all regional seas, and in all marine compartments (sea floor, open water, coasts/beaches), making plastics the predominant fractions of marine litter materials.
- Various kinds of packaging materials - from plastic bottles via caps/lids and food wrappers to plastic bags - form an important part of marine litter items in all four regional seas.
- Micro-particles are not routinely covered in-depth my current monitoring techniques, their emergence in European waters is therefore not fully understood.
- On the European scale, recreational and tourism activities (mostly land-based) are the most important sources of marine litter.
- Land-based litter (including recreational and tourism-related waste) seems under control only in the NE Atlantic, whereas in parts of the Mediterranean, the Baltic and Black Seas, mismanagement of landfills, improper handling, illegal dumping and malfunctioning sewerage systems seem major sources of marine litter.
- Although an item found in great numbers in all regional seas, cigarette butts are very prominent in the Mediterranean, indicating smoking-related littering as a significant problem.
- Sea-based litter in not as important as land-based litter in all regional seas except the NE Atlantic, where maritime activities account for approximately 40% of marine litter.

2.3 Overall aims and principles for the reduction and management of marine litter

2.3.1 Guiding Principles of Marine Litter Prevention and Management

The prevention of marine litter necessitates the inclusion of a vast amount of activities, sectors and sources that cannot be addressed by a single measure. The following guiding principles provide an overarching umbrella structure which serves as a framework in guiding any marine litter measures.

The principle of prevention

The principle of prevention establishes that any marine pollution measure should primarily aim at addressing the prevention at the source. It is reflected in the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) and is applied in the framework of some regional seas agreements such as the Bucharest, Helsinki and OSPAR Conventions. Furthermore, the Treaty on the Functioning of the European Union (TFEU) establishes that preventive action should be taken in order to rectify environmental damage at the source[3]. Additionally, the fundamental role of the principle of prevention is acknowledged by the Honolulu Strategy. The significance of this principle regarding marine litter is that the removal of already introduced waste is very costly and labour intensive, especially compared with prevention measures.

The polluter-pays-principle

The polluter-pays-principle has a preventive function in that externalities from polluting activities should be borne by the polluter causing it. In this context, its application should aim at dissuading potential polluters from polluting in order to reduce (financial) consequences of their actions. The OSPAR, Helsinki, Bucharest and Barcelona Conventions[4] have committed to this principle as a guideline in implementing measures. The polluter-pays-principle is enshrined in the TFEU and is therefore a legally binding principle in EU law. The application of this principle is however limited by the difficulty in determining the polluter and also the extent of (environmental) damage.

The precautionary principle

The precautionary principle plays a particular role in marine litter regulation since it is based on the understanding that measures must not be postponed in the light of scientific uncertainties. The principle is reflected in several pertinent instruments such as the London Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other matters[5] and the OSPAR, Bucharest and Helsinki Conventions. Moreover, the application of the precautionary principle is a fundamental principle of environmental policy in the EU and has its legal basis in the TFEU[6]. The implementation of the MSFD should also be guided by the application of the precautionary principle[7]. The precautionary principle plays an important role in setting targets and addressing the

[3] Art. 191 (2) TFEU.
[4] Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean of 1995.
[5] In this context a "precautionary approach" shall be taken by the Contracting Parties to the London Protocol (Art. 3 (1) London Protocol).
[6] Art.191 (2) TFEU.
[7] Recitals 27 and 44 MSFD.

issue of micro-particles, despite an incomplete scientific knowledge on the specific sources and consequences of marine litter[8].

The ecosystem-based approach

The ecosystem-based approach has been confirmed by the Conference of the Parties to the Convention on Biological Diversity, the Johannesburg Plan of Implementation and also at the Rio+20 Conference. Notwithstanding the lack of definition of its inherent elements on an international level, the ecosystem-based approach has been commonly defined on a regional level by the Helsinki and the OSPAR Conventions. Consequently, both agreements have substantiated their understanding of the ecosystem-based approach as "*the comprehensive integrated management of human activities based on the best available scientific knowledge about the ecosystem and its dynamics, in order to identify and take action on influences which are critical to the health of marine ecosystems, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity*."[9] Thus, it can be understood as an approach to ensure that the collective pressures of human activities do not exceed the carrying capacity of the marine environment. The MSFD applies the ecosystem-based approach as a guiding principle in the management of marine ecosystems and prescribes it as a compulsory element in the development of marine strategies[10]. The ecosystem-based approach necessitates an integrated approach to the cumulative effects of marine litter with other contaminants and substances that are present in the marine environment.

The principle of public participation

The principle of public participation is an important aspect in creating awareness for the problem of marine litter and also ensures a sense of public ownership that is necessary in building support for removal and preventive measures. The MSFD obliges public consultation[11] and stresses the importance of stakeholder involvement, communication and raising public awareness as indispensable elements of the program of measures that are to be developed by 2015[12]. The Honolulu Strategy defines education and outreach as a cross-cutting strategy that supports the implementation and effectiveness of other strategies.

The principle of integration

The principle of integration is one of the core elements of sustainable development. It signifies that environmental considerations should be included in economic development so as to ensure environmentally sound management of human activities and rational use of resources. In the framework of the Barcelona Convention, this principle is enshrined as a central obligation in the Convention itself and also constitutes a key element of the Protocol on Integrated Coastal Zone Management in the Mediterranean. The principle of integration is as well substantiated in the TFEU in which "environmental protection requirements must be integrated into the definition and implementation of the Union´s policies and activities, in particular with a view to promoting

[8] JRC IES (2011).
[9] As defined during the first Joint Ministerial Meeting of the Helsinki and the OSPAR Commission in June 2003, Statement on the Ecosystem Approach to the Management of Human Activities: http://www.helcom.fi/stc/files/BremenDocs/JointEcosystemApproach.pdf.
[10] Art. 1 and 3 MSFD.
[11] Art.19 MSFD.
[12] Annex VI MSFD.

sustainable development[13]. Since marine litter sources include a vast range of economic activities, the principle of integration therefore serves as a guideline to continuously monitor the environmental impacts of economic development and to act and plan accordingly.

2.3.2. The relevance of Target Setting

Scoping the desired condition

Environmental targets, as specified in the MSFD, are a qualitative or quantitative statement on the desired condition of the different components of, and pressures and impacts on, marine waters. Targets are a centre piece of environmental policy and have the following relevance for the MSFD:

- To link the aim of achieving Good Environmental Status (GES) to the measures and effort needed to achieve GES.
- To measure progress towards achieving the objective by means of one (or more) associated indicator(s) and to assess the success or failure of measures to prevent marine litter from entering the seas.
- To draw the attention of policy-makers to the problem and provide the political impetus needed to set the EU on course to achieve the MSFD objective and fulfill the commitment made at Rio + 20.
- To act as an important driver for the implementation of the existing waste legislation, as well as for additional actions across relevant EU policies targeting other sectors which are also key sources of marine debris.
- To help raising stakeholder awareness (e.g. local authorities, fishermen, tourists, general public) of the marine litter problem and promote behavioral change.

Target setting typically undergoes an iterative process, starting from a conceptual understanding of the desired condition and the change that is required to achieve it. Examples of broad-based targets are: the "50% reduction target for nutrients inputs to the sea" by OSPAR; for marine litter, a "no deterioration target" (e.g. maintain or improve the 2012 level of marine litter); and a "trend-based target" (e.g. reduce the amount of litter transported by rivers, downward trend of the number of visible litter items on beaches). In the next step, conceptual targets need to become operational. For this purpose, targets need to be SMART (specific, measurable, achievable, realistic and time-bound) and are thus to be linked to existing or forthcoming monitored data respectively on the state, pressure or impact of marine litter on the marine and coastal ecosystem or to measures. Measures are to be implemented and the resulting change is to be monitored and evaluated. Measures can be linked to all the links of the chain from waste generation (on land or at sea) to final deployment of marine litter, targeting the sources (i.e. sectors), locations, and types of marine litter. An indicative list of characteristics to take into account for setting environmental targets is listed in Annex IV of the MSFD directive (2008/56/EC) and in Table 2.1.

[13] Art. 11 TFEU.

Table 2.1: Overview of potential aspects to set targets on marine litter

	Examples
Location of marine litter (MSFD indicators)	• Beach - washed ashore, or deposited through human activity (e.g. tourism) • Water column • Floating (water surface) • Sea bed • Marine life (plastic ingested, entanglements)
Composition/ Type	• Plastic bags • Cigarette butts • Caps/lids • Plastic bottles • Consumption packaging • Sanitary waste • Cotton buds • Ghost nets and abandoned traps • Micro-particles
Sources & pathways of marine litter	• Sewers and rivers • Beach and shoreline • Landfills • Ship-based litter
Sectors	• Fisheries • Recreation and Tourism • Waste producers
Measures	• Reduce urban waste production (the "4R" measures) • Improved waste collection of land-based sources/sectors • Improved collection of ship-based waste in the port reception facilities • Improved waste water treatment (mainly for Mediterranean) • Behavioural change (reduce consumer littering) • Inspection at sea • Reduce number of non-compliant landfills close to water bodies (for Black Sea)

An example of a SMART target is given for floating litter and seabed litter below, based on the formulation from the report of the Technical Subgroup on Marine litter (JRC IES 2011) (only a selection shown).

- Floating Litter: Overall reduction [XX %] in the number of litter items per square meter on nationally defined affected areas for surface litter by 2020.

- Seabed Litter: Overall reduction [XX %] in the number of litter items per square meter on the sea bed as measured by trawling, and by diving in selected shallow waters, from 2012 (as submitted in the initial assessments) levels by 2020.

<u>European Regional Seas</u>

Several initiatives at regional sea level have called for targets on marine litter:

- The Bergen statement (Ministerial meeting, 2010, under the OSPAR Convention) commits "to develop reduction measures and targets" for marine litter in the North-East Atlantic, "taking into consideration an ambitious target resulting in a reduction in 2020".

- Under the Helsinki Convention, initiatives have evolved to prevent illegal discharges of waste from ships in the Baltic Sea and providing for economic incentives to deliver waste, including garbage and marine litter caught in fishing nets, on shore. The 2007 Baltic Sea Action Plan encourages projects by local governments and communities to remove litter from the coastal and marine environment.
- The Regional Marine Litter Action Plan (2006) of the Black Sea Commission asks for the reduction of marine litter in the Black Sea region.
- The Barcelona Convention is currently implementing the strategic framework on marine litter and preparing a regional plan on marine litter management starting from the 1980 Protocol for the Protection of the Mediterranean Sea against pollution from land-based sources and its amendments in 1996.

Targets reported under Marine Strategy Framework Directive

The MSFD calls for targets to guide progress towards good environmental status; for marine litter, the qualitative descriptor for GES states that the "properties and quantities of marine litter do not cause harm to the coastal and marine environment". Commission Decision 2010/477/EC sets out four indicators for marine litter: on beach litter, water column (including floating litter and deposited on the sea bed), micro-particles, and marine litter ingested by marine life (e.g. stomach analysis of birds). Under the MSFD reporting obligation for Art. 8 (initial assessment), Art. 9 (GES) and Art. 10 (targets), 14 out 22 the Member States (MS) have reported qualitative reduction targets, similar to or further developed on the indicators in the Commission Decision. The majority of MS have between 2-6 targets.

Further target setting, beyond the Decision indicators, is reported by some Member States:

- 6 MS have reported a specific target “to reduce visible litter from beaches” based on the beach monitoring guidelines, from UNEP and OSPAR. Quantitative reduction targets have not been set.
- 3 MS in the OSPAR region have set a target on marine litter ingested by marine life, namely the OSPAR EcoQO indicator “Less than 10% of Fulmars (Fulmarus glacialis) have more than 0,1 gram of plastic in their stomachs”. A similar indicator is to be developed for the other regions. Sea turtles, lobster and cetaceans (whales, dolphins and porpoises) have preliminary been identified as potential indicator organisms by 3 MS.
- 4 MS set targets for the reduction of land- and sea-based waste sources, namely through a better waste collection from beach tourists, in coastal municipalities, no-special-fee system for the disposal of ship-generated waste and reduced inflows of litter from rivers and sewers.
- Marine litter in the water column, sea floor and micro-particles are addressed as part of an overall target. A target on floating litter is set by one MS, linked to the amount of litter fished up. One MS has set an indicator on the proportion of sampling grids with presence of floating litter and garbage density and one MS on the by-catch of waste by fisheries. In the latter two cases, neither MS have developed the indicator further into a target.
- One MS has set target to change social behavior and enhance the performance of waste management.
- A majority of Member States raised the need for more knowledge, especially with respect to sea bed monitoring (6 MS from North, Baltic and Mediterranean Sea), impact of marine litter

on habitats and species (2 MS in Mediterranean), and the water column/micro-particles (2 MS in Baltic).

7th Environment Action Programme (7th EAP)

Despite various activities underway and measures already in place, quantities of marine litter in the EU's seas continue to grow. In the absence of further action, the EU is unlikely to meet either the MSFD objective or reach the Rio+20 commitment. The first results of the MSFD assessment show a lack of coherence and differing level of ambition among Member States, including those sharing a common sea basin.

With a view to stimulating further reflection and action on marine litter and increasing awareness, the Commission proposes in its 7th EAP[14] to set an EU-wide quantitative reduction target for marine litter. The most appropriate, effective and feasible options will be analyzed in an impact assessment which would draw on the work carried out by the TSG Marine Litter, on Member States reporting on GES and targets under the MSFD, the results of the technical studies and research commissioned or funded by the Commission and other relevant sources of information.

Results of the discussions in Berlin

At the Berlin Conference, breakout groups discussed target setting. In general, the discussions supported the setting of an EU-wide target, although also concerns were raised. The following were felt as the key reasons cited in favour of a target:

- An EU-wide target presents a political commitment that can be a driver for action, as seen in other fields (the example of the OSPAR target for reducing nutrient inputs was cited).
- Marine litter crosses national boundaries; moreover, an EU-wide target supports a level-playing field among Member States and also among economic actors across the EU.
- An EU-wide target can also support cooperation and action in the four regional seas, including the EU's outreach and cooperation with non-EU countries, and moreover provides credibility for the EU in global forums, such as the Honolulu process.

The breakout groups also identified a range of concerns for target setting, along with possible ways to address them. For example, several concerns revolved around the need to set realistic and practical targets in the face of the complexity of the marine litter problem. Here, participants emphasised that any targets agreed should be SMART. A closely related concern is that further research is valuable on several aspects of the marine litter problem (for example, its persistence in the marine environment, as this will influence how quickly reductions in plastics entering the seas would yield improvements in good environmental status). Moreover, data availability varies across the EU, and thus for some locations, a baseline is not available at present. The discussions of these issues emphasised that data and research needs should not hold up initial target setting, though data and knowledge limitations should be acknowledged when designing targets.

Differences among the regional seas were noted. The discussions suggested that targets should also be set at regional sea level, in addition to an EU-wide target. In addition, some participants were concerned that a consensus-oriented process may lead to targets that are not ambitious. A number of suggestions addressed this concern – for example, higher targets could be set for the long term.

[14] COM (2012)710.

Another approach would be to provide some flexibility in the extent of reductions towards a common goal. For example, for a target to reduce the amount of litter per square metre of beach, Member States and possibly regional seas might have different quantitative goals. This could reflect their different starting points on this.

EU-wide information sharing on targets and methods for measuring them were highlighted as allowing Member States to share and use common methods, reducing costs and also strengthening the comparability of results.

The discussions brought forward a broad range of suggestions across the different categories of potential marine litter targets. The table 2.2 below provides examples of these suggestions.

Table 2.2: Selection of suggested targets for marine litter

Waste management

- (Increased) recycling at EU level
- (Improved) effectiveness of port reception facilities
- (Reduced) litter from sewage systems

Litter present in the environment

- 50% reduction of litter found in the environment
- % reduction in key litter types
- % reduction in litter impacts

Removal

- (Increased) litter amounts collected by fishing

Generation of marine litter: sources

- Reduction in the most important items of marine litter (e.g. top 10 found on beaches)
- Product targets: greater production of 'smart' products (i.e. those not leading to persistent litter) and the phasing out of 'bad' products
- Eliminate (micro) plastics from cosmetics
- Zero input from all sources

Generation of marine litter: changing behaviour

- Changing behaviour
- Qualitative targets for education
- 100% elimination of single-use plastic bags

Finally, the discussions raised several points regarding different types of targets. For example, several participants noted that targets on marine litter in the environment address the key issue, but raise several methodological challenges, including the need to identify a baseline in some Member States.

A few participants raised questions on methods, such as whether marine litter should be assessed in terms of the number of items or by volume.

The discussions noted that targets focused on sources and sectors may be easier to measure and also have a valuable feature in that they can be linked to measures and to targets and actions under other areas of EU legislation, such as waste management.

Conclusions

For target setting on marine litter, the following practices should be considered:

- The setting of an overall target at EU-level, with further targets at regional sea level should be based on common indicators. Using agreed methodological standards it should be readily measurable. A good example would be an indicator for beach litter based on a common monitoring approach, such as the protocols for beach litter surveys developed by OSPAR and UNEP.
- An overall EU-wide target, which can provide an overall framework and facilitate political commitments, could be linked to a set of operational targets perhaps set at regional sea level. These operational targets could address measures concerning key sources, sectors and types of marine litter.
- Setting targets on the performance of specific measures is a pragmatic solution in the absence of extensive data on marine litter in the environment. Good examples are measures that prevent the disposal and production of waste and garbage on land or at sea and incentives for more recycling and energy recovery.
- Targets to address changes in human behavior (e.g. awareness raising and outreach) and governance (e.g. more effective waste management, more collection of shipping at the port reception facilities) should also be considered.

3 Initiatives, Actions, Measures

The following section describes the framework for action to combat marine litter in the European marine waters, working its way down from the global via the European to the level of the regional seas and Regional Sea Conventions. National frameworks are excluded from this description, due to the international focus of the conference.

3.1 Global Frame and Initiatives

Principal sources: NRC 2008; UNEP 2009.

The **United Nations Convention on the Law of the Sea** (UNCLOS) is a UN convention aiming at the management of marine resources. It includes various provisions, ranging from territorial sea limits and economic and commercial activities via protection, conservation and research issues to binding procedures for settling legal disputes. UNCLOS sets out a legal framework within which all activities in the oceans and seas must be carried out.

Protection and preservation issues are addressed by Part XII of the Convention (Articles 192-237), centered around pollution prevention and control of sea- and land-based activities, as well as atmospheric pollution. Marine litter was specifically mentioned in the UN General Assembly (GA), which carries out annual reviews of the law of the sea (Resolutions), based on annual comprehensive reports prepared by the Secretary-General. The GA´s **Resolution A/RES/60/30 – Oceans and the Law of the Sea** (2005) , states:

"…The General Assembly…

65. Notes the lack of information and data on marine debris and encourages relevant national and international organisations to undertake further studies on the extent and nature of the problem, also encourages States to develop partnerships with industry and civil society to raise awareness of the extent of the impact of marine litter on the health and productivity of the marine environment and consequent economic loss;

66. Urges States to integrate the issue of marine debris within national strategies dealing with waste management in the coastal zone, ports and maritime industries, including recycling, reuse, reduction and disposal, and to encourage the development of appropriate economic incentives to address this issue including the development of cost recovery systems that provide an incentive to use port reception facilities and discourage ships from discharging marine debris at sea, and encourages States to cooperate regionally and subregionally to develop and implement joint prevention and recovery programs for marine debris;…"

The **International Convention for the Prevention of Marine Pollution from Ships**, as modified by the **Protocol of 1978** thereto (MARPOL 73/78), is the most important international agreement covering pollution of the marine environment by ships. It has six annexes, of which Annex V (a non-compulsory annex) specifically covers marine litter ('garbage'), which is defined as "*all kinds of food, domestic and operating waste, excluding fresh fish, generated during the normal operation of the vessel and liable to be disposed of continuously or periodically*".

Annex V contains regulations on types of garbage that are allowed or forbidden to be disposed, and specifications of the distances from the coast and the manner in which they may be disposed of. According to Annex V which was amended in July 2011, the disposal of all kinds of garbage, excluding under certain circumstances food waste, is strictly forbidden. Other obligations include a comprehensive documentation of all waste disposed of into the marine environment (Mouat et al. 2010).

As of October 2012, MARPOL Annex V has been ratified by 144 states, which cover 98.47% of the world's shipping tonnage. Despite these high figures, the impact of MARPOL Annex V is still quite limited (Dworak et al. 2011).

The **London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter** (1972) aims at the management of all sources of marine pollution, by preventing the dumping - the "*deliberate disposal at sea of wastes and other matter from vessels, aircraft and other structures, including the vessels themselves*" - of wastes at sea. The Convention strictly prohibits the dumping of certain items/materials (plastics and other non-biodegradable materials), whereas others require special permissions and are strictly controlled. It does not, however, extends to pipeline discharges from land or operational discharges from vessels or offshore installations.

The **Protocol to the London Convention** (1996; commonly referred to as the "London Protocol") updates the Convention by adhering more strictly to the precautionary principle (in the Protocol, the dumping of waste is generally forbidden, unless the item/material is explicitly approved, whereas the Convention "allows" the disposal of waste unless the item/material is explicitly forbidden). It is anticipated to permanently succeed the Convention (Mouat et al., 2010).

The **Basel Convention on the Transboundary Movements of Hazardous Wastes and their Disposal** (1994) aims at protecting environment and human health from the negative effects resulting from the "*generation, management, transboundary movements and disposal*" of hazardous wastes. The CPs are obliged to take all necessary steps to establish an "*environmentally sound management*" of such waste, to ensure that neither the environment nor human health are negatively affected.

Under the umbrella of **UNEP**, several programs and initiatives to combat marine litter are established. Among these, the **Regional Seas Program**, initiated in 1974, focuses on Regional Actions Plans for the management of a shared marine water body, cooperating closely with intergovernmental bodies and organizations such as the RSC (see below). The 1995 **Global Program of Action for the Protection of the Marine Environment from Land-Based Activities** (GPA) considers marine litter as one of nine "source categories", and formulates the target "*to reduce significantly the amount of litter reaching the marine and coastal environment by the prevention or reduction of the generation of solid waste and improvements in its management, including collection and recycling of litter*", by assisting states in taking actions within their respective policies, individually or jointly. In the context of the GPA, the **UNEP Global Initiative on Marine Litter**, established 2006, encourages partnerships, cooperation and coordination of activities for the control and sustainable management of marine litter. The main partners "include individual Regional Seas Conventions and Action Plans, government representatives, UN agencies, relevant bodies and organizations, donor agencies and organizations, the private sector and NGOs. Existing solutions could be tailored and replicated for specific regions, including innovative economic incentives to prevent litter and encourage cleanup, prevention and management of lost and abandoned fishing gear, harmonization

of monitoring and assessment systems and establishment of reception facilities marine garbage and waste" (UNEP 2009).

Important commitments have been made with regard to marine litter at the **Rio+20 conference**, stating in the outcome document - named "The future we want" - that "*the health of oceans and marine biodiversity are negatively affected by marine pollution, including marine debris, especially plastic, persistent organic pollutants, heavy metals, and nitrogen-based compounds, from a number of marine and land-based sources, including shipping and land runoff*". The participating states "*commit to take action to reduce the incidence and impacts of such pollution on marine ecosystems, including through the effective implementation of relevant conventions adopted in the framework of the International Maritime Organization (IMO), and the follow up of the relevant initiatives such as the [GPA], as well as the adoption of coordinated strategies to this end. We further commit to take action to, by 2025, based on collected scientific data, achieve significant reductions in marine debris to prevent harm to the coastal and marine environment*."

Furthermore, under the umbrella of UNEP´s Global Initiative on Marine Litter, the Fifth International Marine Debris Conference(2011), taking place in Honolulu, adopted the **Honolulu Strategy** (UNEP/NOAA 2011), which outlines three main goals and 12 commitments approved by a wide range of public and private stakeholders. The main goals are:

A: *Reduced amount and impact of land-based sources of marine debris introduced into the sea;*

B*: reduced amount and impact of sea-based sources of marine debris including solid waste, lost cargo, Abandoned, lost or otherwise discarded fishing gear (ALDFG), and abandoned vessels introduced into the sea;*

C*: reduced amount and impact of accumulated marine debris on shorelines, in benthic habitats, and in pelagic waters -*

Other important global frameworks and initiatives include:

- The **FAO Code of Conduct for Responsible Fisheries**.
- The **Agenda 21: The UN Program of Action** from Rio de Janeiro and the Johannesburg **Plan of Implementation**.
- The **Convention on Biological Diversity**, with the **Jakarta Mandate on the Conservation and Sustainable Use of Marine and Coastal Biological Diversity**.

3.2 European Framework and Initiatives

The European Commission in its Commission Staff Working Document SWD (2012) 365[15] published an overview of EU policies, legislation and initiatives related to marine litter, summarized below.

3.2.1 Legislation and policies addressing sources

There are a number of policies and legislation which aim at resource efficiency and waste prevention. Avoiding waste and using the remaining waste as a secondary resource will help to make Europe a 'resource efficient economy' which is one of the objectives of the Europe 2020 Strategy. Concrete

[15] SWD(2012)365 final of 31/10/2012.

actions are set out in the Roadmap to a Resource Efficient Europe. Contributing to marine litter strategies in all four EU marine regions is among these actions. Furthermore, a reduction in material usage during production manufacture will lead to a direct reduction in the amount of end-of-life material accumulating in the environment.

A communication on the bio-based economy for Europe encompasses, amongst others, the conversion of waste streams into value added products and it recognizes the need to provide to citizens more information about product properties and impacts of consumption patterns and life style. Moving to a bio-based economy may hold the potential of creating less waste that ends up in the marine environment and may increase the use of products with less lasting impacts on our oceans.

Given that in most sea regions, approximately 70 – 80 % of marine litter is estimated to come from land, marine litter is part of the broader problem of waste management. Plastics are a key component of marine litter, and most plastics are used for packaging. Thus, EU legislation in this area is important, and improving its implementation has a major potential to reduce the marine litter problem.

The Waste Frame Directive[16] sets out essential conditions for waste management and concerns all waste. Member States must establish waste prevention programmes by December 2013. The Packaging and Packaging Waste Directive[17] sets out a range of requirements to reduce the impact of packaging waste on the environment. It contains provisions on the prevention of packaging waste, on the re-use of packaging and on the recovery and recycling of packaging waste. Prevention of the production of packaging waste is the first priority. The Landfill Directive[18] establishes technical requirements for the operation of landfills, with the goal of reducing their impacts on the environment, including the pollution of surface water. This Directive requires, for example, that the location of landfill sites takes into account factors such as the proximity of water bodies and coastal waters and that wind-blown materials are minimized.

A Green Paper on an European Strategy on Plastic Waste in the Environment[19] was opened for public consultation recently. It aims to launch a broad reflection on possible responses to the challenges posed by plastic waste which are at present not specifically addresses in EU waste legislation. The follow-up to the Green Paper will be an integral part of the wider review of the waste legislation that will be completed in 2014. This review will look at the existing targets for waste recovery and landfill as well as an ex-post evaluation of five directives covering various waste streams.

Finally, the Urban Waste Water Treatment Directive[20] requires that all sewerage discharges serving populations over 10,000 in coastal areas and 2000 in estuarine areas must receive secondary treatment prior to discharge. Sewage related marine debris includes, among others, sanitary towels, tampons, plastic cotton wool bud sticks. In pre-treatment, relatively large elements are removed. Micro-plastics and fibers from cloth washing might pass the treatment plant. Also storm water overflows may be a significant source.

[16] Directive 2008/98/EC.
[17] Directive 94/62/EC.
[18] Directive 99/31/EC.
[19] COM(2013) 123 final of 7//3/2013.
[20] Directive 91/271/EEC.

The Port Reception Facilities Directive[21] is presently under review with a view to achieving the objective of 'zero discharge at sea' from ships calling at EU ports.

3.2.2 Legislation and policies addressing impacts

The EU's Marine Strategy Framework Directive (MSFD)[22] is a key element in Europe's actions to address marine litter. It is also the environmental pillar of the Integrated Maritime Policy (IMP). The Directive calls for the development and implementation of strategies by Member States so that all of the EU's marine regions and sub-regions attain 'Good Environmental Status' (GES) by 2020. GES is defined by means of eleven qualitative 'descriptors'. Descriptor 10 relates directly to marine litter: "Properties and quantities of marine litter do not cause harm to the coastal and marine environment".

To achieve GES, each Member State must progressively put in place its own Marine Strategy to protect the seas. By 15 July 2012, Member States had to make an initial assessment on the state of the marine environment and define 'Good Environmental Status' (GES) together with environmental targets and associated indicators. By 15 July 2014, they should have put a monitoring programme in place and by 2015, they should have their Marine Strategies in place.

On 1 September 2010, the European Commission adopted a Decision (2010/477/EU) outlining the criteria to be used by Member States in the context of the MSFD to assess the environmental status of their seas. The two criteria and four indicators relating to marine litter are:

10.1 Characteristics of litter in the marine and coastal environment

- Trends in the amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, where possible, source (10.1.1)
- Trends in the amount of litter in the water column (including floating at the surface) and deposited on the sea-floor, including analysis of its composition, spatial distribution and, where possible, source (10.1.2)
- Trends in the amount, distribution and, where possible, composition of micro-particles (in particular micro-plastics) (10.1.3)

10.2 Impacts of litter on marine life

- Trends in the amount and composition of litter ingested by marine animals (e.g. stomach analysis) (10.2.1).

The Technical Subgroup on Marine Litter (TSG ML) was established in 2010 to support Member States in harmonizing monitoring protocols and streamlining monitoring strategies across the EU. The TSG ML has developed an overview of existing data and methodologies for the monitoring of marine litter, as required by the MSFD. This 'Toolbox' of monitoring tools provides a first set of methodologies for application by the Member States for starting marine litter data collection. It underlined both the seriousness of the issue and the urgent need for further coordinated research to ensure a common approach to monitoring and mitigation. The group continues to work on, amongst

[21] Directive 91/271/EEC.
[22] Directive 2008/56/EC.

others, the standardization of monitoring, estimating the costs involved and assessing the harm done by marine litter.

The European Commission has finalized three studies to gather information, help implement the MSFD requirements on marine litter and further develop the policy framework for marine litter.

These studies complement the initiatives taken by the Commission to support more fundamental research funded under the 7th Research Framework Programme in order to increase the knowledge base on marine litter. The results of the three studies are available at the website[23] and used as input for the Conference.

Earlier in 2013 a pilot project was launched to identify best practices for litter removal. This project aims at establishing pilot projects in the four regional seas on litter removal, including lost fishing gear.

Finally, both the Water Framework Directive and the Bathing Water Directive contribute with its aims to the goal of the MSFD.

The Feasibility study on introducing instruments to prevent littering identifies best practices for the prevention of plastic litter as well as its clean-up, and assess the feasibility of options to prevent littering and increase public awareness. The Study on the largest loopholes within the flow of packaging material looked at the stages of the plastic packaging cycle where waste could become litter in the marine environment. It focused on Member States where the recycling of plastic packaging lags behind EU targets, as well as several third countries in the southern Mediterranean. The third study is entitled Pilot project - plastic recycling cycle and marine environmental impact - Case studies on the plastic cycle and its loopholes in the four European regional seas areas. Case studies are carried out in four marine regions to identify the types of marine litter and their possible sources.

3.2.3 Research and Awareness

In addition to the range of initiatives and projects directly aimed at reducing marine litter by supporting implementation and enforcement of policies and legal requirements, a number of initiatives and projects encouraging synergies and coordination, focusing on improving the knowledge base and raising awareness through information are underway in the EU. Annex 1 of the CSWD[24] provides information on some financing opportunities for funding projects addressing the issue of marine litter.

One of the key initiatives regarding seas and oceans in the 7th Research Framework Programme (FP7) is 'The Ocean of Tomorrow', which promotes a cross-cutting approach to marine and maritime research and in 2012 focused on research gaps in the definition and monitoring of the Good Environment Status (GES) of EU waters. Projects directly relevant for marine litter include the following:

- A project on the management and potential impacts of litter in the marine and coastal environment will provide estimates of the quantities of marine litter and develop

[23] http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/index_en.htm.
[24] SWD (2012)365 final.

descriptions of its composition and distribution, including the rates of fragmentation of micro-particles (CLEANSEA).

- A project on contaminants in seafood and their impact on public health will have marine litter, especially micro-particles, as one it of its components (ECsafeFOOD).
- A project will look at biotechnological solutions for the degradation of synthetic polymeric materials (BIOCLEAN).
- Another project will synthesize scientific knowledge to improve the understanding of GES, including the descriptor 10 on marine litter (STAGES).

Furthermore, the FP7 projects HERMIONE (Hotspot Ecosystem Research and Man's Impact On European Seas) and 'PERSEUS' (Policy-oriented marine environmental research for Southern European seas) have identified the problem of marine litter in respectively European deep-water ecosystems and the Southern European Seas, and will provide a clearer picture of the extent and severity of the problem as well as public campaigns in order to raise the attention to marine debris and coastal litter.

Specifically on marine litter, MARLISCO (MARine LItter in Europe Seas: Social Awareness and CO-Responsibility) is a Mobilization and Mutual Learning Action Plan, which aims to increase the awareness of the consequences of societal behavior in relation to waste production and the management of marine systems and to promote co-responsibility among different actors. MARLISCO engages 20 partners from 15 countries and is running from 2012 to 2015 and is financed by FP7.

3.3 Regional Sea Conventions - Frameworks and Initiatives

3.3.1 OSPAR

Principal sources: UNEP 2009; OSPAR 2013.

The *Convention for the Protection of the Marine Environment of the Northeast Atlantic* (the "OSPAR Convention") was opened for signature in September 1992 and came into force in March 1998, replacing the Oslo and Paris Conventions. The OSPAR Convention has been signed and ratified by all of the Contracting Parties to the original Oslo and/or Paris Conventions (Belgium, Denmark, the European Community, Finland, France, Germany, Iceland, Ireland, the Netherlands, Norway, Portugal, Spain, Sweden and the United Kingdom of Great Britain and Northern Ireland), as well as by Luxembourg and Switzerland. The OSPAR Commission was established along, to administer the Convention, and to foster policy development and cooperation between CPs.

OSPAR and OSPAR´s predecessors have a long history of addressing marine litter issues. Sweden first raised concerns in the early nineties that, due to North Sea currents, large amounts of litter were being deposited on the Swedish west coast. This concern and the lack of region-wide information on the amounts, trends and consistency of litter in the marine environment resulted in the establishment of a correspondence group in 1997, tasked with developing monitoring guidelines for beach litter in order to quantify the issue.

In order to assist in the development of these guidelines a pilot project was established under the lead of Sweden. This pilot project was the first region-wide attempt in Europe to develop a method for monitoring marine litter on beaches and to assess presence of marine litter on the beaches in the OSPAR region, using a standardised method (OSPAR 2010a). The former lack of such standardised

methods made it difficult to compare data from different regions and to make an overall assessment of marine litter pollution for the entire OSPAR region. A total of 614 regular beach surveys were conducted on 51 reference beaches in eight countries during the pilot project period[25].

As part of the development of the Ecological Quality Objectives (EcoQO) approach within OSPAR, in order to consider how ecosystem health could be assessed to determine the extent of human impacts, a EcoQO on plastic particles in Fulmars' stomachs was proposed in 2001. The EcoQO and associated monitoring was further developed through the EU-funded "Save the North Sea" project (2002-2004), which focused on marine litter. The EcoQO was included in the Quality Status Report (QSR; OSPAR 2010) and has been taken up by the EU Technical Subgroup on Marine Litter as a technique for monitoring of floating litter under the Marine Strategy Framework Directive (MSFD). Many of the Contracting Parties within the natural range of the Northern Fulmar have also adopted it as an indicator for MSFD purposes.

As well as developing monitoring methodologies OSPAR has also undertaken assessments of the state of marine litter pollution over the years through the QSRs 2000 and 2010 and their underlying assessments. The QSR 2000 identified marine litter as an issue but acknowledged the lack of information on the subject.

The background assessment for the QSR 2010 "Marine Litter in the Northeast Atlantic" (OSPAR 2010) was undertaken in conjunction with UNEP as part of their global assessment of marine litter and included the initial result of both the beach litter monitoring and the Fulmar EcoQO. The QSR 2010 highlighted that marine litter was a persistent problem and that additional efforts were needed to stop litter entering the marine environment both from sea-based and land-based sources.

OSPAR has also started the process of implementing measures to reduce marine litter with the adoption of Recommendation 2010/19 on the reduction of marine litter through the implementation of fishing for litter initiatives in 2010. The recommendation aimed to address two of the issues raised in the QSR 2010 by educating fishermen about the impact of litter and directly removing marine litter from the marine environment. The allow fishermen to bring ashore litter that they collect in their nets as part of their normal fishing activity and dispose of it on land at no additional coast. The recommendation was developed by KIMO International, a long standing observer at OSPAR, and the Netherlands, based upon Fishing for Litter schemes that KIMO had established in several countries.

Currently the activities on marine litter are coordinated through ICG - Marine Litter, which is co-convened by the Netherlands, Germany and Belgium. The group, which coordinates the beach litter monitoring program, also focuses on the implementation of the MSFD descriptor 10 on marine litter and has a strong cross over in membership with the EU Technical Subgroup. ICG ML is continuing to work on further development of the beach litter monitoring program in areas such as data handling,

[25] The method developed, and then used in fieldwork for conducting surveys of marine litter on beaches, followed a common standardised survey protocol for either a 100-metre or a 1-km stretch of beach. The protocol for 100-metre surveys included well over 100 different items of all sizes, whereas the protocol for 1-km surveys included about 20 mainly large items (>50 cm in any direction). In 2010 OSPAR adopted the "Guidelines for Monitoring Marine Litter on the Beaches in the OSPAR Maritime Area" which included the standardised methodology, data handling and photo guide. This guideline has since formed the basis of the advice from EU Technical Subgroup on Marine Litter for the monitoring of beach litter under the Marine Strategy Framework Directive (MSFD).

with the development of an online database, and statistical analysis of trends. A monitoring protocol for seabed litter is also being developed, taking into consideration work at the EU level, with the aim of finalizing monitoring guidelines this year. The group also works to coordinate research on areas such as micro-particles, indicator development and riverine input by sharing information on national research projects.

ICG ML is also considering the development of common measures. Over the last few years OSPAR has been examining the feasibility of developing a regional action plan approach to coordinate actions to deliver Good Environmental Status across the MSFD descriptors as well as implementing the North-East Atlantic Environment Strategy. Litter was chosen as a pilot project due to the existence of a dedicated group (ICG-ML) and the commitment in the North-East Atlantic Environment Strategy to "*develop appropriate programmes and measures to reduce amounts of litter in the marine environment and to stop litter entering the marine environment, both from sea-based and land-based sources*". These efforts resulted in a checklist (see Annex III) which is meant to be the OSPAR input to the conference capturing the main components that may need to be considered to prevent litter from causing harm in the North-East Atlantic. The strategies mentioned in the checklist can be developed further into a "Regional Action Plan on Marine Litter" after the conference. The Checklist basically points out the relevant sources and the marine compartments to be considered for removal activities. The Issue Paper concretizes on the recommended sources in the checklist based on available data and suggests first measures for the different strategies listed.

3.3.2 Black Sea Commission

Principal sources: BSC 2013; UNEP 2009.

The *Convention for the Protection of the Black Sea Against Pollution* (Bucharest Convention) was signed in 1992 by six Black Sea countries. The later established Commission on the Protection of the Black Sea Against Pollution (BSC) and its Permanent Secretariat assist CPs at implementing the provisions of the Bucharest Convention, and provide a mechanism for all the riparian states of the Black Sea to cooperate in the challenge of reducing pollution levels in this vulnerable regional sea. In 1996, the CPs adopted a Strategic Action Plan for the Protection and Rehabilitation of the Black Sea (BS SAP), which was amended in 2009.

So far there are no legal instruments dedicated specifically to the management of marine litter in the Black Sea marine and coastal environment, as the problem is neither widely accepted nor well known in the region. Nevertheless, the Bucharest Convention contains several Articles relevant to marine litter.[26] Additionally, three lists of hazardous substances and matter, which are annexed to the Convention and to the Protocols on Land-based Sources and on Dumping, include "*persistent*

[26] These are: Article VI on pollution by hazardous substances and matter; Article VII and the Protocol on the Protection of the Black Sea Marine Environment Against Pollution from Land-based Sources on pollution from land-based sources; Article VIII on pollution from vessels; Article IX and the Protocol on Cooperation in Combating Pollution of the Black Sea by Oil and Other Harmful Substances in Emergency Situations on pollution caused by emergency situations; Article X and the Protocol on the Protection of the Black Sea Marine Environment Against Pollution by Dumping on pollution by dumping; Article XI on pollution from activities on the continental shelf; Article XII on pollution from or through the atmosphere; and Article XIV on pollution by hazardous wastes in transboundary movement.

synthetic materials which may float, sink or remain in suspension" or, in other words, those materials which constitute plastic marine litter.

In this context, the new "Protocol on the Protection of the Marine Environment of the Black Sea from Land-Based Sources and Activities", which was agreed upon in 2009 (BSC 2009a), but which has not entered into force yet, is of great importance. Contrary to the Bucharest Convention, the Protocol includes a clear definition of marine litter (adopting the UNEP definition), and of point and diffuse sources of marine litter (and pollution in general).

In accordance with the (momentarily in force) Protocol on the Pollution from Land-based Sources:

- The Black Sea states should prevent, reduce and control pollution caused by discharges from any sources on their territories such as rivers, canals, coastal establishments, other artificial structures, outfalls or run-off, etc.;
- Each Black Sea state should also carry out "monitoring activities in order to assess the levels of pollution, its sources and ecological effects along its coasts", in particular, with regard to the hazardous substances and matter (e.g., persistent synthetic materials).

In 2005, the Regional Activity on Marine Litter, supported by UNEP, was launched. Main outputs of this activity, completed in mid-2007, were the documents "Marine Litter in the Black Sea Region: A Review of the Problem" and a "Draft Strategic Action Plan for Management and Abatement of Marine Litter in the Black Sea Region". The first report evaluated existing data, policies, activities, and institutional arrangements concerning marine litter in the Black Sea region and proposed several actions to deal with the problem, which eventually led to the adoption of a Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea, adopted in Sofia, Bulgaria in 2009.

This updated version of the original BS SAP (from 1996) describes the policy actions required to meet the major environmental challenges now facing the Sea, including marine litter, and presents a series of management targets.

It is also worth mentioning that during years 2005-2008 the two relevant Memorandums of Understanding (MoUs) between the BSC Permanent Secretariat and UNEP (Nairobi) were implemented. The expected outputs of the activities included the following:

- Report on Marine Litter in the Black Sea;
- Recommendation for updating the BS SAP;
- Recommendations on methodologies to be used;
- Recommendations for monitoring and assessment of marine litter in the Black Sea;
- Recommendations for increased public awareness on marine litter.

For the moment, the BSC prepares the First Report on the Implementation of the (amended) BS SAP (2009) and the "State of the Black Sea Environment"-Report which would also reflect the steps taken by CPs to combat marine litter in the Black Sea. There is an urgent need to work on the elaboration of the methodology for requirements of assessment and monitoring of marine litter specifically in the Black Sea and to develop the set of indicators for marine litter to be included in the Report.

The BSC considers the marine litter topic within the relevant Advisory Groups under the BSC´s umbrella, in particular the Advisory Group on Control of Pollution from Land Based Sources (LBS), the

Advisory Group on the Development of Common Methodologies for Integrated Coastal Zone Management (ICZM) and the Advisory Group on the Environmental Aspects of the Management of Fisheries and other Marine Living Resources (FOMLR).

The BSC Permanent Secretariat also interacts with its observers and various partners in the Black Sea region, including other Regional Seas Conventions and relevant international organizations. Being a partner or sub-contractor of a range of EU-funded projects, including relevant FP7 Projects, it has developed a wide network of contacts and experts in the Black Sea region and beyond (currently the Black Sea Commission is a member of the Advisory Board of MARLISCO Project and will be represented in its Advisory Board of the CLEANSEA Project).

Thus, the current situation regarding marine litter in the Black Sea can be summarized as follows:

- The actual levels of marine litter pollution are not adequately evaluated and monitored in the Black Sea riparian countries. There is an urgent need to amend the reporting templates of the LBS, ICZM, FOMLR as well as Pollution Monitoring and Assessment Advisory Group (PMA) to reflect the sources and amounts of marine litter on the national level.
- Refreshment of existing legal instruments regulating marine litter in the Black Sea is needed, including the amendments to the Bucharest Convention and its relevant satellite documents, as well as their enforcement.
- Some concrete legal instruments dedicated specifically to the management of the problem of marine litter in the Black Sea marine and coastal environment could be elaborated or ratified (i.e. guidelines, the new Protocol to the Bucharest Convention, Regional Action Plan on Marine Litter etc.).
- Unification of approaches between the Regional Sea Conventions and their Contracting Parties, launching of the marine litter public awareness campaign, implementation of new projects, initiatives and MoUs with partner organization on marine litter problem are also on the agenda.

3.3.3 HELCOM

Principal sources: UNEP 2009; HELCOM GEAR 2012.

The *Convention on the Protection of the Marine Environment of the Baltic Sea Area* (Helsinki Convention) was signed in 1974 by all riparian countries of the Baltic Sea. After the political changes in Europe, an updated version of the Convention was signed in 1992, again by all the states bordering on the Baltic Sea, and the European Community.

The Helsinki Commission (HELCOM) was established as the governing body of the Helsinki Convention, working to protect the marine environment of the Baltic Sea from all sources of pollution. The Commission has adopted Recommendations for the protection of the marine environment, which the governments of the Contracting Parties must act on in their respective national programs and legislation. Of these Recommendations, several are of direct and indirect importance to marine litter, and date back until 1989.[27]

[27] Recommendation 28E/10 (2007) “Application of the no-special-fee system to ship-generated wastes and marine litter caught in fishing nets in the Baltic Sea area”; Recommendation 24/5 (2003) “Proper handling of Waste/Landfilling”; Recommendation 23/1 (2002) “Notification of Ship's wastes”; Recommendation

Until recently, marine litter has not been seen as a major problem in the Baltic, as there have not been comprehensive studies on the topic and a lack of comparable and reliable data has been a significant obstacle to addressing marine litter issues in the region. The HELCOM marine litter project, co-funded by UNEP, (HELCOM 2007) was the first effort to study the scale of the problem in the region as a whole, assess the availability of information, and determine the actions needed in order to develop and implement a regional strategy for addressing marine litter. This assessment still represents the latest overview of marine litter in the Baltic Sea, but new information (e.g. MARLIN project 2013) is accumulating.

As the Baltic Sea supports a dense network of shipping traffic, HELCOM started very early addressing the problem of ship generated waste. Since the late 1980s, the Commission has been working to implement a comprehensive set of measures to reduce pollution by ship generated waste (known as the "Baltic Strategy for Port Reception Facilities for Ship Generated Wastes and Associated Issues"). The cornerstones of this strategy are adequate port reception facilities, mandatory delivery and efficient law enforcement, as well as the establishment of a “No-Special-Fee” system for delivery of ship-generated waste as well as.

The latter was encouraged by the Baltic Sea Action Plan, adopted in 2007, which recognized the need to act on marine litter, and which encouraged awareness raising and promoted the “No-Special-Fee” system for port reception facilities (which resulted in the HELCOM Recommendation 28E/10; see footnote above). Furthermore the Baltic Sea has obtained a Special Area status under Annex V to MARPOL 73/78 (see chapter 3.1 on the global legal framework).

The HELCOM Ministerial Declaration 2010 agreed “*to take further steps to be able to carry out national and coordinated monitoring of marine litter and identify sources of litter*” and “*to further investigate the potential harmful impacts to wildlife from microscopic plastic particles, an ingestion of which could lead to the transfer of toxic chemicals to the food chain*”. Two HELCOM projects, CORESET and HELCOM MORE, are momentarily dealing with indicators in the context of determination of GES for the marine environment (CORESET) and the revision of the HELCOM monitoring strategy and gap analysis (HELCOM MORE), respectively. Within this work it has been recognized that marine litter needs to be addressed as well. Recently, the issue of marine litter is increasingly addressed by several HELCOM Groups including HELCOM HABITAT and the HELCOM Fisheries and Environmental Forum regarding negative effects of lost fishing gear, HELCOM MONAS regarding monitoring issues, HELCOM GEAR considering a regional marine litter action plan, and HELCOM MARITIME with regard to shipping. It is envisaged that some results of the conference could be endorsed by the next HELCOM Conference of Ministers, to be possibly included in a future Regional Action Plan.

3.3.4 UNEP/MAP/Barcelona Convention

Principal sources: UNEP/MAP 2012; UNEP 2009.

In the Mediterranean, marine litter is an issue of concern since several decades. Already in 1980, a Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources

22/3 (2001) “Unified interpretations to ensure a harmonized and effective implementation of the strategy for port reception facilities for ship-generated wastes and associated issues”; Recommendation 10/5 (1989) “Guidelines for the Establishment of Adequate Reception Facilities in Ports”.

(LBS) was adopted, under the auspices of the Barcelona Convention. The Protocol explicitly recognized the importance of dealing with the problem of marine litter, and even contained a definition: In Annex I of the Protocol, marine litter is defined as "*persistent synthetic material which may float, sink or remain in suspension and which may interfere with any legitimate use of the sea*"[28]. The CPs to the Barcelona Convention adopted further protocols with direct or indirect implications for marine litter management.[29]

Furthermore, the Mediterranean was designated a Special Area for the purposes of Annex V of the MARPOL 73/78 Convention, and the Mediterranean coastal states presented a joint submission to the IMO's MEPC (in 2008), notifying that adequate reception facilities for garbage were provided in their respective ports. Additionally, from 2009 onwards, disposal into the Mediterranean Sea of the following items and materials is prohibited: all plastics, including but not limited to synthetic ropes, synthetic fishing nets and plastic garbage bags; and all other garbage, including paper products, rags, glass metal, bottles, crockery, dunnage, lining and packing materials.

In 1991 - as provided for in Article 5 of the LBS Protocol - the Contracting Parties adopted common measures to control pollution by persistent materials in the Mediterranean Sea, which encompass the necessary legislation and proper law enforcement, establishment of regular surveys and/or monitoring programs (including beach cleaning), the design and implementation of educational programs, encouraging the use of biodegradable synthetic materials and promoting research on the development of such materials.

A decade later, the Marine Pollution Assessment and Control Program of UNEP/MAP (MED POL) undertook a comprehensive assessment on the status of the management of coastal litter in the Mediterranean. The results of the assessment showed that the main sources of coastal litter in the region are run-off from rivers, tourist activities and coastal urban centers. This result indicates that inadequate coastal solid waste management is responsible for the presence of litter on beaches, floating on water or on the sea bed (benthic). The above mentioned results are in contradiction with the fact that almost all the Mediterranean countries have policies for the management of coastal solid waste. In fact, the problem is related to the enforcement of the policies which is, in general, very weak because of the poor coordination between different national and local administrations dealing with solid waste management issues and the inadequate infrastructure and understaffed services. However, perhaps the most important root problem is the absence of "proper" behavior by the population, due to a lack of awareness and environmental education.

In 2003, UNEP/MAP-WHO prepared the Guidelines for Management of Coastal Litter for the Mediterranean Region. These guidelines were prepared within the framework of the Strategic Action

[28] The amended LBS Protocol from 1996 that entered into force in 2008 defines litter as *any persistent manufactured or processed solid material which is discarded, disposed, or abandoned in the marine and coastal environment*.

[29] Protocols regarding: the prevention and elimination of pollution of the Mediterranean Sea by dumping from ships and aircraft or incineration at sea; Cooperation in preventing pollution from ships and, in cases of emergency, combating pollution of the Mediterranean Sea; Specially protected areas and biological diversity in the Mediterranean; Protection of the Mediterranean Sea against pollution resulting from exploration and exploitation of the continental shelf and the seabed and its subsoil; Prevention of pollution of the Mediterranean Sea by transboundary movements of hazardous wastes and their disposal; and Integrated Coastal Zone Management in the Mediterranean.

Program (SAP) to address pollution from land-based activities and are intended to help the responsible authorities, planners and field operators. The regional strategy for prevention of and response to marine pollution from ships - adopted by the CPs to the Barcelona Convention/Prevention and Emergency protocol - outlined several measures (till 2015) to be taken by the Mediterranean coastal states with regard to potential marine litter from seabed sources.

Following the implementation of the UNEP/MAP-WHO guidelines and the Global Marine Litter Initiative of UNEP/GPA of 2006, a new assessment on marine litter ("Results of the Assessment of the Status of Marine Litter in the Mediterranean", 2008), was prepared by MED POL/WHO to update the current status of the marine litter problem in the Mediterranean and better understand how marine litter is dealt with by the countries of the region. This assessment created the sound basis to prepare the "Strategic Framework for the Management of Marine Litter in the Mediterranean 2012-2020" that was submitted to and adopted by the 17th Contracting Parties meeting of the Barcelona Convention and its Protocols in Paris, France (in 2012). The overall goal of the adopted Strategic Framework is to ensure that marine and coastal litter do not adversely affect the coastal and marine environment and the impacts related to properties and quantities of marine litter in the marine and coastal environment are minimized, controlled and eliminated to the maximum extent practicable through regional and national activities.

The 1996 amendments to the 1980 LBS Protocol that provide for the "new" definition of marine litter entered into force on 11th May 2008.. This paved the way for the Contracting parties to develop pollution reduction programs and formulate legally binding measures and targets in order to eliminate land based pollution including marine litter. In the framework of implementing the LBS Protocol and the Regional Strategic Action Programme to combat pollution from land based sources , the Contracting Parties also prepared specific National Action Plans (NAPs) to combat pollution from land based sources and activities in which specific areas of intervention were identified and assessed the needed budget. Among the main priority areas (wastewater, industrial waste and solid waste), marine litter sources is implicitly included.

With the entering into force of the amendments to the LBS Protocol, the entry into force of the Integrated Coastal Zone Management in the Mediterranean (ICZM) Protocol and the coming into effect of the Mediterranean Sea as a Special Area (under MARPOL, Annex V), the 17th COP meeting felt the need to undertake stronger commitments towards the development and future adoption of a legally binding instrument (Regional Plan) which will include measures and timeframes for its implementation. Therefore, COP17 mandated UNEP/MAP MED POL to prepare in the years 2012-2013, in cooperation with the Contracting Parties and the relevant UNEP/MAP Regional Activity Centers, a Regional Plan on Marine Litter Management (including legally binding measures and timeframes).

With regard to marine litter, the 17th COP also adopted another important decision with regard to the objective for marine litter reduction: "Marine and coastal litter do not adversely affect coastal and marine environment". The marine litter ecological objective is one of the 11 ecological objectives adopted in the framework of the MAP ecosystem approach road map implementation in synergy with EU MSFD.

3.4 Spatial and temporal challenges when developing marine litter RAPs

Principal sources: European Commission/JRC 2010; JRC IES 2011; OSPAR 2012.

Marine litter - as an environmental problem - has several inherent characteristics that pose significant challenges to states/parties developing a Regional Action Plan. These characteristics have implications for establishing a sound data and knowledge base, and the baseline against which targets are measured, and for establishing and evaluating the targets themselves.

Establishing a data and knowledge base - monitoring

To develop (future) targets and measures/actions to reach these targets in the context of a RAP, data on amounts, consistency and trends is necessary, to be able to identify sources of marine litter which can be tackled by measures. Additionally, knowledge on impacts is needed, to prioritize measures targeting marine litter that is especially damaging or harmful. Such data can be obtained by developing (and realizing) coherent and comparable monitoring programs, assessing litter not at the sources, but in all compartments of the marine environment. Monitoring, however, faces several challenges:

- Any assessment of marine litter needs to consider short term variations regarding type and amount of litter found, caused by meteorological and/or hydrodynamic events and seasonal fluctuations (such as seasonal human activities, such as tourism). As these variations influence the conclusions drawn from marine litter assessments regarding sources and/or trends, they need to be taken into account when planning such monitoring schemes.
- Because some marine litter materials are very long-lived (persistent), monitoring schemes and surveys should be designed multiannually, to consider the long time scale of both accumulation and recovery processes.
- The aggregation of monitoring results obtained on the local scale to the sub-regional or even regional scale is different for the various parameters to be considered. Some monitoring results can be more easily applied at a regional scale (beach and floating litter surveys, socio-economic studies, studies on degradation processes using standard protocols, data on impacts on specific marine organisms), whereas others are difficult to aggregate (e.g. sea-floor monitoring, due to the low density of observations, or the OSPAR Fulmar Plastic EcoQO, since "fulmars are highly mobile and long-lived birds, and therefore their stomach contents represents input over a great spatial and temporal scale").

As such, the adequate spatial and temporal scale of potential monitoring programs needs to be considered carefully.

Target setting and evaluation

Setting targets to reduce the amounts and input of marine litter in(to) the marine environment, and evaluating these, is a crucial element of developing a Regional Action Plan. However, as such targets need to be based on monitoring data regarding amounts, trends, sources and impacts, the process of target setting also needs to take certain characteristics of marine litter into account:

- Due to the persistence of some marine litter materials, reduced inputs will possibly not lead to a measurable reduction of total litter levels in the marine environment on the short term.

Even with a complete stop of all litter input, the problem would still be existent for a long time. Targets should reflect this difficulty.

- However, amounts of intact floating litter (i.e. recently discarded litter) could be reduced in the short run through appropriate measures.
- Similarly, micro-particles are partly introduced directly (through cosmetic products and as a replacement for sand in sandblasting etc.), and further input of these particles can be avoided immediately through changes in the product designs.
- Regarding long-term trends of production and consumption, targets should consider expected future trends in application of plastic products, their impacts, and the effects of regulatory, technological, or social changes.
- To be able to evaluate the progress towards reaching the targets, the initial monitoring programs (see above) need to be continued with multiannual surveys, to be able to account for seasonal and spatial variations in litter accumulation etc.

4 Potentially effective measures to combat marine litter

In this section and related Annex I, existing "best practice" measures and initiatives to combat marine litter are presented, with the aim of demonstrating what concrete action is possible in some regional seas. The measures/actions presented are selected using the results of most recent projects on the issue, namely the ARCADIS "Pilot project '4 Seas'– plastic recycling cycle and marine environmental impact" (ARCADIS 2013), the RPA "Feasibility Study of introducing Instruments to prevent Littering" (RPA 2013) and the BiPRO "Study of the largest loopholes within the flow of packaging material" (BIPRO 2013). In these projects, measures were selected as best practice using various effectiveness and efficiency criteria. The measures identified by ARCADIS, BIPRO and RPA are available in the corresponding reports which can be downloaded at the bottom of the webpage: http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/index_en.htm .

First measures taken out of the reports mentioned above are listed in Annex I, stating the name of the measure/initiative, as well as providing a short description. In addition, more measures were included in Annex I from the ongoing "MARine Litter in European Seas: Social AwarenesS and CO-Responsibility" (MARLISCO) project. Contact information is provided to allow interested participants (countries and stakeholders alike) to get into contact with responsible authorities/stakeholders for mutual exchange of knowledge and ideas. Some contacts refer to the authors of the reports, who can provide more information, others (the ones included by MARLISCO and conference participants) refer to the stakeholder carrying out the measure itself. Participants are invited to complete the list by adding information and contact points and by uploading more measures/initiatives on the conference website, using the provided data bases for existing measures and new initiatives. For the final version of the Issue Paper Annex I will be finalized after the conference. "New" measures/initiatives - which were, for example, presented at the conference itself - are also collected and summarized in Annex II. The different possibilities for further contribution to the Issue Paper were explained in more detail at the conference.

5 The way ahead: Next steps towards establishing/implementing Action Plans

The following chapter aims at describing the way ahead towards developing or implementing a regional (or sub-regional) "Action Plan" (AP) to combat marine litter[30]. The geographical scope - i.e. the principal agent - of these AP will be the European regional seas for which the Regional Sea Conventions play a crucial role in coordinating Contracting Parties´ (CPs) efforts to improve marine protection. The chapter was developed in close exchange with the RSC and updated based on the results of the Berlin conference (especially the discussions that took place in the breakout session 2). It should enable and facilitate an open and constructive discussion in the regional seas of the issues surrounding possible reductions and prevention of further introduction of marine litter. Optimally, this discussion would lead to a common understanding and possible agreement between the CPs and relevant stakeholders regarding necessary next steps towards developing and/or implementing a regional (or sub-regional) Action Plan.

Based on the varying knowledge of amounts, sources and composition of marine litter in the different regional seas (as described in chapter 2 above), and on the current developments (such as the implementation process of the RAP within the Mediterranean, the OSPAR Checklist on Marine Litter, or the draft HELCOM Ministerial Declaration), this chapter develops - for each individual regional sea - a step-wise approach to reach common conclusions as to which next steps are most important for either establishing a new RAP, or implementing an existing one.

The steps are structured roughly according to the Policy Cycle - i.e. after determining the scope of the problem (Step 1), objectives are formulated (Step 2). Then, according to the scope of the problem, and the objectives set, measures are proposed (Step 3). In the final step, then, suggestions are made regarding the evaluation of the effectiveness of the measures (Step 4). The individual steps are explained below in more detail.

After each step, discussion points are listed that could represent the necessary "next steps" for the development or implementation of the (regional/sub-regional) AP. The points are open for further considerations, and were discussed at the Berlin conference which led to the results as outlined below. Within the regional breakout groups, participants - i.e. MS and other countries, stakeholders and RSC representatives - reached a common understanding about these "next steps", to "pave the road" for a regional/sub-regional AP. The outcomes of the discussion at the conference are summarized below the respective discussion points. In case changes or additions were proposed, these were integrated into the list of measures or targets.

The individual steps:

Step 1 consists of presenting the available information regarding amounts and sources of marine litter in the respective regional sea, and is basically a summary of the information listed in chapter 2 above. Participants were invited to add additional information/data, and to confirm the information, with the aim of creating a common knowledge base for further discussion.

[30] "Action Plan" is used here in a general sense, i.e. it is left open in which form or on which level such an AP is to be developed or implemented. Generally, an AP outlines what needs or can be done to address the marine litter problem. The respective Regional Seas Convention can take responsibility for a part of the AP.

Step 2 proposes a set of possible "operational targets", to reduce and prevent input of the most prevalent and/or threatening/damaging types of marine litter common in the respective region. Such targets should be set in a way that they can be linked to MSFD/Ecosystem Approach indicators, and that achieved reductions by the different measures/actions can be quantified after implementation (see chapter 2.3.2 for more information on target setting).

In step 3, measures including recommendations on harmonized monitoring requirements are proposed that on the one hand are seen effective in closing important data and knowledge gaps, and which on the other hand are regarded as most effective and efficient in improving the marine litter situation in the respective regional sea (focusing on the most prominent items found, and the most obvious sources). These are taken from the literature (see chapter 4 and Annex I) and are structured according to the Honolulu Strategy, i.e. measures are categorized as "effective in reducing land-based litter", "…sea-based litter" and as "clean-up measures". Following a proposal by OSPAR, which has already received positive reactions e.g. by CPs and other RSCs, a fourth category is introduced, aiming at "producing less litter by means of smart production". The scope of the measures purposely incorporates actions to be implemented on land and in river systems, which actually exceed the mandates of most RSC (the Helsinki Convention has a mandate to address all sources of pollution to the marine environment). However, focusing "narrowly" on sea-based sources would limit the possible measures and their impact greatly. Therefore, a "wide approach" was chosen here. Participants were again invited to add to the list (additions were collected at the conference), to reach a common understanding to implement (some of) the measures listed there, and to prioritize the measures regarded as most relevant and effective (the measures selected in the prioritization exercise are marked in **bold**).

Step 4 closes the Policy Cycle by proposing steps that will later help in evaluating the effectiveness of the measures taken, and evaluating the progress. As these steps are closely linked to the outcomes of the steps before, only a few possible steps are outlined here, to be further defined after the conference, or even in the context of the RSC.

5.1 Steps towards developing and implementing an Action Plan: North-East Atlantic (OSPAR-Region)

STEP 1: Consistency, Sources, Amounts of Marine Litter

The main groups of items found on beaches in the North-East Atlantic are rope/nets/cords and packaging materials and small (<50cm) pieces of plastic, including plastic bags, plastic bottles and caps/lids. Cotton buds and other household/solid municipal waste seem less prevalent.

These items found indicate two types of activities to be the most prevalent sources for marine litter in the North-East Atlantic:

- solid waste management from coastal and sea-based tourism and recreation (including recreational fishing and boating), and
- marine industries (fishing vessels; merchant shipping, ferries and cruise liners; pleasure crafts; offshore oil and gas installations; fish farm installations).

Each sector/activity accounts for approximately 30-40% of the marine litter items found in the overall region (this number is even higher in parts of the North Sea; marine industries are a much more

prevalent source in the NE Atlantic than in the other three regional seas). The type of the items found indicate direct disposal on the beach or in the sea (intentionally or through neglect) as the main input pathways, only a small percentage could originate from accidental spillage/losses (like spilled plastic pellets).

Inland household-related sources are also important (around 10% of the litter found), but seem generally under control due to well performing household and industrial waste collection and treatment infrastructures and well-working sewerage systems, although some leakage can still occur (possible leaks: micro-particles, e.g. from cosmetics; and fast food outlets along the coast; transport and port handling operations; and household waste reaching the sea by rivers).

Steps ahead: agreement on main sources/pathways

Main items in the NE Atlantic are packaging waste and small pieces of plastic including plastic bags, plastic bottles and caps/lids, as well as rope/nets/cords. Other relevant elements are plastic pellets, balloons, cigarette butts and fireworks debris.

Main sources of marine litter in the NE Atlantic: coastal and sea-based tourism and recreational activities (packaging waste, plastic bags, plastic bottles and caps/lids) and marine industries (rope/nets/cords from fishing vessels; merchant shipping, ferries and cruise liners; pleasure crafts; offshore oil and gas installations; fish farm installations).

The major data and information gaps are:

- amounts, composition, transport, origin and environmental impacts of marine litter on the sea floor and in the water column/floating.
- amounts, sources and environmental impacts of micro-particles.
- quantitative information on socio-economic impacts of marine litter, especially regarding the cost of degradation in relation to socio-economic benefits provided by the marine environment (tourism/recreation, provision of food and products, etc.).
- input from rivers.
- environmental impacts of marine litter in the ecosystem and population levels.

Question discussed at the Berlin conference:

- Do all participants agree with the statements above and is there any additional information we should take into account?

→the participants generally agreed on the listed information, and added plastic bags as an important item, as well as environmental impacts, also on the ecosystem and population level, as additional data gaps. Additionally, the participants emphasized the importance of monitoring schemes to take local and regional circumstances into account.

STEP 2: Possible Operational Targets

According to the identified main sources of marine litter in the NE Atlantic, targets regarding a reduction of marine litter from coastal and sea-based tourism and recreational activities and marine industries (fishing, shipping, aquaculture, offshore installations, other maritime activities) seem

necessary. Additionally, it should be obvious that inputs of household litter/municipal solid waste should not increase in the future.

Steps ahead: agreement on common targets to reduce the amount of marine litter

Currently not all the necessary information is available to accurately determine the amounts of litter in the marine ecosystem, and to exactly ascertain the impacts of marine litter on ecosystems or populations. Nevertheless, the precautionary principle should be interpreted to oblige policy makers, stakeholders and society as a whole to reduce input of marine litter significantly, even without knowing the exact amounts and impacts. This must nevertheless be seen as an interim approach. By continuing to develop more evidence on amounts and impacts of marine litter, better targeting of action should always be seen as a clear objective in evolving strategies. Litter items found in the region indicate tourism/recreation and maritime industries as the major sources of marine litter in the NE Atlantic. Consequently, targets aiming at reductions of inputs from these sources seem of especial importance.

Example Operational Targets:

- "Reduce packaging waste on shores significantly in comparison to average monitoring results by 2020.
- "Reduce litter from fisheries and aquaculture (e.g. ropes and nets) on shores significantly in comparison to average monitoring results by 2020".
- "Make sure that sewage related (or riverine) litter does no increase/decreases in the marine environment in the future/in the next X years in comparison to 2012 levels".
- "Yearly increase of litter delivered to Port Reception Facilities (PRF) (as a target for the shipping industry)".

Due to the gaps in monitoring data, quantitative targets of amount of litter in the environment do not seem a feasible option at the moment. Targets which express a quantifiable reduction of new litter entering the marine environment and which are closely linked to the sources and possible measures, are more feasible and needed.

Questions discussed at the Berlin conference:

- Do the participants have a common understanding of the statements regarding operational targets, and can we possibly agree on the development of such or similar/adjusted targets? If no common understanding exists, what is need to create it and how?

- Do the participants have a common understanding of the conclusion regarding the necessity of future quantitative targets?

→the participants generally agreed on the proposed operational targets, but changed the wording in some cases, and added an additional target regarding the shipping sector and PRF. One point of special importance for the participants was the issue of "quantified" targets - it was stated that the target of a "significant reduction" is not effective; instead, a quantified reduction target, e.g. in the order of 25 or 50%, is deemed necessary and realistic. Another point highlighted was the necessity of some kind of audit and control for new materials introduced (life cycle analysis should include marine litter).

STEP 3: Measures/Actions

Measures and actions taken should respond to the major sources and input pathways of marine litter in the NE Atlantic region, as well as to the most important data and information gaps. Based upon the OSPAR Checklist (see Annex III) the following measures have been identified by the authors, OSPAR representatives and further conference attendees as potentially effective measures in tackling the problem (given the lack of information on amounts and impacts), and were discussed and prioritized at the conference (measures in **bold**).

Steps ahead: agreement on concrete measures/actions

Sea-based litter (OSPAR Checklist Strategy B):

- **Fishing for litter activities (target group: fisheries; impacts: direct removal/clean-up; education).**
- Environmental education for (other) professional seafarers.
- Apply FAO technical guidelines in relation to lost fishing gear/gear marking; other methods to reduce abandoned/lost fishing gear.
- **Harmonized fee system for port reception facilities (e.g. compulsory implementation of no-special-fee-system).**
- Higher fines for littering at sea.
- **Stricter enforcement of international legislation/regulation regarding all sectors (North Sea Network of Investigators and Prosecutors could investigate cooperation on marine litter pollution enforcement, for shipping the Port State Control and Coastguard should be strengthened).**
- Develop and strengthen implementation of industry best management practices (BMP) designed.
- **Incentives for responsible behaviour/disincentives for littering; giving value to end-of-life products (e.g. deposit schemes for drink containers and other specific items), extended producer responsibility for high value items (e.g. nets, warps).**

Land-based litter (OSPAR Checklist Strategy A):

- **Improved waste management, including increased recycling rates and phasing out landfilling (of Plastic Waste).**
- Reduce sewage-related waste (improvement of the sewage plants).
- **Education and outreach on marine litter impacts and importance of avoiding littering (school programmes; tourism/recreational hotspots; private sector involvement) and innovative approaches to keep localities clean, like "Love Clean London" and Adopt-a-beach/MyBeach.**
- **Incentives for responsible behavior/disincentives for littering: giving value to end-of-life products (e.g. deposit schemes for drink containers and other specific items), higher fines for beach littering/for smoking on beaches.**

Clean-up measures (OSPAR Checklist Strategy C):

- **Fishing for litter (target group: fisheries; impacts: education, direct removal/clean-up).**

- Compulsory beach cleaning by local communities and/or private companies (i.e. of the tourism sector); or incentives for beach cleaning (e.g. awards, like the “Blue flag award”/Cleanest Beach).

Producing less litter by means of smart production (OSPAR Checklist Strategy D):

- **Ban on single-use plastic bags (or other single-use items) or plastic bag taxes and charges (use of the taxes generated for environmental fund).**
- Sustainable packaging guidelines/special packaging/products for selling in beach regions.
- **Elimination and/or "change" (start voluntary action/then regulation) of certain products from the market (e.g. plastic beads in hygiene products, helium-filled balloons on cruise ships, "Chinese lanterns", small plastic wheels in sewage plants; introduction of bio-degradable cigarette filters) which tend to enter aquatic systems directly.**
- **Sustainable production and extended producer responsibility.**
- **Lifecycle analysis for new materials/items/activities should include marine litter.**

Measures addressing knowledge and data gaps:

- **Research and monitoring on river litter.**
- **Research and monitoring on micro-plastics.**

Questions discussed at the Berlin conference:

- Are there additional measures/actions proposed?

- Which measures do the participants consider as priority actions?

- On which measures do the participants reach a common understanding, and on which level (local, national, regional, European) should these be implemented?

- If no common understanding could be reached, what further discussions are needed and with whom in order to agree on and implement required measures?

→the participants agreed on the importance of the measures proposed, suggesting additional ones, or expanding and combining existing ones. Furthermore, the participants prioritized the most important measures (measures in **bold**), and emphasized the importance of measures located close to the source or targeted at specific items, and sub-regional measures.

STEP 4: Future Evaluation of the Measure´s Effectiveness

To ensure the effectiveness of the agreed measures, an evaluation process needs to be planned/organized/performed.

Steps ahead: planning the evaluation of agreed measures

To evaluate effectiveness of measures, a baseline and specific indicators for their effectiveness need to be developed for example:

- “% of total fishing vessels actively involved in a fishing for litter scheme”.

Questions discussed at the Berlin conference:

- If the participants reach a common understanding about one or several measures, can baselines and indicators be agreed upon to evaluate the future success of the measure?

→although the crucial importance of evaluating the effectiveness of measures was acknowledged by the participants, this point was not discussed due to time constraints.

5.2 Steps towards implementing the Strategic Action Plan/establishing a RAP on Marine Litter: Black Sea

STEP 1: Consistency, Sources, Amounts of Marine Litter

The main groups of items found on beaches in the Black Sea are disposable packaging and short life or single use plastic goods (i.e. bottles, bags, crisp/sweets packaging, cans, caps/lids). Litter from professional maritime activities seems less important, although expert´s opinions rate this source as second most important.

Combined, the literature suggests three types of activities to be the most important sources for marine litter in the Black Sea:

- municipal waste/sewage and badly managed landfills (i.e. household activities),
- coastal-based tourism and recreation, and
- maritime industries and ports.

Some experts also regard IUU fishing activities as an important source (UNEP 2009), and due to a lack of information, transboundary and riverine sources could also be important.

Concrete figures for these sectors cannot consistently be extracted from the sources, although it is clear that municipal waste/sewage and coastal-based tourism and recreation each account for at least 30% of the marine litter found in the Black Sea, followed by maritime industries and ports. For IUU fishing, no figures are available. The type of the items found indicate direct disposal on the beach or through rivers/wind as the main input pathways.

Steps ahead: agreement on main sources/pathways

Main items in the Black Sea: disposable packaging and short life or single use plastic goods (i.e. bottles, bags, crisp/sweets packaging, cans, caps/lids).

Main sources in the Black Sea: municipal waste/sewage and badly managed landfills (i.e. household activities), coastal-based tourism and recreation, and marine industries and ports. IUU fishing activities are probably also important, and the influx of litter from riverine and transboundary sources in unknown.

The major data and information gaps are:

- amounts and consistency of marine litter in the whole regional sea/data which can be used to aggregate/scale-up to the RSC level.
- IUU fishing activities and their importance for marine litter generation.
- maritime activities and their importance for marine litter generation (as information is not coherent here).
- importance of riverine and transboundary sources.
- socio-economic impact (cost) of marine litter.
- clarification of the importance of recreational fishing for marine litter generation (the ARCADIS-Study states a share of 45% of litter generation).

Question discussed at the Berlin conference:

- Do all participants agree with the statements above and is there any additional information we should take into account?

→the participants generally agreed on the listed information, and added transboundary and riverine inputs as possible sources and important data gaps.

STEP 2: Possible Operational Targets

According to the identified main sources of marine litter in the Black Sea, targets regarding a reduction of marine litter from municipal waste/sewage and badly managed landfills (i.e. household activities), coastal-based tourism and recreation, and marine industries and ports seem necessary.

Steps ahead: agreement on common targets to reduce the amount of marine litter

Although not all necessary information is available to accurately determine amounts of marine litter in the marine ecosystem, and to exactly ascertain the impacts of marine litter on ecosystems or populations, the precautionary principle obliges policy makers, stakeholders and society as a whole to reduce input of marine litter significantly, even without knowing the exact amounts and impacts. Litter items found in the region indicate municipal waste/sewage and badly managed landfills (i.e. household activities), coastal-based tourism and recreation, and marine industries and ports as the major sources of marine litter in the Black Sea, possibly also IUU fishing activities. Consequently, targets aiming at these sources seem of crucial importance.

Possible Operational Targets:

- To develop a methodology of assessment of marine litter on the national and regional levels and to amend the countries reporting templates to RSC to reflect the relevant data.
- To set up quantitative targets and to measure the amount of marine litter as of 2013.
- "Make sure that amounts of household litter do not increase in the marine environment in the future/in the next 5 years in comparison to 2013 levels".
- "A significant reduction of beach litter items from tourism and recreational activities by 2020, compared to 2013 levels".
- "Reduce litter from maritime activities and IUU fishing (rope, nets, cord) significantly in comparison to average monitoring results by 2020".
- Reduce accidental loss of waste from landfills/Reduce number of illegal landfills and Dumpsites.

Due to the gaps in monitoring data, quantitative targets of amount of litter in the environment seem not a feasible option at the moment. Targets which express a quantifiable reduction of new litter entering the marine environment and which are closely linked to the sources and possible measures, are more feasible and needed.

Questions discussed at the Berlin conference:

- Do the participants have a common understanding of the statements regarding operational targets, and can we possibly agree on the development of such or similar/adjusted targets? If no common understanding exists, what is need to create it and how?

- Do the participants have a common understanding of the conclusion regarding the necessity of future quantitative targets?

→the participants did not modify the targets proposed, but emphasized that targets on sources (i.e. landfills, tourism) and objectives regarding harmonized methodologies and assessment schemes are the most important ones in the Black Sea region. Nevertheless, it was stated that the data and information gaps should not hinder the implementation of other targets and/or measures.

STEP 3: Measures/Actions

Measures and actions taken should respond to the major sources and input pathways of marine litter in the Black Sea region, as well as to the most important data and information gaps. The following measures are seen to be most effective in tackling the problem (given the lack of information on amounts and impacts), and were discussed and prioritized at the conference (measures in **bold**).

Steps ahead: agreement on concrete measures/actions

Sea-based litter:

- **Reconsider the Regional Action Plan on Marine Litter for the Black Sea (2006) to include the recent developments in the region, to make necessary steps for its reinforcement by the Black Sea countries** (R).
- To amend the reporting templates for countries reporting under relevant BSC Advisory Groups to include data for amounts and content of marine litter, garbage from ships, port reception facilities etc. (R).
- Recommendations for amendments into the BS SAP 2009 (when preparing the First Report on the Implementation of the BS SAP in 2013) with a possible (non-priority) aim to in the future amend the text of the Bucharest Convention to include marine litter as a problem (R).
- **Education and outreach on marine litter impacts and importance of avoiding littering/ marine litter public awareness campaign (maritime industries and tourism/recreational hotspots for boating/fishing) (N).**
- Stricter enforcement of international waste regulations, especially of MARPOL Annex V (i.e. joint activities under the BSC-IMO MoU, specific activities in the scope of the BSC ESAS Advisory Group dealing with environmental aspects of shipping, possible inclusion of garbage prevention and assessment into the Regional Action Plan on Marine Litter for the Black Sea to be developed as well as to the reporting templates of BSC ESAS AG) (N).
- Implement professional sectoral guidelines (i.e. for port cargo handling operations) (N/R).
- Adequate port reception facilities and port waste management, timely handling and safe disposal of waste (N).

Land-based litter:

- **Reconsider the Regional Action Plan for the Black Sea of 2006 to include the recent developments in the region, to make necessary steps for its reinforcement by the Black Sea countries** (R).
- To amend the reporting templates for countries reporting under relevant BSC Advisory Groups to include data for amounts and content of marine litter (R).

- Recommendations for amendments into the BS SAP 2009 (when preparing the First Report on the Implementation of the BS SAP in 2013) with a possible (non-priority) aim to in the future amend the text of Bucharest Convention to include marine litter as a problem (R).
- Enter into force of the land-based pollution protocol from 2009 and its "guiding principles" (N/R).
- **Closing leakages in waste management: improved waste management/landfill management (as well as closing of landfills), including waste reduction and recycling and establishing/drafting/implementing national waste strategies and/or national coastal zone management plans, as land-based litter is not under control (N/L).**
- **Education and outreach on marine litter impacts and importance of avoiding littering/ marine litter public awareness campaign (inland households and municipalities; tourism/recreational hotspots)/innovative approaches to keep localities clean, like "Love Clean London") (N).**
- Adequate number of waste bins near the coast/beaches (sea-gull resistant garbage bags or covered bins) (L).
- Incentives/disincentives for littering: higher fines for beach (or general) littering/for dumping waste illegally (L)?
- **Refund system(s) for bottles (especially plastic bottles) (N).**
- Implement professional sectoral guidelines (N).

Clean-up measures:

- Compulsory cleaning of inland pathways: rivers, near landfills etc. (N/L).
- Compulsory beach cleaning by local communities and/or private companies (i.e. of the tourism sector); or incentives for beach cleaning (e.g. awards, like the "Blue flag award") (N).

Producing less litter by means of smart production:

- Ban on single-use plastic bags or plastic bag taxes and charges (N).
- Elimination and/or "change" (start voluntary action/then regulation) of certain products from the market (e.g. plastic beads in hygiene products; introduction of bio-degradable cigarette filters) which tend to enter aquatic systems directly (N).
- Sustainable packaging guidelines (N).

Measures addressing knowledge and data gaps:

- **Development of the regional and national marine litter assessment and monitoring schemes using common methodologies and assessment criteria (to develop methodologies for monitoring and assessment of floating, submerged and coastal litter), and collect these data in national or regional databases/amend reporting templates of the BSC Advisory Groups and/or CPs (R).**
- To organize and maintain marine litter monitoring facilities, also in order to measure the amount of marine litter in the environment in 2013 (to set up a baseline) (R).
- Thereby focusing on the impacts of maritime industries, including IUU fishing activities (R).
- Improved quantification of marine litter and identification of sources, allowing improved prosecution of offenders (N).

Questions discussed at the Berlin conference:

- Are there additional measures/actions proposed?

- Which measures do the participants consider as priority actions?

- On which measures do the participants reach a common understanding, and on which level (local, national, regional, European) should these be implemented?

- If no common understanding could be reached, what further discussions are needed and with whom in order to agree on and implement required measures?

→the participants agreed on the importance of the measures proposed, modified the wording of some, and prioritized the most important measures (measures in **bold**), Additionally, the participants agreed on the proper level for implementing the measures (N = national level; R = regional; L = local)

STEP 4: Future Evaluation of Measure´s Effectiveness

To ensure the effectiveness of the agreed measures, an evaluation process needs to be planned/organized/performed.

Steps ahead: planning the evaluation of agreed measures

To evaluate effectiveness of measures, a baseline and specific indicators for their effectiveness need to be developed.

Questions discussed at the Berlin conference:

- If the participants reach a common understanding about one or several measures, can baselines and indicators be agreed upon to evaluate the future success of the measure?

→although the crucial importance of evaluating the effectiveness of measures was acknowledged by the participants, this point was not discussed due to time constraints.

5.3 Steps towards establishing an Action Plan: Baltic Sea

STEP 1: Consistency, Sources, Amounts of Marine Litter

The main groups of items found on beaches in the Baltic Sea are discarded short-life or single-use goods, mostly consisting of sanitary and household waste, such as cotton bud sticks, bottles, food and snack packaging and cigarette butts. Litter from industrial sources is clearly less important. Fishing nets and micro-particles (fibers and remnants of car tires) are assumed to be important groups of marine litter.

These items found indicate four types of activities to be the most important sources for marine litter in the Baltic Sea:

- coastal-based tourism and recreation,
- household activities, including sanitary waste, transport and waste collection/dumping,
- fishing, and
- land-based micro-particles (e.g. road traffic).

The first two sectors/activities account for high shares of marine litter found in beach surveys (exceeding 30 or 40%). The type of the items found indicate direct disposal (intentionally or through neglect) on the beach or further inland (i.e. through flushing, depositing waste on river banks, or through dumpsites) as the main input pathways. The amount of sanitary items indicate over-capacity incidents in waste water treatment plants when high amounts of storm waters cause sewage overflows .

Steps ahead: Agreement on main sources/pathways

Main items in the Baltic Sea: cotton bud sticks, bottles, food and snack packaging, cigarette butts, fishing nets and micro-particles.

Main sources in the Baltic Sea: coastal-based tourism and recreational activities (cigarette butts and packaging), households (sanitary waste and disposed packaging of consumer goods), fishing and traffic.

The major data and information gaps are:

- amounts and consistency/composition, and transport, origin and impacts of marine litter on the sea floor and in the water column (floating litter, micro-particles).
- the importance of sanitary wastes for marine litter generation.
- long-term trend information.
- transfer of toxic chemicals with micro-particles particles, and toxicity of marine litter.
- environmental impact of marine litter on the ecosystem level.
- socio-economic impact (cost) of marine litter.
- input pathways of marine litter, especially regarding micro-particles (role of cosmetics, textile fibres, ash and traffic) and inputs from rivers.

Question discussed at the Berlin conference:

- Do all participants agree with the statements above and is there any additional information we should take into account?

→the participants generally agreed on the stated information, and emphasized the highly varied picture stemming from non-harmonized and insufficient monitoring guidelines and activities. Consequently, several data and information gaps were added to the list.

STEP 2: Possible Operational Targets

According to the identified main sources of marine litter in the Baltic Sea, targets regarding a reduction of marine litter from coastal-based tourism, recreational activities, households and fishing seem necessary. At this time point, traffic as the source of micro-particles is not included until this can be better confirmed. These should be regarded as a possible concretization of the future "significant reduction target" proposed in the draft Ministerial Declaration, and could be endorsed by the CPs, to be included in the envisaged Regional Action Plan on Marine Litter.

Steps ahead: agreement on common targets to reduce the amount of marine litter

Although not all necessary information is available to accurately determine amounts of marine litter in the marine ecosystem, and to exactly ascertain the impacts of marine litter on ecosystems or populations, the precautionary principle obliges policy makers, stakeholders and society as a whole to reduce input of marine litter significantly, even without knowing the exact amounts and impacts. Litter items found in the region indicate tourism/recreation, households and fishing as the major sources of marine litter in the Baltic Sea. Consequently, targets aiming at these sources seem of especial importance.

Possible Operational Targets:

- "A significant reduction of beach litter items from tourism and recreational activities (bottles, food and snack packaging and cigarette butts) by 2020 with the aim of achieving significant quantitative reductions by 2025, compared to 2015 levels".
- "Reduce the number of abandoned fishing nets significantly by 2020 with the aim of achieving significant quantitative reductions by 2025 , compared to 2015 levels".

Due to the gaps in monitoring data, quantitative targets of amount of litter in the environment seem not a feasible option at the moment. Targets which express a quantifiable reduction of new litter entering the marine environment and which are closely linked to the sources and possible measures, are more feasible and needed.

Questions discussed at the Berlin conference:

- Do the participants have a common understanding of the statements regarding operational targets, and can we possibly agree on the development of such or similar/adjusted targets? If no common understanding exists, what is need to create it and how?

- Do the participants have a common understanding of the conclusion regarding the necessity of future quantitative targets?

→the participants did not modify the above stated targets with the exception of stating skepticism towards a target on sanitary items; instead, a few important statements regarding target setting in the Baltic Sea were made:

- There is a strong necessity to establish environmental targets and to link these with operational targets.

- The uncertain data and knowledge situation regarding sources inhibits the setting of operational targets.

- Nevertheless, the following sources or litter categories were deemed relevant for setting targets: fishing nets; beach litter; river litter; waste management (e.g. targets aiming at collection and recycling quotas); targets on sanitary items are regarded with skepticism, as the uncertainty regarding the significance of this item is very high.

- The term "significant reduction" is too vague, a quantified reduction target is regarded necessary.

STEP 3: Measures/Actions

Measures and actions taken should respond to the major sources and input pathways of marine litter in the Baltic Sea region, as well as to the most important data and information gaps. The following measures are seen to be most effective in tackling the problem (given the lack of information on amounts and impacts), and were discussed and prioritized at the conference (measures in **bold**). Furthermore, the measures are supposed to be regarded as a possible concretization of the content of the future Regional Action Plan proposed in the draft Ministerial Declaration.

Steps ahead: agreement on concrete measures/actions

<u>Sea-based litter:</u>

- Possible setting of legal definition of marine litter in the Helsinki Convention.
- Measure(s) on pleasure boating (promotion of garbage collection for pleasure crafts sailing in Finnish archipelago and lakes district – “Keep the Archipelago Tidy ” campaign/Finland).
- **Measures to reduce losing/abandoning fishing nets.**
- Fishing for Litter initiative of KIMO International, extended to the Baltic Sea, including a compensation scheme.
- Public awareness documentary “Ghost in the Baltic Sea” and the campaign for removing ghost nets from Polish and Lithuanian waters by BalticSea 2020 Foundation.
- Further work on harmonization of the "no-special-fee"-system (addressing as possible gaps in existing regulations, enforcement and practices concerned shipping, PRF auditing to assess adequacy of garbage collection, strive for fair waste burden sharing between ports through termination of setting maximum/ceiling amounts for reception of litter in ports within NSF-system).
- Enforcing existing marine litter regulations.

Land-based litter:

- Possible setting of legal definition of marine litter in the Helsinki Convention.

- **Improved waste management, including waste reduction and recycling, especially in tourism hotspots/near the coast (on different levels: financial tools like regional funds, twinning, training of national judges, or EC infringement procedures, as there are laws in order to force MS to expand infrastructure).**
- **Reducing inputs of household litter, such as micro-particles, latex and sanitary items through enhanced sewage treatment and separation of sewage and storm water treatments.**
- **Education and outreach/awareness raising on marine litter impacts and importance of avoiding littering (tourism/recreational hotspots; private sector involvement?) and innovative approaches to keep localities clean, like National Litter Picking-days of "Keep Sweden Tidy" and Big Cleanup Day in Latvia and Lithuania.**
- Raise awareness about the correct disposal of sanitary and hygiene products (as an example the "Bag it and Bin it" campaign/UK).
- **Incentives/disincentives for littering: higher fines for beach (or general) littering.**
- **Harmonisation of deposit refund systems for bottles (plastic and glass) among countries/EU-wide.**
- **Implement more stringent regulation of plastic packaging, including measures like taxes on packaging and single-use plastic shopping bags.**

Clean-up measures:

- Compulsory beach cleaning by local communities and/or private companies (i.e. of the tourism sector); or incentives for beach cleaning (e.g. awards, like the "Blue flag award").
- Measures for removing river litter.

Producing less litter by means of smart production:

- **Ban on single-use plastic bags (EU-wide action necessary) or plastic bag taxes and charges (in parallel, alternatives should be developed).**
- Elimination and/or "change" (start voluntary action/then regulation) of certain products from the market (e.g. general non-biodegradable products, like plastic beads in hygiene products; introduction of bio-degradable cigarette filters) which tend to enter aquatic systems directly.
- Sustainable packaging guidelines.
- Replace the plastic in cotton swabs with paper/carton.

Measures addressing knowledge and data gaps:

- **Standard monitoring program(s) (for a consistent and applied measurement methodology for the description of the litter items, the sources of marine debris, volume in kg, data on the number of items, and detailed information on the conditions of the reference beaches (if beach litter is concerned), because data provided by the current monitoring programs is not comparable or quality-controlled).**
- Clarification/research into the importance of sanitary waste.
- Better data on plastic use/production.

Questions discussed at the Berlin conference:

- Are there additional measures/actions proposed?

- Which measures do the participants consider as priority actions?

- On which measures do the participants reach a common understanding, and on which level (local, national, regional, European) should these be implemented?

- If no common understanding could be reached, what further discussions are needed and with whom in order to agree on and implement required measures?

→the participants agreed on the importance of the measures proposed, suggesting additional ones, or expanding and combining existing ones. Furthermore, the participants prioritized the most important measures (measures in **bold**).

STEP 4: Future Evaluation of Measure´s Effectiveness

To ensure the effectiveness of the agreed measures, an evaluation process needs to be planned/organized/performed.

Steps ahead: planning the evaluation of agreed measures

To evaluate effectiveness of measures, a baseline and specific indicators for their effectiveness need to be developed.

Questions discussed at the Berlin conference:

- If the participants reach a common understanding about one or several measures, can baselines and indicators be agreed upon to evaluate the future success of the measure?

→although the crucial importance of evaluating the effectiveness of measures was acknowledged by the participants, this point was not discussed due to time constraints.

5.4 Steps implementing the Mediterranean Strategic Framework for Marine Litter Management/the Regional Action Plan

STEP 1: Consistency, Sources, Amounts of Marine Litter

The main groups of items found on beaches in the Mediterranean are sanitary items (mostly cotton bud sticks), cigarette butts and cigar tips, as well as packaging items and bottles.

These items found indicate three types of activities to be the most important sources for marine litter in the Mediterranean:

- coastal-based tourism and recreation,
- household and sanitary activities (including waste collection and dumping), and
- smoking-related activities (overlapping with recreational/tourism activities, but also representing a topic on its own).

The type of the items found indicate direct disposal (intentionally or through neglect) on the beach or further inland (i.e. through flushing, depositing waste on river banks, or through dumpsites) as the main input pathways. The fishing and shipping industries are also considered major sources of marine litter. Exact data, however, is lacking.

Steps ahead: Agreement on main sources/pathways

Main items in the Mediterranean: sanitary items (mostly cotton bud sticks), cigarette butts and cigar tips, as well as packaging items and bottles.

Main sources in the Mediterranean: coastal-based tourism and recreation, households, and smoking-related activities. Fishing and shipping activities are also considered to be main sources of marine litter.

The major data and information gaps are:

- existing data is not fully consistent and geographically restricted to some parts of the region.
- amounts and consistency/composition, and transport, origin and impacts of marine litter on the sea floor (especially in the deep sea) and in the water column (floating litter).
- lost/abandoned fishing gear.
- impacts and amounts of micro-particles.
- socio-economic impact (cost) of marine litter.
- importance of shipping activities for the generation of marine litter.
- riverine inputs.

Question discussed at the Berlin conference:

- Do all participants agree with the statements above and is there any additional information we should take into account?

→the participants generally agreed on the listed information, and added the shipping industry as a source to be considered, and three major data and information gaps (the deep sea, shipping activities and riverine inputs).

STEP 2: Possible Operational Targets

According to the identified main sources of marine litter in the Mediterranean, targets regarding a reduction of marine litter from coastal-based tourism and recreation, households, and smoking-related activities seem necessary.

Steps ahead: agreement on common targets to reduce the amount of marine litter

Although not all necessary information is available to accurately determine amounts of marine litter in the marine ecosystem, and to exactly ascertain the impacts of marine litter on ecosystems or populations, the precautionary principle obliges policy makers, stakeholders and society as a whole to reduce input of marine litter significantly, even without knowing the exact amounts and impacts. Litter items found in the region indicate coastal-based tourism and recreation, households, and smoking-related activities as the major sources of marine litter in the Mediterranean. Consequently, targets aiming at these sources seem of especial importance.

Possible Operational Targets (to be set at the regional level):

- "A significant reduction of beach litter items from tourism and recreational activities (food and snack packaging and cigarette butts/cigar tips) by 2020, compared to XY levels".
- "A significant reduction of smoking-related litter (cigarette butts and cigar tips) on beaches by 2020, compared to XY levels".
- "Reduce the amount of sanitary items (mainly cotton bud sticks) significantly by 2020, compared to XY levels".
- Source-related targets (e.g. number of plastic bottles consumed in a certain community).
- Item-or material-related targets (e.g. reduction of certain items or materials in the environment, especially on beaches).
- Removal effort-related targets (e.g. length of shoreline in relation to total shoreline where beach cleaning has been done, or number of volunteers in beach cleaning operations).

Due to the gaps in monitoring data, quantitative targets of amount of litter in the environment seem not a feasible option at the moment. Targets which express a quantifiable reduction of new litter entering the marine environment and which are closely linked to the sources and possible measures, are more feasible and needed.

Questions discussed at the Berlin conference:

- Do the participants have a common understanding of the statements regarding operational targets, and can we possibly agree on the development of such or similar/adjusted targets? If no common understanding exists, what is need to create it and how?

- Do the participants have a common understanding of the conclusion regarding the necessity of future quantitative targets?

→the participants principally agreed on the above listed targets, and added that they should be set on the regional scale. Additionally, such targets should be combined with more specific operational targets (source, item/material and removal-related targets).

STEP 3: Measures/Actions

Measures and actions taken should respond to the major sources and input pathways of marine litter in the Mediterranean region, as well as to the most important data and information gaps. The following measures are seen to be most effective in tackling the problem (given the lack of information on amounts and impacts) and were discussed and prioritized at the conference (measures in **bold**).

Steps ahead: agreement on concrete measures/actions

Sea-based litter:

Port reception facilities and no-special-fee system (also for marinas). Fishing for Litter ("KIMO-Model") and removal of Abandoned & Lost & Discarded Fishing Gear. Land-based litter:

- Enhance Marine litter management as an integrated part of municipal solid waste management and integrated coastal zone management.
- **Improved waste management (4Rs plus prevention) and ban on illegal dumping**, especially in tourism hotspots/near the coast/sea-facing promenades etc. (effective municipal waste management system with sufficient waste bins protected from wind and animals (covered or with resistant bags), cleaning of sewers, proper storage and transport/collection of waste).
- **Upgrade, redesign and improved maintenance of sewage system, including the storage of wastewater**.
- Assist local coastal communities in solid waste management/implement the "Guidelines for Management of Coastal Litter").
- Twinning projects (or something similar) to transfer management skills/knowledge of waste management to Mediterranean countries in the South and East.
- **Education and outreach on marine litter impacts and importance of avoiding littering (tourism/recreational hotspots; private sector involvement?)/innovative approaches to keep localities clean, including anti-littering campaigns specifically aiming at smoking/smokers (like "ashtray cones").**
- Incentives/disincentives for littering: higher fines for beach littering and/or provision of guidelines to countries on legal and institutional aspects in effectively patrolling and imposing fines on those illegally dumping waste in coastal areas and littering on beaches.
- Ban smoking on beaches.
- Introduction of dissuasive taxes (on plastic bags/or as a "tourist tax", to cover the additional costs for the municipalities for the tourism use and disposal and to finance other measures).

Clean-up measures:

- Compulsory cleaning of inland pathways: rieras/rivers, near landfills etc., especially during rainy seasons/after long spells of dry weather.
- Compulsory beach cleaning by local communities and/or private companies (i.e. of the tourism sector); or incentives for beach cleaning (e.g. awards, like the "Blue flag award").
- Removal of sea-bottom litter.
- **Fishing for Litter ("KIMO-Model") and removal of Abandoned & Lost & Discarded Fishing Gear**.

- Promote Blue Flag practices.
- "Adopt-a-Beach" concept.
- Participation in International Coastal Cleanup.

Producing less litter by means of smart production:

- Ban on single-use plastic bags (EU-wide action necessary)/or plastic bag taxes and charges.
- **Sustainable packaging guidelines.**
- **Elimination and/or "change" (start voluntary action/then regulation) of certain products from the market (e.g. plastic beads in hygiene products; introduction of bio-degradable cigarette filters) which tend to enter aquatic systems directly.**
- Replace the plastic in cotton swabs with paper/carton.
- **Introduce extended producer responsibility measures.**
- Establish voluntary agreements with Plastic Packaging Products producers regarding Deposits, Return and Restoration Systems or alternatively introducing mandatory integrated management systems.

Measures addressing knowledge and data gaps:

- **Standard monitoring program(s) (for a consistent and applied measurement methodology for the description of the litter items, the sources of marine debris, volume in kg, data on the number of items, and detailed information on the conditions of the reference beaches, because data provided by the current monitoring programs is not comparable or quality-controlled).**
- Establish a Mediterranean working group on marine litter.
- Enhance information sharing around the Mediterranean by NGO/IGO, government agencies, research institutions.
- Hold regular Regional Seas or European-wide Conferences on Marine Litter on rotation basis.
- Organize, as much as feasible, guest participation among the four European Seas in monitoring exercises.

Questions discussed at the Berlin conference:

- Are there additional measures/actions proposed?

- Which measures do the participants consider as priority actions?

- On which measures do the participants reach a common understanding, and on which level (local, national, regional, European) should these be implemented?

- If no common understanding could be reached, what further discussions are needed and with whom in order to agree on and implement required measures?

→the participants agreed on the importance of the measures proposed, suggesting additional ones, or expanding and combining existing ones. Furthermore, the participants prioritized the most important measures (measures in **bold**), and recognized such a prioritization as crucial for the implementation of measures. Also, to implement any measures, a standardized monitoring programme and an evaluation of the measures´ effectiveness were regarded as prerequisites by the

participants. Generally, the participants lay emphasis on simple and low- to medium-impact measures instead of very ambitious ones.

STEP 4: Future Evaluation of Measure´s Effectiveness

To ensure the effectiveness of the agreed measures, an evaluation process needs to be planned/organized/performed.

Steps ahead: planning the evaluation of agreed measures

To evaluate effectiveness of measures, a baseline and specific indicators for their effectiveness need to be developed.

Questions discussed at the Berlin conference:

- If the participants reach a common understanding about one or several measures, can baselines and indicators be agreed upon to evaluate the future success of the measure?

→although the crucial importance of evaluating the effectiveness of measures was acknowledged by the participants, this point was not discussed due to time constraints.

6 Literature

Allen, R., Jarvis, D., Mills, C. (2012). Entanglement of grey seals *Halichoerus gryptus* at a haul out site in Cornwall, UK. Marine Pollution Bulletin: 2815-2819.

Anastasopoulou, A., Mytilineou, C., Smith, C.J., Papadopoulou, K.N. (2013). Plastic debris ingested by deep-water fish of the Ionian Sea (Eastern Mediterranean). Deep-Sea Research I 74: 11-13.

ARCADIS (2013). Final report. Pilot project 4 seas: Case studies on the plastic cycle and its loopholes in the four European Regional seas areas. European Commission project. See also http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/index_en.htm

ARCADIS (2013a). Final proposal policy mix "4 seas project". North Sea Region – Oostende as case.

ARCADIS (2013b). Final proposal policy mix "4 seas project". Black Sea Region – Constanta case study.

ARCADIS (2013c). Final proposal policy mix "4 seas project". Baltic Sea Region – Riga as case.

ARCADIS (2013d). Final proposal policy mix "4 seas project". Mediterranean Sea Region – Barcelona as case.

Barnes, D.K.A., Milner, P. (2005). Drifting plastic and its consequences for sessile organism dispersal in the Atlantic Ocean. *Marine Biology*, *146*, 815–825.

BIPRO (2013). Final report. Pilot project. Study of the largest loopholes within the flow of packaging material. European Commission project.

Bond, A.L., Montevecchi, W.A., Guse, N., Regular, P.M., Garthe S., Rail, J.-F. (2012). Prevalence and composition of fishing gear debris in the nests of Northern Gannets (*Morus bassanus*) are related to fishing effort. Marine Pollution Bulletin, MPB-D-11-00771R1.

Brink, P. T., Lutchman, I., Bassi, S., Speck, S., Sheavly, S., Register, K. and C. Woolaway (2009). Guidelines on the Use of Market-based Instruments to Address the Problem of Marine Litter. Brussels: Institute for European Environmental Policy (IEEP).

BSC (2007). Marine Litter in the Black Sea Region: A review of the problem. Black Sea Commission Publications 2007 – 1, Istanbul, Turkey.

BSC (2009). Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea, adopted in Sofia, Bulgaria, 17 April 2009.

BSC (2009a). Protocol on the Protection of the Marine Environment of the Black Sea from Land-Based Sources and Activities (2009) [entry into force pending].

BSC (2013). Personal Communication (February - March 2013).

Carson, H., Colbert, S., Kaylor, M. & McDermid, K. (2011). Small plastic debris changes water movement and heat transfer through beach sediments. *Marine Pollution Bulletin*, 62, 1708-1713.

CBD (ed.) (2012). Impacts of Marine Debris on Biodiversity - Current Status and Potential Solutions. CBD Technical Series No. 67. Published by the Secretariat of the Convention on Biological Diversity in collaboration with the Scientific and Technical Advisory Panel – GEF.

Cheshire, A.C., Adler, E., Barbière, J., Cohen, Y., Evans, S., Jarayabhand, S., Jeftic, L., Jung, R.T., Kinsey, S., Kusui, E.T., Lavine, I., Manyara, P., Oosterbaan, L., Pereira, M.A., Sheavly, S., Tkalin, A., Varadarajan, S., Wenneker, B., Westphalen, G. (2009). UNEP/IOC Guidelines on Survey and Monitoring of Marine Litter. UNEP Regional Seas Reports and Studies, No. 186; IOC Technical Series No. 83: xii + 120 pp.

Chiappone, M., White, A., Swanson, D.W. and Miller, S.L. (2002). Occurrence and biological impacts of fishing gear and other marine debris in the Florida Keys. Marine Pollution Bulletin, 44, 597–604.

Claessens, M., Vandegehuchte, M., Van Cauwenberghe, L., Janssen, C.R. (2012). Plastic waste in the Belgian coastal waters: where and how much?, in: Mees, J. et al. (ed.) (2012). Book of abstracts - VLIZ Young Scientists' Day. Brugge, Belgium, 24 February 2012. VLIZ Special Publication, 55: pp. 97.

Collignon, A., Hecq, J-H., Galgani, F., Voisin, P., Collard, F. (2012). Neustonic microplastic and zooplankton in the North Western Mediterranean Sea. Marine Pollution Bulletin, doi:10.1016/marpolbul.2012.01.011.

Dworak, T., Görlitz, S., Interwies, E., Rehdanz, K., Bertram, C., Hiebenthal, C. (2011). Methodische Grundlagen für sozio-ökonomische Analysen sowie Folgenabschatzungen von Maßnahmen einschließlich Kosten-Nutzen Analysen nach EG-Meeresstrategie-Rahmenrichtlinie (MSRL). Project Report.

European Commission/Joint Research Centre (eds.) (2010). Marine Strategy Framework Directive, Task Group 10 Report, Marine Litter.

European Commission Staff Working Document: Overview of EU policies, legislation and initiatives related to marine litter. SWD(2012) 365 final.

European Commission/Joint Research Centre (eds.) (2011). Marine Litter Technical Recommendations for the Implementation of MSFD Requirements. MSFD GES Technical Subgroup on Marine Litter.

Fleet, D. M. (2003). Untersuchung der Verschmutzung der Spülsäume durch Schiffsmüll an der deutschen Nordseeküste - Untersuchung der Müllbelastung an den Spülsäumen der deutschen Nordseeküste – Umweltbundesamt - FKZ 202 96 183.

Fleet, D., van Franeker, J., Dagevos, J. und M. Hougee (2009). Marine Litter. Thematic Report No. 3.8. In: Marencic, H. und J. de Vlas (Eds.). Quality Status Report 2009. Wadden Sea Ecosystem No. 25. Common Wadden Sea Secretariat, Trilateral Monitoring and Assessment Group, Wilhelmshaven, Germany.

Fossi, M.C., Panti, C., Guerranti, C., Coppola, D., Gianetti, M., Marsili, L., Minutoli, R. (2012). Are baleen whales exposed to the threat of microplastics? A case study of the Mediterranean fin whale (*Balaenoptera physalus*). In press: Marine Pollution Bulletin.

Franeker, van, J.A., Blaize C., Danielsen, J., Fairclough, K., Gollan, J., Guse, N., Hansen, P.-H., Heubeck, M, Jensen, J.-K., Guillou, B.O., Olsen, K.-O., Pedersen, J., Stienen, E.W.M., Turner, D.M. (2011). Monitoring plastic ingestion by the northern fulmar *Fulmarus glacialis* in the North Sea. Environmental Pollution Volume 159: 2609-2615.

Hartwig, E., Clemens, T., Heckroth, M. (2007). Plastic debris as nesting material in a Kittiwake. (*Rissa tridactyla*)-colony at the Jammerbugt, Northwest Denmark. Marine Pollution Bulletin 5: 595-597.

Galgani F., J.P. Leauteb, P. Moguedetb, A. Soupletc, Y. Verind, A. Carpentierd, H. Goraguere (2000). Litter on the Sea Floor Along European Coasts.

HELCOM (2007). Assessment of the Marine Litter problem in the Baltic region and priorities for response.

HELCOM (2009). Marine Litter in the Baltic Sea Region: Assessment and priorities for response. Helsinki, Finland, 20 pp.

HELCOM GEAR (2012). Marine Litter in the Baltic Sea - Overview of present Status and Potential for further HELCOM Actions. HELCOM HOD 39/2012.

HELCOM (2013). Personal communication (March 2013).

JRC IES (eds.) (2011). Marine Litter - Technical Recommendations for the Implementation of MSFD Requirements. MSFD GES Technical Subgroup on Marine Litter.

Katsanevakis S. (2008). Marine debris, a growing problem: Sources, distribution, composition, and impacts. In: Hofer TN (ed) *Marine Pollution: New Research*. Nova Science Publishers, New York. pp. 53–100.

Katsanevakis, S., Verriopoulos, G., Nikolaidou, A. ,Thessalou-Legaki, M. (2007). Effect of marine pollution with litter on the benthic megafauna of coastal soft bottoms. *Marine Pollution Bulletin*, *54*, 771–778.

Keep Sweden Tidy (2012): Litter Report.

KIMO (2007) Small plastic particles in Coastal Swedish waters. A report by N-Research. Available at: http://www.kimointernational.org/KIMOPublications.aspx.

Kinell G, Söderqvist T, Moreno-Aranbicia P, Liungman O & Ahrensberg N (2012) Marine litter in Sweden: A study for the Economic and Social Analysis of the Initial Assessment of the Marine Strategy Framework Directive. Havs- och vattenmyndighetens rapport 2012:3.

Kühn, A., van Franeker, J.A. (2012). Plastic ingestion by the northern fulmar (*Fulmaris glacialis*) in Iceland. In: Marine Pollution Bulleting 64: 1252-1254.

Laist, D. (1997). Impacts of marine debris: Entanglement of marine life in marine debris including a comprehensive list of species with entanglement and ingestion records. In J. Coe and D. Rogers (Eds.). Marine debris: Sources, impact and solutions, 99-141. Springer Verlag. New York.

Large, P. A., Graham, N. G., Hareide, N-R., Misund, R., Rihan, D. J., Mulligan, M. C., Randall, P. J., Peach, D. J., McMullen, P. H., and Harlay, X. 2009. Lost and abandoned nets in deep-water gillnet

fisheries in the Northeast Atlantic: retrieval exercises and outcomes. – ICES Journal of Marine Science, 66: 323–333.Law, K. L., S. Moret-Ferguson, N. A. Maximenko, G. Proskurowski, E. E. Peacock, J. Hafner and C. M. Reddy (2010). Plastic accumulation in the North Atlantic Subtropical Gyre. Science, 329, 1185–1188.

Lusher, A.L., M. McHugh, R.C. Thompson (2013). Occurrence of microplastics in the gastrointestinal tract of pelagic and demersal fish from the English Channel, Marine Pollution Bulletin, Volume 67, Issues 1–2, 15 February 2013, Pages 94-99, ISSN 0025-326X, 10.1016/j.marpolbul.2012.11.028.

Maes, T., Nicolaus, M., Stephens, D., van der Molen, J., Reese, A. 2012. Marine Litter Monitoring. Defra project ME5415.

MARLIN Project (2013). Personal Communication (March 2013).

MCS Beachwatch (2007). The Annual UK Beach Litter Survey report. Marine Conservation Society.

Moos, N., Burckhardt-Holm, P., Köhler, A. (2012). Uptake and effects of microplastics on cells and tissue of the blue mussel *Mytilus edulis L.* after an experimental exposure. Environ Sci Technol: 11327-35.

Mouat, J., Lopez Lorano, R. und H. Bateson (2010). Economic Impacts of Marine Litter. KIMO International.

Murray, F., Cowie, P.R. (2011). Plastic contamination in the decapods crustacean *Nephrops norvegicus* (Linnaeus, 1758). *Marine Pollution Bulletin*: doi:10.1016/j.marpolbul.2011.03.032.

Noren F., Magnusson K. (2010). Osynligt avfallsproblem i havet, in Havsutsikt 1.

NRC (2008). Tackling Marine Debris in the 21st Century - Committee on the Effectiveness of International and National Measures to Prevent and Reduce Marine Debris and its Impacts, National Research Council.

Ocean Conservancy (2002-2006). ICC Annual Reports 2002-2006.

Ökoinstitut (ed.) (2012). Study on Land-Sourced Litter (Lsl) in the Marine Environment - Review of sources and literature.

OSPAR (2007). Monitoring of marine litter on beaches in the OSPAR region.

OSPAR (2009). Marine litter in the North-East Atlantic Region: Assessment and priorities for response. London, United Kingdom.

OSPAR (2010). Quality Status Report 2010. London. 176 pp.

OSPAR (2010a). Guidelines for Monitoring Marine Litter on the Beaches in the OSPAR area.

OSPAR (2012). MSFD Advice document on Good environmental status - Descriptor 10: Marine Litter.

OSPAR (2013). OSPAR Actions on Marine Litter. Presented by Secretariat as input the International Conference on Prevention and Management of Marine Litter in European Seas.

Rebolledo E.L.B., van Franeker J.A. Jansen, O.E., Brasseur, S.M.J.M. (2012). Mar Pollut Bull, PMID 23245459.

Richards, Z. & Beger, M. (2011). A quantification of the standing stock of macro-debris in Majuro lagoon and its effect on hard coral communities. *Marine Pollution Bulletin*, 62, 1693-1701.

Rodríguez,A., Rodríguez, B., Carrasco M.N. (2012). High prevelance of parental delivery of plastic debris on Cory´s shearwaters (*Calonectris diomedea*). Marine Pollution Bulletin: 2219-2223.

RPA (2013). Final report. Feasibility study of introducing instruments to prevent littering. European Commission project.

Save the North Sea (2004). Save the North Sea project results.

Stephanis, de R., Giménez, J., Carpinelli, E., Gutierrez-Exposito, C., Canãdas, A. (2013). As main meal for sperm whales: Plastic debris. In press in: Marine Pollution Bulletin.

Tanaka, K., Takada, H., Yamashita, R., Mizukawa, K., Fukuwaka, M., Watanuki, Y. (2013). Accumulation of plastic-derived chemicals in tissues of seabirds ingesting marine plastics. In: Marine Pollution Bulletin: http://dx.doi.org/10.1016/j.marpolbul.2012.12.010.

Tinch, R., Brouwer, R., Görlitz, S. Interwies, E., Mathieu, L., Raatikainen, N., Soutukorva, A. and D. Tinch (2012). Recreational benefits of reductions of litter in the marine environment - Final report.

Tomas, J., R. Guitart, R. Mateo and J.A. Raga. (2002). Marine debris ingestion in loggerhead sea turtles, *Caretta caretta*, from the Western Mediterranean. *Marine Pollution Bulletin,* 44: 211–216.

Topçu, E. N. and Öztürk, B. (2010). Abundance and composition of solid waste materials on the western part of the Turkish Black Sea seabed. In: Aquatic Ecosystem Health & Management, 13: 3, 301 — 306.

Topçu, E.N., et al. 2012. Origin and abundance of marine litter along sandy beaches of the Turkish Western Black Sea Coast. In: Marine Environmental Research (http://dx.doi.org/10.1016/j.marenvres.2012.12.006).

Triessnig, P., Roetzer, A., Stachowitsch, M. (2012). Beach condition and marine debris: New hurdles for sea turtle hatching survival. *Chelonian Conservation and Biology,* 11(1): 68-77.

Tuomisto (1994). The effects of marine litter on marine species and litter in the Finnish sea areas. Graduate study, Helsinki University, Laboratory of Hydrobiology.

UNEP (2009). Marine Litter: A Global Challenge. Nairobi. 232 pp.

UNEP/MAP (2008). Results of the Assessment of the Status of Marine Litter in the Mediterranean.

UNEP/MAP (2012). Report of the 17th Ordinary Meeting of the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its Protocols.

UNEP/MAP (2013). Personal communication (March 2013).

UNEP/NOAA (2011). Honolulu-Strategie: “A global framework for prevention and management of marine debris”.

Votier, S.C., Archibald, K., Morgan, G., Morgan, L. (2010). The use of plastic debris as nesting material by a colonial seabird and associated entanglement mortality. Marine Pollution Bulletin 62: 168-172

Werner, S. (2012). Artenvielfalt gefährdet. Wie der Mensch die Meere und seine Zukunft vermüllt. Wissenschaft und Frieden 02/2012, S. 33-36.

WWF (1998-2005). Naturewatch Baltic Report. Published yearly by the WWF in http://www.naturewatchbaltic.org/.

WWF Poland (2011). Ecological Effects of Ghost Net Retrieval in the Baltic Sea. Pilot Project: Collecting Ghost Nets. Final Report.

Further sources (not cited in the report):

CAW (2012). Stopping the Rising Tide of Marine Debris Pollution.

Cefas (2012). Proposed UK Targets for achieving GES and Cost-Benefit Analysis for the MSFD: Final Report.

European Commission (2011). Plastic Waste: Ecological and Human Health Impacts. Science for Environment Policy In-Depth Report.

European Commission (2011). Plastic waste in the environment – Final Report. DG Environment.

Hastings, E. and Potts, T. (2012). Marine litter issues, impacts and action-contributing to a marine litter strategy for Scotland.

Herr, H. (2009). Vorkommen von Schweinswalen (Phocoena phocoena) in Nord- und Ostsee – im Konflikt mit Schifffahrt und Fischerei?

Jacobsen, J. K., L. Massey and F. Gulland (2010). Fatal ingestion of floating net debris by two sperm whales (Physeter macrocephalus). Mar. Pollut. Bull., 60, 765–767.

Keller, A. A., E. L. Früh, M. M. Johnson, V. Simon and C. McGourty (2010). Distribution and abundance of anthropogenic marine debris along the shelf and slope of the US West Coast. Mar. Pollut. Bull., 60, 692–700.

Law, K. L., S. Moret-Ferguson, N. A. Maximenko, G. Proskurowski, E. E. Peacock, J. Hafner and C. M. Reddy (2010). Plastic accumulation in the North Atlantic Subtropical Gyre. Science, 329, 1185–1188.

Liebezeit, G. & Dubaish, F. (2012). Microplastics in Beaches of the East Frisian Islands Spiekeroog and Kachelotplate. Bull Environ Contam Toxicol DOI 10.1007/s00128-012-0642-7.

Mehlhart, G., Blepp, M. (2012). Study on land-sourced litter (LSL) in the marine environment. Review on sources and literature.

Miyake et al. (2011). Deep-Sea Litter Study Using Deep-Sea Observation Tools.

NOAA (2012). NOAA Marine Debris Program.

STAP (2011). Marine Debris as a Global Environmental Problem: Introducing a solutions based framework focused on plastic. A STAP Information Document. Global Environment Facility, Washington, DC.

Umweltbundesamt (UBA) (2010). Abfälle im Meer - ein gravierendes ökologisches, ökonomisches und ästhetisches Problem. Redaktion: Werner, S. FG II 2.3.

UBA (2010a). Einträge von Nähr- und Schadstoffen. Daten zur Umwelt: http://www.umweltbundesamt-daten-zur-umwelt.de/umweltdaten/public/theme.do?nodeIdent=2395

UNEP (2011). Marine Litter (ML) - Work Plan for 2012-2016.

UNEP (2011). UNEP Yearbook 2011 - Emerging Issues in our Global Environment.

U.S. Environmental Protection Agency (2011). Marine Debris in the North Pacific - A Summary of Existing Information and Identification of Data Gaps.

Wurpel, G., Van den Akker, J., Pors, J. & Ten Wolde, A. (2011). Plastics do not belong in the ocean. Towards a roadmap for a clean North Sea. IMSA Amsterdam.

Annex I: List of existing measures

Measures tackling land-based litter	Short Description	Implementing organization and possible partners	Contact Person[31]
BREF (Best Available Techniques Reference Document) in common wastewater and waste gas treatment/management systems in the chemical sector	The BREF on waste water and waste gas treatment and management in the chemical sector reflects an information exchange carried out under Article 16(2) of Council Directive 96/61/EC. For this context, the document can be applied to prevent the release of pellets to the environment from industrial sites. The criteria set in the BREFS are integrated in the permits of manufacturers of plastic materials.	European Commission (http://eippcb.jrc.es/reference/BREF/cww_bref_0203.pdf).	Demetra Orthodoxou/Isotech Ltd (Contact form: www.isotech.com.cy)
Improved waste collection and street cleaning	In some Member States, waste services can be improved. In particular, regular waste collection, also in urban peripheries, can reduce fly-tipping. In addition, regular street cleaning can pick up litter and reduce wind and rain-borne waste that can become marine litter.	Local government level responsible for waste collection, and waste collection company or agency.	Tony Zamparutti/ Milieu (tony.zamparutti@milieu.be)
Responsible Snack Bars (Chiringuitos Responsables)	The Spanish Biodiversity Foundation (Fundacion Biodiversidad) of the Ministry of Agriculture, Food and the Environment, prepared a 'Decalogue of Good Environmental Practices' and launched a campaign asking beach snack bars (called 'chiringuitos' in Spanish) to adopt it by signing a pledge. To give emphasis to this campaign, the 'Responsible snack bar award' was also launched for the first time in Nov. 2012. 6 awards were given with cash prizes for the top 3 winners. The cash prize together with the marketing advantage of being a responsible snack bar (they have the right to display the sign), provide economic and market incentives. So far, 526 snack bars have signed the pledge.	Spanish Biodiversity Foundation and the Spanish Ministry of Agriculture, Food and the Environment.	Demetra Orthodoxou/Isotech Ltd (Contact form: www.isotech.com.cy)
The Plastic Bag Levy	In March 2002, the Irish Government introduced a 15 cent levy on plastic shopping bags that were previously provided free of charge to customers at points of sale. This was introduced under the 2001 Waste Management Act. The key objective of the levy was to reduce the amount of plastic bag litter. Prior to introduction of the levy, plastic bags constituted 5% of the national litter composition, which was reduced to <1% already in 2007. A report published in 2008 stated that 'the available evidence indicates a significant and broadly sustained decline in plastic bag litter since the levy was introduced'. There was also a dramatic reduction in the per capita usage of plastic bags (from 37 bags per person per year to 22-24) and the generation of revenue for the Environment Fund (circa €110 million from 2002 to 2007).	Irish Government.	Thomas Doyle/University College Cork (t.doyle@ucc.ie/http://www.cmrc.ie/)
Blue Lid Campaign	The Blue Lid Campaign was started as a social responsibility project that is now widespread all over Turkey for supplying wheelchairs in exchange of plastic bottle lids to those who need a wheelchair but could not afford to have one. Lids are gathered and brought by post or retailed store vehicles to be collected at the storage, where lids are weighed and transported to recycling plants. Wheelchairs are given in exchange for lids. The project works on a voluntary basis and has become very popular in Turkey.	Turkey Spinal Cord Injury Association.	Ramazan Kahveci/Turkey Spinal Cord Injury Association (kahveci.drramazan@gmail.com/http://www.tofd.org.tr/k2)

[31] Some contacts refer to the authors of the reports, who can provide more information, others (the ones included by MARLISCO and conference participants) refer to the stakeholder carrying out the measure itself.

Combination of manual and mechanical cleaning in less urban and less frequented areas	Regularly cleaning of less urban and frequented beaches, using both mechanical and manual methods. Usually this type of beaches undergo 1 winter cleaning and in some regions a more regular cleaning in summer (e.g. every 2 weeks in Ostend). The goals is to obtain a higher cleaning frequency year round.	Coastal municipalities (not specified); private companies, e.g. soft drinks, beer; volunteers; sporting clubs, social employment organizations.	Stijn Lambert/ARCADIS Belgium (S.Lambert@arcadisbelgium.be)
Provide adequate waste (and recycling) receptacles in beach areas	Provide adequate waste and recycling receptacles in public beach areas to reduce the amount of marine litter introduced in the environment and increase the awareness of beach tourists. Choice between different types of bins: completely open, closed with a cover, with a slit, above the ground and underground. This choice depends on available budget, local circumstances (e.g. problem of sea gulls), cultural behavior; e.g. open bins are cheaper but less efficient; closed bins may invoke reluctance to use them (dirty), but are most effective against sea gulls; covered with medium opening could be the best option.	Coastal municipalities (not specified).	Annemie Volckaert/ ARCADIS Belgium (a.volckaert@arcadisbelgium.be)
Connect unconnected sewers to WWTPs	Under the UWWTP Directive, all agglomerations with populations greater than 2000 should be connected to wastewater treatment plants. Small agglomerations outside urban areas may not be connected (and some MS may not have fully implemented the UWWTP Directive for all agglomerations). Making this connection will ensure that litter swept into sewer systems by rain will not be discharged to the environment. However, for 'unitary' systems, it should be noted that heavy rainfalls can overwhelm UWWT plant capacities. Separating rainfall and wastewater sewers would address this problem, but requires significant investment if a unitary system is already in place. The objective is to limit the presence of domestic solid waste and waste water through better waste water treatment capacity.	Water service companies and local government responsible for sewerage, wastewater treatment (not specified).	Tony Zamparutti/ Milieu (tony.zamparutti@milieu.be)
Grit chambers for unconnected sewers	Under the UWWTP Directive, all agglomerations with greater than 2000 population equivalent should be connected to wastewater treatment plants. Small agglomerations outside urban areas may not be connected. As a result, litter that flows into the sewers during rainfall will be directly discharged to the environment. Grit chambers can capture litter before discharge from the system. Fine filters would be needed, however, to capture many types of plastics; moreover, these are likely to need regularly cleaning and maintenance. The objective is to improve the collection of domestic solid waste and waste water through better waste water treatment capacity.	Local government responsible for sewerage, wastewater treatment, water service company (not specified).	Tony Zamparutti/ Milieu (tony.zamparutti@milieu.be)
Appropriate penalties for beach littering	Imposing of fines aimed at discouraging anti-social behavior including the improper discarding of waste and trash. Fines and penalties can focus specifically on beaches, or also on the surrounding environment (sea front, adjacent streets). Local fining policy should be communicated to tourists via e.g. posters at tourist facilities or orally via trained seasonal workers on the beach. Revenues can be used to fund awareness campaigns or provide additional waste receptacles and other infrastructure.	Coastal municipalities, public cleaning services, coastal guards (not specified).	Stijn Lambert/ARCADIS Belgium (S.Lambert@arcadisbelgium.be)

Involve the retail/touristic sector in actions to improve consumer behavior in relation to plastic bags/bottles	Proving environmental messages directly at the source of consumption on the proper use and disposal of plastic bags and also on available alternatives has a significant impact on reduction in plastic bags use. It is also important that plastic bags are not delivered for free. If this nevertheless is the case, cashiers should reduce the number of bags delivered for free and optimize the packaging of the purchased goods in bags. Furthermore, it is important that a bag carries an environmental message on the resource savings, protection of the environment against littering, etc. The touristic sector plays a significant role as regards the behavior of tourists as it is often the case that tourists tend to change their environmental behavior when away from home towards less environmentally friendly and aware. The touristic sector should provide information to tourists on ways to reduce their negative environmental prints during the vacation. A positive example is that the provision of information to tourists in accommodation facilities on saving water and energy consumption by throwing on the floor only the towels which should be replaced, has been accepted by the tourists and has lead to resource savings. The same principle could be applied to responsible use and disposal of plastic bags. Cotton bags with designed prints and messages can be a very attractive souvenir and useful for carrying stuff to the beach. Plastic bags in touristic facilities can be replaced with suitable alternatives. Accommodation facilities should sell bottled water in glass and promote consumption of tap water by offering filtered tap water.	Retailers and tourism industry; municipal authorities (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Promote and support implementation of deposit refund system for multi carrier bags of all type by retailers of certain size, including robust plastic bags for multi use	The deposit refund system for carrier bags of all types considers that the consumer pays for a bag and gets the money back or a new bag in exchange when returning the old bag to the place of purchase. A deposit refund system has inter alia its benefits in combating generation of the waste "on the go" and littering in the environment after consumption of the products away from home. The economic benefit for a consumer drives a participation in the scheme, but with time it can also have potential positive effects on environmental behavior. Thereby it is important that a bag carries an environmental message on the resource savings, protection of the environment against littering, etc. in order to inform consumer on the individual contribution he/she is making for the improvements and protection of the environment. This can increase the personal sense of responsibility by consumer for the surrounding he/she is living in. The deposit refund system for plastic bags could be in particular implemented in the coastal regions and high touristic cities. The transferability of the measures depends on the acceptance and experience made in these starting areas.	Retailers; municipal authorities (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)

Provide requirements related to improved separate collection and street cleanliness in public procurement for waste collection services	Services for waste collection are usually provided via private companies contracted by municipalities. Length of provision of services is issued in contracts. In relation to quality of services provided specific requirements in tender specification have to be included fostering continuous improvements of the service provision over the contracting period. Improvements of the tender specifications for the public procurement of services for waste collection on the territory of municipalities could be a low hanging fruit which could bring about the change. Trainings and workshops should be organized for municipalities related to issuance of contracts that contain sufficient provisions for fulfillment of municipal waste services (control of fulfillment, termination or penalties in case of non-fulfillment) The following relevant requirements related to improved quality and sustainability of waste collection services may be included in tender procedures: - definition of minimum service requirements (frequency of collection, working hours, health and safety issues, etc) - description of risks and termination provisions - efficient contract length - increase in number of bins/containers for separate collection over the contracting period - design and volume of containers adjusted to frequency of collection - frequency of waste collection services specified for urban/rural areas - high standards for street cleanliness	Municipal authorities, waste collectors (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Supervise compliance and quality of service provided by waste management companies through inspections and control activities	Municipalities are responsible to organize waste management system on their respective territory. Services for waste management (collection, recycling, disposal) are usually provided via private companies contracted by municipalities. Length of provision of services, quality of services required and other specifications are issued in contracts. Local authorities in municipalities have to control and supervise compliance of waste management companies with provisions specified in the contract. Waste management companies should maintain accurate and complete books and accounts of all services provided and upon request to make it available to inspections, examinations, or audit by authorized inspectors. Regular supervision of waste operators by the local competent authorities will help to maintain a good and sufficient quality of services.	Municipal authorities, waste collectors (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Increase the number and quality of different bring systems (civic amenity sites, kerbside collection, collection points, supervised single container collection, etc; number and types for urban/rural areas to be determined)	Increase in the number of different bring systems for collection of municipal waste will improve the waste management on the local level and reduce negative environmental effects such as littering in the environment. Establishment of the appropriate waste related infrastructure is considered very important but the implementation is costly.	Municipal authorities and waste management companies (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)

Enforce and improve EPR scheme for PPW	Extended producer responsibility (EPR) is an environmental policy approach in which a producers' responsibility for a product goes beyond the point of manufacturing and sale throughout the entire life cycle and finally to the end of life. Producers take the responsibility for the post-consumer stage of the product life cycle and need to pay for the take-back, recycling and finally disposal. By this approach, producers are stimulated to design consumer products which produce less waste and contain more recycled and less toxic components, require few resources and energy and are more environmentally friendly, in order to reduce costs associated with the management of the waste stage. In the EPR scheme, the producers have the primary responsibility, but the scheme involves participation of all relevant actors in the product chain and in the society. Producers may fulfill their obligations either individually or joining recovery organization scheme which overtakes organization of EPR for its members. The scheme is applicable to packaging waste and for WEE, ELV and ELB is applicable on the mandatory level. In the case of packaging waste the scheme is applicable on the voluntary basis, but the MS may opt for the mandatory approach due to issues of protection of the environment and society but respecting the proper functioning of the internal market.	Municipal authorities; producers, authorities, waste collectors (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Enforce technical requirements on daily cover of the landfills (close to the coasts) and intensify inspections/implement fines	Landfill Directive 1999/31/EC sets the legislative frame for the management of landfills within the EU. It regulates the operation of landfill of waste in such a way as to prevent or reduce as far as possible negative effects of landfilling on the environment and human health, also taking into account the global environment. To this end, the Directive contains provisions on wastes and treatments acceptable at landfill sites, and lays down conditions for permitting, operation and closure and after-care of landfills. Member States have to adopt laws, regulations and administrative provisions to incorporate the Directive into national legislation. To some of the MS which have acceded the EU in 2004 and 2007 have been granted transitional periods for fulfillment of specific obligations of the Landfill Directive. The permission should contain, inter alia, a requirement on daily cover of the landfill site with soil, stone, rock, construction and demolition wastes, or alternative synthetic materials, which should be spread over the deposited waste at the end of each working day. The daily cover has multiple functions: prevention of wind-blown litter, scavenging by birds and other animals, prevention of disease spreads, reduction of dusts and odor, etc. It also improve the visual appearance of the landfill site and by brings to the general tidiness. The landfills should document their landfill cover management plan and make it available to inspections upon request. The MS may develop guidelines and manuals on best practices for application of daily cover at landfills in order to support and enforce good practices. For an examples, such a guidance is developed by EPA Ireland.	Public authorities, waste treatment facilities (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)

Identify and close non-compliant landfills and illegal dumpsites close to the coast	Landfill Directive 1999/31/EC sets the legislative frame for the management of landfills within the EU. It regulates the operation of landfill of waste in such a way as to prevent or reduce as far as possible negative effects of landfilling on the environment and human health, also taking into account the global environment. To this end, the Directive contains provisions on wastes and treatments acceptable at landfill sites, and lays down conditions for permitting, operation and closure and after-care of landfills. Member States have to adopt laws, regulations and administrative provisions to incorporate the Directive into national legislation. To some of the MS which have acceded the EU in 2004 and 2007 have been granted transitional periods for fulfillment of specific obligations of the Landfill Directive. The most significant relevance for contributing to the marine litter have the illegal and/or non-compliant landfills and dumpsites located closely or directly at the sea. These should have priority in plans and actions to eradicate and/or rehabilitate non-compliant landfills. Non-compliant landfills are operational in the countries highly dependent on landfilling as the major treatment method for municipal waste and often due to lack of regional landfills and other infrastructure and the leaking collection system. In general non-compliant landfills and illegal dumpsites contribute eventually to the generation of marine litter, irrespective of their location. The PPW inappropriately discarded in the poorly managed landfills can be transported by the wind and waters (e.g. rivers) to the marine environment.	Public authorities, waste treatment facilities (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Formalization of informal sector in MW/PPW management	Informal sector in waste management in the three MED countries is very active and effective in recovering recyclables from municipal waste management and this activity provides income for significant percentage of the poor urban population. Informal sector contributes significantly to resource efficiency by collecting, sorting, processing and trading recyclables, including PPW and improves performance of the waste management which is usually suboptimal and underdeveloped. Scrap collectors, trade networks and different actors that evolve lead to material savings and generate additional employment and income opportunity to disadvantage social group. The activities of informal sector take place in usually in very poor working conditions prone to hazards and diseases including bad sanitary service and health care. Regularizing informal recovery into the official structures of waste management in the cities would result in increase in recycling rates and drop in landfilling in poorly managed landfills, better protection of the environment and would improve working conditions for many people and secure them with regular source of livelihood.	State and local authorities; informal sector in waste management (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Develop and promote joint action to reduce the input & impact of sanitary waste (e.g. cotton bud sticks, tampons (applicators), disposable nappies) into the marine environment. Public awareness campaigns to persuade the public to change to the solid waste route for the disposal of their domestic sanitary waste	Public awareness campaigns to persuade the public to change to the solid waste route for the disposal of their domestic sanitary waste. For example: - Nationwide campaigns: e.g. 'Bag-it-and-Bin-it' campaign: to encourage the disposal of domestic sanitary waste away from the sewered route into the solid waste stream. - Local campaigns: Think Before You Flush Towns: to stimulate Porthleven Town residents not to throw sanitary waste into the toilet. - Summer campaign sensibilisation:"Litter is a threat to the sea". Catalan Water Agency. Barcelona (sanitary waste is only one of the litter categories targeted with the campaign) - Information on packaging of sanitary items: e.g. logo and text "don't throw in the toilet". Important to assign what will be the harmful effect of throwing garbage into the toilet.	Local governements; NGO; industries (producers of sanitary products).	Stijn Lambert/ARCADIS Belgium (S.Lambert@arcadisbelgium.be)

Waste Management Plan in the coastal areas (and in the river catchment areas) contain chapter on marine (river) litter reduction and prevention	Marine litter is part of the overall waste management. It results from generally lack of appropriate system for the management of waste, from its sources to its final disposal. It is important that the marine litter is recognized as waste management related problem, in particular in the countries sharing the four regional European marine environments. The national institutional arrangements regarding the addressing, preventing and combating the marine litter problems should be strengthened by incorporating them into adequate legislative framework. For an example, national strategies incorporated into local, costal and landfill site management plans should be amended in order to include strategies on minimization of marine litter could be. The regional and/or local Waste Management Plans in the coastal regions/municipalities should contain specific chapter related to prevention and reduction of marine litter from land-based sources, including section related to plastic packaging in marine litter (e.g. bags and bottles). The coastal local municipalities should implement strategies for combating the marine litter in their WMPs as they suffer the most negative effects of ML on their beaches and coastal zones.	Municipal authorities, waste collectors (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Promote small scale deposit refund systems (e.g. for direct sale on beaches)	Introducing small scale deposit refund system for plastic bottles which are purchased by consumers directly on the beach is a simple way to prevent generation of plastic waste on the beach and in the marine environment. It is important to motivate consumers/tourists to participate in the measure and to support it. The benefits of the cleaner beaches during their stay should be communicated to all beach visitors in order to motivate them to return the bottle back to the small shops at the beach in exchange of the deposit. The anti littering message communicated to consumers should be also supported with sound financial incentive. Therefore, the deposit should be high enough to foster the return. Local authorities should support small scale deposit refund systems on the beaches for all type of plastic bottles and to motivate retailers to participate in the scheme on a voluntary basis. Retailers may also want to participate in the scheme due to sense of responsibility for protection of their beaches and because they feel responsible for maintaining their "working environment" clean.	Small scale retailers; municipal authorities; retailers (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Promote consumption of tap water (e.g. establish hydration stations on public spaces and on the beaches; inform on drinking water quality)	The promotion of consumption of tap water considers plastic bottles in which water is sold to the consumer. A promotion of consumption of tap water including the provision of tap water at hydration stations for free could decrease the consumption of bottled water and therewith the amount of used bottles. Hydration stations can be installed as fixed stations by municipalities in public places in touristic cities or at beaches or they can be established as mobile stations in shops, public institutions, etc. To increase the awareness and acceptance of citizens and tourists awareness campaigns shall be carried out and the quality of drink water has to be promoted. Public institutions could offer tap water on conferences instead of bottled water as good example. The promotion and introduction of hydration stations can be started locally in touristic coastal cities. Once the introduction is in place and accepted by the relevant actors (particularly consumers) the measure could be extended to neighboring and other cities or the whole coast. A possible extension will depend on the experience made in the "starting cities" and the transferability of the measure to other cities/coastal regions.	Municipal authorities (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Ban plastic bottles during beach parties, events, concerts; selling drinks in plastic cups with deposit refund system	The measure considers a ban of plastic bottles at public events (e.g. concerts, beach parties, festivals); this means that the use and sale of plastic bottles at such events shall be forbidden. As alternative the drinks shall be sold in cups with a deposit refund system. The deposit must be high enough to foster the return of the cups in exchange for a refund (not less than 2 Euros per cup).	Municipal authorities; event organizers (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)

Step-wise introduction of the geographical coverage of ban on plastic bags, starting with coastal cities, and coastal regions during the summer months	The ban considers plastic bags which are provided by retail (for free or with a charge) to the consumer when purchasing goods in retail (exemption from the ban for specific goods are possible). It is considered that a local ban in touristic coastal cities during the touristic season is very efficient and can be related to good acceptance at local level (other than a general ban of plastic bags). Once the ban is in place and accepted by the relevant actors (particularly retail and consumers) the ban could be extended to neighboring and other cities or the whole coast and/or to the whole time of the year. A possible extension will depend on the experience made in the "starting cities" and the transferability of the measure to other cities/coastal regions.	Municipal authorities; retailers (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Support and promote commitment of retailers to introduce targets on reduction and optimization of use of plastic packaging materials	A good example of the cooperation between retailers and their suppliers is Global Protocol on Packaging Sustainability (GPPS) of the Consumer Goods Forum, a partnership between the major retailers in Europe and North-America and global consumer goods manufacturers, plus many of the world's leading packaging manufacturers and industry bodies. Furthermore, in their efforts to reduce negative impacts on the environment arising from suboptimal management of packaging in retail sector, retailers should set targets which would commit them to strive toward their fulfillment. The flexibility is left to retailers regarding the ways and actions to reach the foreseen targets. Targets can be set for the following issues: - reduction of the use and environmental impact of carrier bags - reduction of product packaging (product storage, display at shelves, portioning, reduce over-packaging) - on packaging prevention (deposit schemes) - substitution of plastic packaging with other types of packaging	Retailers (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Introduce deposit refund system for refillable plastic beverage bottles	A deposit-refund system (DRS) combines a tax on product consumption with a rebate when the product or its packaging is returned for recycling or appropriate disposal. Advantage of reusable PET beverage containers are cumulative over the entire life cycle and the benefits increase with the utilization loops. The circulation rates depend on the breakage resistance, stability and material quality. However, in respect to quantitative relevance, reusable containers are heavier then single use one. In established reuse deposit refund systems the collection rate is usually 100%. There is practically no littering, due to economic reasons which are driving consumers to return reusable bottles at the point of sale. Further, the system lead to more targeted sorting of packaging waste as worn out bottles and those which do not meet required specifications are sorted out and set to recycling. A deposit refund system has inter alia its benefits in combating generation of the waste "on the go" and "midnight littering" in the environment. The economic benefit for a consumer drives a participation in the scheme, but with time it can also have potential positive effects on environmental behavior. The deposit refund system for reusable plastic bottles could be in particular implemented in the coastal regions and high touristic cities and in countries with high bottled water consumption (e.g. FR and ES).	Producers, retailers, authorities (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)

Introduce mandatory deposit refund system for single use beverage packaging	Mandatory deposit refund system for single use beverage (plastic) packaging provides for very high collection rates which in some cases can reach up to 90% (e.g. in Estonia for PET packaging collection is more then 90%). Separate collection of singe use containers within the deposit refund systems lead to targeted sorting of packaging waste, and consequently to very high recycling rates. In this way potential that the PPW will escape the cycle is minimized, due to high value of the source separated secondary raw material for manufacturers of new products which reduce their costs and resource consumption and increase efficiency. Due to very uniform and clean fractions which are recovered via deposit refund system costs and efforts for sorting of PPW are considerably minimized. Mandatory deposit refund system significantly contributes to the reduction of waste generated on the go away from home and "mid-night littering" due to economic incentive gained upon return of empty bottles at the point of sale. This approach considerably improves management of waste plastic bottles and reduces sub-optimal end of life options such as landfilling, or in the worst case littering in the environment. Usually the amounts of deposit are higher than in the case of reusable bottles stimulating consumers to participate in the scheme of take back but also influencing their purchasing decision toward single use bottles due to higher refunds but also lower total costs in comparison to reusable bottles. This may result in reduction of reusable bottles on the market.	Producers, retailers, authorities (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Organize environmental awards for hotels and similar facilities to facilitate use reduction of plastic packaging products and substitution with other materials (with the focus on plastic bottles and bags)	Sustainability of European tourism calls for pro-active co-operation among tourism enterprises, tourist destinations and national, regional and local authorities in order to address a wide range of challenges. Environmental Award Scheme principle could be used for promoting sustainable actions and measures in touristic sector in particular toward minimization and reduction of plastic waste generation. Since plastic bags and bottles make the most significant share of all plastic packaging waste in marine litter, environmental award scheme for tourism should include category related to use reduction/waste minimization of plastic bottles/bags and provision of more sustainable alternatives. The Environmental Award Scheme can be granted to those facilities which reduce use/waste generation of plastic bags and bottles, and proved their performance via set of criteria. Use reduction of plastic bottles and bags in accommodation facilities could be measured and corresponding certificates could be established and granted to facilities which: a) reduce consumption of beverages in plastic bottles and provide for adequate alternatives (glass bottles) b) promote consumption of tap water and establish hydration stations in the joint rooms within the accommodation facility (e.g. in the lobby, in restaurant, etc) c) replace plastic bags with paper or canvas bags, where appropriate d) establish separate collection of plastic packaging waste in house e) % of waste recycled by tourism enterprise f) reduce amount of waste to be sent to landfills	Environmental Ministries and Ministries for Tourism; local level (city, municipality) official touristic organizations and local authorities; tourism sector (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)

Organize awards for tourists to reduce use of plastic bags/bottles (and other plastic packaging products) during their stay via lottery	The measure tackles the possibility of the service provides in touristic sector to directly influence the behavior of the tourists in respect to consumption and disposal of plastic packaging products in particular plastic bags and bottles. This takes into account efforts of the accommodation facilities to reduce the use of plastic bottles and bags, to inform visitors on the measures implemented and to motivate them to participate. Visitors can be motivated to participate if the measures do not induce considerable efforts for their involvement, if the measures are simple and the positive effect for the protection of the environment and resources are well communicated and explained to visitors. A simple questionnaire or brochure provided upon check in would be adequate to communicate measures to hotel visitors. As additional stimulation to visitors to participate, hotel administration should organize lottery to reward for faithful commitment of the tourists to the measures implemented in the hotel. For an example, a stamping card provided to the tourists willing to participate will be stamped every time when tourist uses filtered tap water instead of bottled water, or uses canvas bag for shopping instead of plastic bag. A reward may include discount for the next vacation or provision of additional hotel services free of charge (such as wellness program).	Tourism sector.	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Inform tourists and coastal users on importance of use of alternatives to plastic bottles and bags and risks associated with improper use	The measure considers awareness raising campaigns and other informative actions to reduce the negative impacts of plastic bottles and bags entering the marine environment. The target group are especially tourists and coastal users. The informative measures shall include risks associated with improper use of bottles and bags (e.g. entanglement of turtles, birds, ...), proper disposal of bottles and bags (e.g. after leaving the coastal recreational sites) and information on alternatives. The information can be spread via billboards on beaches, leaflets in accommodation facilities, etc.	Municipalities (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Involve beach watch personnel in promotion of anti-littering on the beaches	Involving beach watch personnel in promotion of anti-littering on the beaches could be a simple way to prevent generation of plastic waste on the beach and in the marine environment. Beach watch personnel could be informed/educated related to the marine litter problem and could be involved in motivating beach users to use existing waste collection infrastructure by simple measures such as wearing t-shirts or positioning flags or banners with corresponding messages on marine litter. Messages could e.g. be related to the extent and negative impacts of marine plastic litter, correct disposal behavior ("take your bag away", "bring your bottle back"), benefits of a clean beach. Local authorities and retailers could support such T-shirt campaigns and use them for advertisement. The measure should aim to increase the feeling of responsibility of both, beach watch personnel and beach user for "their" beach. The messages should be made in different languages representing the language capacities of beach users. The beach watch personnel could strengthen the effect of the messages on their T-shirts by corresponding behavior (active communication with beach users) and by their simple presence.	Municipalities and other institutions (touristic institutions) (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)

Allocation of certain percentage of touristic tax to the environmental funds for the project on the prevention/mitigation of beach littering	The measure considers the allocation of certain percent of touristic tax (daily touristic fees in accommodation facilities, parking fees, beach fees) to the environmental funds for the prevention of littering on the beaches and for preventive and mitigating actions. Thus the measure would have positive impacts for the local authorities due to reduced costs for maintaining the cleanliness of the beaches and also for touristic industry due to more attractiveness of the beaches for tourists. The tourism industry generally is not in favor of such taxes, and are seeing this as damaging to tourism and as the mean for local governments to fill their budgets. However by investing the collected revenues in cleaner environment and cleaner coasts should be welcomed by the touristic industry. It is very important to inform tourists that a certain share of tourist tax that they are paying during their stay is allocated to the maintaining the beaches clean. Thereby, the since of responsibility for cleaner beaches may be developed by tourists, since they are also financially participating in the waste management on the beaches, and not only residents. The tourist tax is usually daily tax rates which is played by tourists during the stay. In Germany, for an example, there is bed tax or cultural tax, the values differs across the country. In particular in 2010, there was a boom of such taxes across Germany, possibly in reaction to a reduction in the VAT rate leaving local authorities short of funding.	Tax authorities (all levels) (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Introduce requirements for local management companies to control appropriate source separation of PPW by inhabitants	Municipalities are responsible to organize waste management system on their respective territory. Services for waste management (collection, recycling, disposal) are usually provided via private companies contracted by municipalities or by the municipalities themselves. Local authorities have to control fulfillment of the contracts specification by waste management companies. Local municipalities can delegate the function of controlling waste behavior of inhabitants to local waste management companies by including this requirement in appropriate legislation, by-law, standard or regulation. This should provide local authorities with the instruments and competence to successfully organize waste related issues on its respective territory. Waste management companies are obliged to provide appropriate waste collection and disposal infrastructure, as specified in the contract, but it is also important that inhabitants participate and make use of the structures available. Waste operators have to inform inhabitants via informative leaflets on waste prevention and appropriate source separation, and also introduce miss-incentives such as penalties for non-compliance (e.g. fines, temporary termination of the contract) or positive incentives (discount on the waste bill due to increased quantities of PPW collected separately). This measure will also raise public awareness of solid waste management problems and priorities and promote an effective willingness to pay by inhabitants for waste collection and disposal service.	Municipal authorities, waste collectors (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)

Provide guidelines and manuals on separate collection for different target groups (municipalities, companies, citizens) according to their needs	Municipalities are responsible to organize waste management system on their respective territory. In respect to operational issue, they usually contract private waste management companies (waste collection, disposal, recycling, etc). For the optimal performance of the waste management on the local level, the local authorities can provide manuals and guidelines for all relevant stakeholders. This may include manuals for professionals in waste management related to clarification of legislative provisions and obligations placed on them. It is important to inform inhabitants on the available local infrastructure for separate collection (e.g. via smart phone applications, information on working hours of civic amenity sites and repair and recycling centers, etc) and to provide explanations on proper source separation of recyclables from household waste, including PPW. This measure will also raise public awareness of solid waste management problems and priorities and promote an effective willingness to pay by inhabitants for waste collection and disposal service. Furthermore, state authorities can provide manuals for the local authorities on the establishment of conform and functional waste management system including appropriate separate collection infrastructure on their respective territory.	Municipal authorities, waste collectors (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Include requirements on density and proximity of collection points (bins and container collection) in the settlements (near the shore greater density) in the national legislation	The measure considers an legal obligation on density and proximity of collection points for packaging waste (in particular for PPW) in the regional and local waste management plans of in particular coastal municipalities/regions. This could be reached by amendments in national/local legislation. This obligation is put on producers of packaging products, i.e. is part of the extended producers responsibility and should be either fulfilled by recovery organizations or by producers individually. Municipalities have to make sure, that the measure is correctly implemented and enforced and have to monitor the fulfillment of legislative requirements by recovery organization/producer. Establishing appropriate density and proximity of infrastructure for separate collection of packaging waste at most sensible locations (beaches, waterfront walkways, etc.) could be a low hanging fruit and the costs could be kept moderate (by initially focusing implementation at most sensible locations).	Municipal authorities, producers, waste collectors (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Ensure that the bin design/container design prevents plastic packaging escape (e.g. blown away, taken away by birds, etc.; bins with holes, or covered, sufficient container volume)	The measure considers an legal obligation to use only bins and containers in public places which are designed in a way, that plastic waste cannot be blown out or easily removed by birds, etc; i.e. bins and containers should have a lid or slit and can be secured. This could be reached by amendments in national/local legislation Municipalities have to check the designs of bins in their municipalities and have to make sure that all bins/containers, which have an open top or are cannot be secured are replaced by bins/containers with lids or slits which can be secured (choice of bins/containers depends on available budget, local circumstances (e.g. problem of sea gulls), cultural behavior (e.g. closed bins = effective against sea gulls and wind, but reluctance to open them (dirty), amount of waste disposed of) Establishing appropriate infrastructure at most sensible locations (beaches, waterfront walkways, etc.) could be a low hanging fruit, costs could be kept moderate by initially focusing implementation at most sensible locations).	Municipal authorities and collectors of municipal waste in public places (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)

Ensure proper, uniform and internationally recognisable marking of bins/containers	The ministries of environment from different MS sharing the EU seas should come together and cooperate on development of joint marking system for waste bins within the regional sea in order to facilitate improved separate collection of waste streams for recycling and to minimize contamination of recycling streams. In the countries sharing European regional seas of particular importance is to draw attention to citizens and tourists with uniform and recognizable marking to the bins/containers designated for disposal of PPW, in order to reduce quantities of plastic bags and bottles in marine litter. The marks must be simple and easy to understand in order to facilitate the appropriate massage. Regional competition can be organized for selection of the best solution and design of recycling stickers and in order to take into account some specific cultural specifications of particular region bordering the European seas (e.g. what is considered attractive and informative in MED region could be completely different from the Black sea region). The measure can be also officially communicated via national environmental legislatives. Companies in the waste services provisions should be made possible to access the adequate marking free of charge, but to be responsible for printing costs and efforts invested in placing the stickers on bins/containers. It is important to establish an internet based platform where free of charge all waste collection service providers and manufacturers of waste bin could access the bin stickers and download them for printing. This service should be free of change for all users.	Municipal authorities and collectors of municipal waste in public places (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Introduce system of environmental awards for municipalities which are front runners in use reduction and proper separate collection of plastic bags/bottles, high recycling rates to support and enhance competition for best performance.	The Environmental Award scheme should be introduced for municipalities in order to support and promote competition for best performance in relation to management of PPW. The scheme could be at first implemented in the coastal regions due to potential to minimize dumping and fly tipping of PPW in the marine environment. Municipalities which are front runners in promotion and implementation of actions and initiatives for use reduction of plastic packaging products by its inhabitants (in particular plastic bottles and bags) are eligible candidates for the award. In addition, they need to enhance separate collection and increase recycling rate of PPW. The "best municipality" will be awarded with additional funds for environmental projects from the national environmental funds. Similar scheme is already implemented by the EU - The European Green Capital Award. This already existing scheme could introduce a new section to tackle improvements in management of PPW in the cities and in municipalities and to foster competition for outstanding contributions for prevention, re-use and recycling and proper disposal of PPW. The Award scheme could also have several sub-categories and in particular one for the prevention and use reduction of plastic bags and bottles.	Environmental Ministries within MS; waste collectors, authorities, retailer, tourism sector.	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)

HELCOM Recommendation Proper handling of waste/landfilling	RECOMMENDS that the Governments of all the Contracting Parties for existing landfills within the Baltic Sea catchment area take measures as follows: a) existing landfills not fulfilling the criteria of proper landfilling practices required for obtaining a permit should be closed, or restored in accordance with the national legislation; b) existing landfills which have been nationally granted a permit and do not implement proper handling of waste should be brought in line with the requirements of national legislation or closed down as soon as possible, RECOMMENDS FURTHER that the Governments of all the Contracting Parties take measures as follows: a) the amount of waste to be landfilled should be minimized and its hazard level to the environment and human health should be decreased through introduction and wide implementation of waste separation, pre-treatment and recycling; b) national legislation should be upgraded and enforced in order to reach proper handling of waste and proper landfilling practices and to prevent illegal waste dumping as defined in EC Council Directive 1999/31/EC; c) proper landfilling should be implemented with regard to location, design, construction of new landfills and their operation, closure and aftercare phases; d) the environmental risk of already closed landfills should be assessed and pollution prevention measures should be implemented. Both the procedures must be in accordance with national legislation and in proportion to the possible environmental threat, RECOMMENDS FURTHER that the Contracting Parties should report to the HELCOM Commission on implementation of this Recommendation in 2006 and every three years thereafter.	HELCOM http://www.helcom.fi/Recommendations/en_GB/rec24_5/	Samuli Korpinen, Project Manager, HELCOM; Katajanokanlaituri 6B, FIN-00160 Helsinki
DIRTY DOZEN/SPOT THE DIFFERENCE	Identified significant element of SRD within beach litter and water column (including river banks). Approached NI Water for support including Surfers Against Sewage (both agreed). Launch public awareness raising event for World Oceans Day (June 8th)	Coleraine Borough Council www.colerainebc.gov.uk	Jim Allen, Environment Offier, Coleraine Borough Council; Cloonavin. 66 Portstewart Road, Coleraine N Ireland BT52 1NN
Zero Plastics to Landfill by 2020	The aim for our association is to ensure that, by 2020, no more plastics end up in landfills. The European plastics manufacturers are concerned that despite the huge advances in waste management in certain countries in recent years, many EU member states are continuing to invest in landfilling as a cheap short term solution. Such policies create a significant obstacle to the development of more resource efficient options such as recycling and energy recovery of waste materials, including plastics. In order to tackle this issue, PlasticsEurope urges policy-makers at European, national and local level to support legal instruments that will help foster innovation and unlock private investment into waste collection, sorting, recycling and recovery.	PlasticsEurope	Martin Engelmann, Program Manager, PlasticsEurope; Avenue E. van Nieuwenhuyse 4/3 - 1160 Brussels - Belgium

BIOCLEAN	BIOCLEAN is a European Funded Consortium under the FP7 programme. BIOCLEAN includes 19 partners from 9 different and widely distributed European Countries and 1 from China. Biodegradation of synthetic plastics can occur in nature, in sediments and marine environments as well as in landfills, compost and soil. The process is governed by the polymer characteristics, the organisms available and the surrounding environmental conditions. However, the knowledge on the biodegradation of major synthetic polymers is still very limited and fragmented. BIOCLEAN strategy is aimed at deepening the scientific understanding on the biodegradation of such materials in natural environments and waste disposing facilities and exploring the feasibility of biotechnological solutions for the effective and sustainable disposal of plastic waste. In particular, the consortium will focus on PVC, Polystyrene, Polypropylene and Polyethylene.	University Bologna; University of Applied Sciences - Northwestern Switzerland, Technical University Of Crete, Helmholtz Centre for Environmental - Research, MADEP SA, Internationales Hochschulinstitut Zittau, University of Ostrava, Centre National de la Recherche Scientifique, Polish Academy of Sciences, Organic Waste System, Felsilab S.r.l., Biobasic Environnement, Environmental Protection Engineering S.A., Nanjing University, Inter-Municipal Corporation For Solid Waste Management Of Chania, Maritim Miljø-Beredskap AS, PlasticsEurope, SIMA-tec GmbH, HAVFORSKNINGS-INSTITUTT INSTITUTE OF MARINE RESEARCH http://www.biocleanproject.eu	Ralph Schneider, Project Manager, PlasticsEurope; Av E van Nieuwenhuyse 4/3 - 1160 Brussels - Belgium
Vacances Propres	Vacances Propres is a well established non-profit organisation that promotes responsible behaviour at holiday destinations like beaches and ski resorts. PlasticsEurope joined Vacances Propres as an official sponsor at the beginning of 2011. Created in 1971, by Franck Riboud's initiative (Riboud is the former CEO of Danone), Vacances Propres is a joint effort from the packaging and consumer goods sectors. Among the many members of the association, are Coca Cola, Evian, Perrier, Vittel, Total Petrochemicals, Ball packaging Europe, Arcelor Mittal as well as Eco Emballages (the French Green System organisation). For more than 40 years now, Vacances Propres has been working in close collaboration with municipalities receiving large numbers of tourists in relatively short periods of time. Communication campaigns encourage people to behave as responsibly during their leisure time as they do at home, not throwing litter away and polluting nature; and sorting their waste right on the beach! Vacances Propres' branded waste bags and sorting equipment are at free disposal to make it easy for everyone to respect the environment. Among its many other activities, the association also organises local actions for voluntary cleaning of leisure spots. Vacances Propres also has the full support of the French Mayors' association (Association des maires de France). http://www.vacancespropres.com/	PlasticsEurope	Michel Loubry, Director West Region, PlasticsEurope; Le Diamant A - 14, rue de la République - 92800 Puteaux - France

Organize training of waste operators to introduce simple measures to prevent that collected PPW becomes litter	Building capacity by operational professionals in provision of waste services to introduce simple measures to prevent collected PPW escaping into the environment, during transportation, or in landfills, could be very effective and simple measure to prevent PPW becoming the litter.	Waste management companies; local authorities (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Measures tackling sea-based litter	**Short Description**	**Implementing organization and possible partners**	**Contact Person**
Stronger (financial) incentives to deliver ship-generated waste at the port reception facilities and to discourage dumping at sea	The Directive on Port Reception Facilities (2000/59/EC) sets key principles for the fees on ship generated waste (Art. 8): these could make a significant contribution to the costs of port reception facilities and waste management, and at the same time provide no incentive for ships to discharge their waste to the sea.	Port authorities, shipping companies; port waste management companies (not specified).	Tony Zamparutti/ Milieu (tony.zamparutti@milieu.be)
Adequate port reception facilities and timely handling and safe disposal	The Directive on Port Reception Facilities (2000/59/EC) calls on Member States to ensure adequate reception facilities for the ships that normally use their ports (Art. 4). MARPOL 73/78 also requires port reception facilities, and a 2012 IMO Resolution (MEPC.219(63)) sets some further elements for adequacy, and notes that ports can require ships to separate waste onboard, including plastics. As EMSA notes, EU ports normally assess port reception facility needs based on the amounts of ship-generated waste delivered in previous years. In 2010, EMSA found that most EU Member States had adequate port reception facilities (the report found little information, however, on the delivery of cargo residues). This implies that measures to expand port reception facilities will be needed only in a few ports. At the same time, it will be important to ensure that waste storage and other facilities protect waste from being dispersed by wind and rain.	Port authorities (not specified).	Tony Zamparutti/ Milieu (tony.zamparutti@milieu.be)
Guidance for ships' Garbage Management Plans	Under Annex V of the MARPOL Convention, all ships of more than 400 tons or certified to carry more than 15 persons must prepare a Garbage Management Plan (from January 2013, all ships of more than 100 tons), and carry a garbage record book. The discharge at sea of many types of waste, including all plastics, is prohibited. In a 2012 guidance, IMO calls for ships to minimize taking onboard material that could become garbage. In addition, under the Directive on Port Reception Facilities (2000/59/EC), ships that demonstrate that they have an environmental management system that reduces their waste generation can be given reductions in port fees. Further guidance on garbage management on ships, and on the elements of environmental management systems for ships, could be prepared. It would be most useful for guidance to be prepared at EU level, e.g. by an EU institution or via the European Certification Organization (CEN).	EU MS, IMO and shipping sector.	Tony Zamparutti/ Milieu (tony.zamparutti@milieu.be)
Enforcement and inspection related to port reception facilities	The Directive on Port Reception Facilities (2000/59/EC) sets requirements on ships to delivery waste and cargo residues at port, rather than dumping them at sea, and on ports to have adequate facilities to receive waste and cargo residues. (In general, fishing and recreational vessels are exempt from the provisions of the directive; however, EMSA recommends inspections of these sectors.) The Directive sets out requirements and principles for enforcement and inspection of ships (Art. 11). EMSA indicates as good practice that inspections are decided on the basis of the notifications of waste made by ships when they enter ports (better done when notifications are made electronically via an IT system), and also look at inconsistencies (or absence) of the notifications. Moreover, ports should communicate with each other, in particular on suspicious cases. Port and inspection authorities are often separate, and need to communicate properly. Inspectors should have checklists; EMSA has indicated examples of good practice for checklists. Where possible, these inspections can be linked to overall environmental control inspections. The specific actions to be taken will vary based on existing systems in ports.	Port authorities, shipping companies; port waste management companies (not specified).	Tony Zamparutti/ Milieu (tony.zamparutti@milieu.be)

Guidance for maritime cargo transport and port cargo handling	Accidental loss of cargo can be a problem at sea, and also in port cargo handling. Guidance could address both issues and encourage a reduction in cargo losses.	EU MS, IMO and shipping sector.	Sibylle Greindl/ Milieu (sibylle.greindl@milieu.be)
Awareness raising on marine litter for shipping, fishing and recreational sectors	One proposal received underlines that awareness-raising is valuable as a complement to other measures for ship-generated waste (regulatory requirements, good enforcement and appropriate port reception facilities). Awareness-raising can be carried out for all maritime sectors, including shipping, fishing as well as recreational boating, Awareness-raising is particularly valuable for the latter two sectors, as they can be exempted from many of the requirements under the Port Reception Facilities Directives. The objective is to prevent sea waste produced by ships.	Possibly EU; alternatively, MS, ports; associations for shipping, fishing and recreational boating.	Tony Zamparutti/ Milieu (tony.zamparutti@milieu.be)
Conduct education and outreach campaigns to promote the use of technologies that minimize loss of fishing gear and ghost fishing (incl. technical standards)	MARPOL 73/78, Annex V, prohibits the dumping at sea of many types of garbage, including fishing gear. While the accidental loss of fishing gear is exempted, 'all reasonable precautions … to prevent such loss' should be taken. Moreover, fishing vessel operators are required to report accidental losses. Education and outreach campaigns can inform the fishing sector of these requirements and also promote technologies to minimize losses of gear (i.e. good and best practices that can be part of 'all reasonable precautions').	Member States and ports, EU; fishing industry associations (not specified).	Tony Zamparutti/ Milieu (tony.zamparutti@milieu.be)
Introduce a deposit-refund system for EPS fish boxes	Introduce a voluntary deposit refund systems for EPS fish boxes. The user (fisherman, fish processor, retailer, consumer) has to pay a certain deposit for each EPS fish box (e.g. 0.5 to 2€). When returning the fish box to the EPS fish box collection point (e.g. in ports, at local fish markets, in retail) the deposit is paid back.	Port authorities or municipal authorities; retailers (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Sustainable Cruise	"Sustainable Cruise" is co-funded by the European Commission through LIFE+ the European program for supporting environmental projects. Starting with a "Pilot ship", Costa Pacifica, the project proposes experimenting management models and innovative technologies which meet the objectives established by the European Directive on waste, which can be summarized in the so-called 3Rs: Reduce, Re-use and Recycle. In practice, starting with a detailed analysis of the waste flows on board, the project partners propose identifying concrete actions which meet these objectives and which can be effectively applied to other sectors as well (eg catering and hospitality). Specifically for optimizing the project results, Sustainable Cruise is concentrated on three types of waste: biodegradable waste, packaging and paper. At the end of the project, for each of these categories, innovative solutions will be proposed and where possible positively applied. These solutions will be aimed at the reduction of packaging, transformation of food and paper into merchandisable by-products, and at increasing the percentage of waste destined for recycling. Hypotheses will be analyzed from the technical, environmental and economic point of view during the project thanks to the commitment of the partners involved: Costa Cruises, Ce.Si.S.P., MedCruise, VOMM, Contento Trade, Design Innovation and RINA Services.	Costa Cruises, Centre for the Development of Product Sustainability (CE.Si.S.P.), MedCruise, VOMM Impianti e Processi Srl, Contento Trade srl, Design Innovation, RINA Spa www.sustainablecruise.eu	Elisabetta Pinna, Head of Training&Competence, Maritime HESS Development; Piazza Piccapietra, 48 - 16121 Genova - Italy
Recycling System for Waste EPS	To improve economical recycling system for EPS Fish Boxes in fish wholesale markets etc and fishing floats. JEPSA purchased the volume reduction machine for waste EPS float treatment, and JEPSA lend the such machine to the Agency (marine blue 21), made the contract of business such as operation instruction.	The Japan Plastics Industry Federation; Japan Expanded Polystyrene Association http://www.jpif.gr.jp	Yasuhiko Mizuno, Executive Director, The Japan Plastics Industry Federation; 3-5-2, Nihonbashi-Kayabacho, Chuo-ku, Tokyo 103-0025, JAPAN

Application of the no-special-fee system to ship-generated wastes and marine litter caught in fishing nets in the Baltic Sea area	RECOMMENDS that the Governments of the Contracting Parties apply the attached Guidelines for the establishment of a harmonised "no-special-fee" system for the operation of reception facilities in their ports as of 1 January 2000 for ship-generated wastes covered by Annex I (oily wastes from machinery spaces) of MARPOL 73/78 and as of 1 January 2006 for wastes covered by Annex IV (sewage) and Annex V (garbage) of MARPOL 73/78, RECOMMENDS ALSO that the litter caught in fishing nets be covered by the “no-special-fee” system.	HELCOM http://www.helcom.fi/Recommendations/en_GB/rec28E_10/	Samuli Korpinen, Project Manager, HELCOM; Katajanokanlaituri 6B, FIN-00160 Helsinki
LINEOUT	response to research which demonstrated a high proportion of recovered shore material composed of discarded and lost recreational fishing gear (monfilament line and tackle). targetted anglers and designed bespoke bins to be installed at all Council harbours, ports, marinas and informal fishing marks. partnered by Marine Conservation Society UK.	Coleraine Borough Council; retail sector/fishing groups/Marine Conservation Society/local Charter Boating skippers. www.colerainebc.gov.uk	Jim Allen, Environment Offier, Coleraine Borough Council; Cloonavin. 66 Portstewart Road, Coleraine N Ireland BT52 1NN
Fishing for Litter and Ghost Nets retrieval	Fishing for Litter: Fishermen voluntarily participate in the project by collecting the litter that ends up in their fishing gear and bringing it ashore where port staff weigh and monitor the litter in accordance with UNEP codes. The aim of the project is to raise awareness of the marine litter – problem and get an idea of the types of litter that exist in the sea. Ghost Nets retrieval: We are having a holistic approach on the issue where we both retrive nets but also focus on the nature of the problem.	KIMO Baltic Sea www.kimobaltic.eu	Ida Wingren, Project Manager, KIMO Baltic Sea; Varvsgatan 4, 272 36 Simrishamn, Sweden
Establish recycling management schemes for EPS fish boxes in ports and local markets close to the coast	Most relevant quantities of EPS fish boxes arise at ports and local fish markets. The measure aims to collect and recycle the EPS fish boxes arising at these locations by promoting the establishment of management schemes for the recycling of EPS fish boxes in close coordination between recyclers, ports, municipalities and local retail. The recycling schemes should cover the whole value chain including collection, cleaning, compacting or grinding, transport and recycling. The management system should also include awareness raising and information such as providing clearly visible information in fishing ports and local markets on the correct use and disposal of EPS fish boxes and where the boxes are collected.	Port authorities or municipal authorities; local retailers (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Cleaning measures	**Short Description**	**Implementing organization and possible partners**	**Contact Person**
Coastwatch Campaign (Portugal)	Coastwatch is a project with a strong component of environmental education. It promotes active citizenship in school community and allows a significant coastal monitoring, including marine litter monitoring. In some cases, beach cleanups are associated to Coastwatch monitoring program. The Coastwatch Campaign is organized into four phases: 1) Preparation and dissemination of the campaign, 2) Monitoring and training of teachers, students and other participants, 3) organization of data, regional reports and statistical analysis and 4) Preparation and presentation of final report and campaign results.	GEOTA (NGO); the Portuguese Ministry of Education; the Portuguese Ministry of Agriculture, Sea, Environment and Spatial Plan, and the Portuguese Institute of Sport and Youth.	Fundação da Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa (ffct.secretariado@fct.unl.pt; http://www.fundacao.fct.unl.pt)
Sea Surface Marine Litter Cleaning Operation	Garbage collection boats gather all sorts of marine litter (plastic bags, balloons, buoys, rope, medical waste, glass and plastic bottles, cigarette lighters, beverage cans, polystyrene, fishing line and nets) almost everyday in coordination with a shore team. İstanbul Metropolitan Municipality and Beşiktaş Municipality send collected marine litter to waste repositories to be sent to recycling plants later.	Three municipalities of metropolitans, namely İstanbul, Kocaeli, and İzmir, and the district municipality of Beşiktaş.	Nejat Büyükköksal/ Beşiktaş Municipality (http://www.besiktas.bel.tr/)

Meer ohne Plastik	The BUND raises awareness to the topic of marine litter at both seafarers and German inhabitant by beach cleaning events and attractive educational material.	BUND e.V., Seas at Risk	Nadja Ziebarth, Policy Officer for Marine, Bund für Umwelt und Naturschutz Deutschland e.V.; Am Dobben 44, D-28203 Bremen
Coast rescuers -a manifestaton against marine litter	Coast Rescuers is a public campaign - and a manifest against marine litter. The campaign organise a number of event beaches with thousands of people cleaning their local beach. The litter collected is monitored and the public helps to document the litter with pictures and social media. The aim of the campaign is to increase the knowledge of marine litter and its consequences and to present a tangible solution that everyone can be part of.	Keep Sweden Tidy, Coastal municipalities and private business in Sweden	Jessica Ångström, Project leader, Keep Sweden Tidy
HELCOM Recommendation on Marine Litter	Gives a unified method of sampling and reporting of marine litter found on beach. Recommends also that all the Baltic Sea States should support beach litter monitoring activities and beach clean-up campaigns and should cooperate with local authorities and NGOs in this matter.	HELCOM http://www.helcom.fi/Recommendations/en_GB/rec29_2/	Samuli Korpinen, Project Manager, HELCOM; Katajanokanlaituri 6B, FIN-00160 Helsinki
Ocean Initiatives	Ocean Initiatives is an international eco-citizen campaign to raise awareness of the marine litter issue and dedicated to the protection of our coastline, lakes and rivers. Our volunteers organize local beach clean-up operations, with the help of Surfrider Foundation Europe who coordinates operations, provides logistical support and broadcasts news of the events on an International, European, national and local level. Educational tools provided by Surfrider inform participants on the marine litter problem and encourage them to adopt a better sustainable behaviour. Clean-ups operations can be conducted on the beach, lake or river, underwater, from a canoe, a boat or with any other chosen mean.	Surfrider Foundation Europe www.initiativesoceanes.org	Cristina Barreau, Project Officer, Surfrider Foundation Europe; 33 allée du Moura
IF THEY ONLY KNEW	began 1989 with schools outreach programme to raise awareness about litter in general with a strong emphasis on shoreline litter, later developed to include marine debris. Various, regular cleanups including personal research into range, types and impacts of marine debris and beach visitor discards along north irish coastline. Annual shoreline cleanups (incudes river bank/estuaries)a feature. developed hard hitting marine debris talk delivered to wide audience. Helped instigate and develop first Tidy Ulster Shoreline conference to look into problem 1992 with Tidy Northern Ireland. helped form and contribute to UK Talk/Workshop group based in London (no longer meeting). recently labelled talks programme as 'If They Only Knew'.	Coleraine Borough Council; www.colerainebc.gov.uk	Jim Allen, Environment Offier, Coleraine Borough Council; Cloonavin. 66 Portstewart Road, Coleraine N Ireland BT52 1NN
Measures addressing the production_less litter by means of smart production	**Short Description**	**Implementing organization and possible partners**	**Contact Person**

Support and enforce eco-design of plastic packaging products	Existing initiatives related to eco-design from industry and authority side should be promoted in order to enforce eco-design more efficiently. Currently there is no EU harmonized approach and definition of the eco-design for plastic packaging products, in particular for plastic bottles and bags. Article 9 of PPWD requires Member States to ensure that only packaging that complies with the essential requirements (ER) of Annex II of the Directive may be placed on the market. For this purpose, harmonized standards shall give presumption of conformity with the ER. In the absence of harmonized standards, national standards can also give presumption of conformity. At Community level, the references to harmonized standards EN 13427:2004, EN 13428:2004, EN 13429:2004, EN13430:2004, EN 13431:2004 and EN 13432:2000 have been published in a Commission Communication in OJ C 44 of 18 February 2005 and give conformity to ER of the PPWD. Packaging which complies with the standards is deemed to be in conformity with the ER. Companies have the responsibility of demonstrating compliance when requested by the competent authority. Article 9 of the Directive 94/62/EC requires that: "… packaging may be placed on the market only if it complies with all essential requirements defined by this Directive including Annex II".	Plastic and plastic packaging industry associations; environmental ministries of MS.	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Establish annual Environmental Award Scheme for the PPP industry sector to foster innovations in production	Environmental Awards Scheme is a well established initiative on EU level but as well as in many MS. On the EU level the scheme is implemented since 1987 - the European Business Awards for the Environment (EBAE). Since then the scheme has annually rewarded companies that make an outstanding contribution to sustainable development by introducing significantly improved products, processes and services, organizational change or marketing strategies which reduce the use of natural resources and decrease harmful emissions into the environment. From these improvements the business itself is also benefiting due to reduced costs and increased efficiency, better competitiveness on the market and is strengthening the company image in the eye of consumers. It is important to motivate players from PPP to contribute to the protection of the environment and in particular marine environment, thus the Environmental Award Scheme should include a category which would directly tackle protection of the marine environment against pollution arising from inappropriate management of PPW and loopholes in the life cycle of PPP. Thereby it is important to support innovations and research and development which would allow production of "thinner" plastic bottles and bags, in order to contribute to the quantitative reductions, as well as to support and promote close loop business models with integrated stakeholders and material and energy resources, which would minimize the risks of PPW escaping the life cycle and becoming litter.	Environmental Ministries within MS; industry (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)
Apply pressure manufacturers to minimize material and make products more environmental friendly with aim to reduce the input& impact of sanitary waste (e.g. cotton bud sticks, tampons (applicators), disposable nappies) into the marine environment	Pressure to be applied to manufacturers to minimize material and make products more environmental friendly. Manufactures can be motivated to make products more environmental friendly by e.g. the EU-wide introduction of a specific ecolabel for sanitary products, pressure from ngo's/governments and inspiring best practices from producers(e.g. cardboard tampon applicators from the brand Natracare).	NGO's, government & Industry (producers of sanitary products)	Stijn Lambert, Arcadis Belgium nv; Koningsstraat 80 | 1000 Brussel
Measures addressing knowledge and data gaps	**Short Description**	**Implementing organization and possible partners**	**Contact Person**

Implementation of improved and harmonized EU monitoring system for beach litter	Implementation of an improved and harmonized EU monitoring system (to be developed at EU level), including * regulatory basis for continued monitoring (incl. available resources (manpower + budget)) * clear guidelines for beach monitoring (macro, meso)	National governments (not specified).	Annemie Volckaert/ ARCADIS Belgium (a.volckaert@arcadisbelgium.be)
Establishment of monitoring system for marine litter (sea)	In order to get a better understanding of the marine litter problem, a monitoring system is to be setup as a means to quantify the amounts of marine litter, spatial distribution, composition and impact of litter on marine life that is present in the water column (particularly micro-plastics), ingested by marine animals (e.g. stomach analysis), floating on the water surface and is deposited on the sea floor.	Possibly regional sea organizations; and national environmental bodies (not specified).	Sibylle Greindl/ Milieu (sibylle.greindl@milieu.be)
Operation Clean Creeks ('Calanques Propres')	Over the past forty years, associations, a Committee of Interest of the district, and sports clubs, organize cleanups of creeks. In 2003, Marseille Horizon proposed to unite their efforts on the same day to reinforce the message and facilitate logistics. In 2005, Marseille Horizon approached MerTerre, which then invited the participants to quantitatively and qualitatively assess the collected waste. And in 2008, the overall coordination of the operation was entrusted to MerTerre. Since its inception, the operation continues to grow in size.	MerTerre, Marseille Horizon (http://www.marseille-horizon.org/19_ope_2012_modif.html).	Isabelle Poitou/ MerTerre (association@mer-terre.org/http://www.mer-terre.org)
Coastwatch Campaign (Portugal)	Coastwatch is a project with a strong component of environmental education. It promotes active citizenship in school community and allows a significant coastal monitoring, including marine litter monitoring. In some cases, beach cleanups are associated to Coastwatch monitoring program. The Coastwatch Campaign is organized into four phases: 1) Preparation and dissemination of the campaign, 2) Monitoring and training of teachers, students and other participants, 3) organization of data, regional reports and statistical analysis and 4) Preparation and presentation of final report and campaign results.	GEOTA (NGO); the Portuguese Ministry of Education; the Portuguese Ministry of Agriculture, Sea, Environment and Spatial Plan, and the Portuguese Institute of Sport and Youth.	Fundação da Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa (ffct.secretariado@fct.unl.pt; http://www.fundacao.fct.unl.pt)
Collecting Ghost Nets in the Baltic Sea	In 2011, WWF Poland together with fishermen, scientists and divers conducted a pilot project financed by Baltic Sea 2020, with a view to work out the methodology for net removal and carry out activities to clean the Polish territorial waters from ghost nets. As a result 6 tonnes of ghost nets were retrieved from the Baltic during 24 days of actions at sea – from sea bottom and two ship wrecks. To further diminish the impact of ghost nets on the Baltic ecosystem actions aimed at collecting ghost nets should be accompanied by measures aimed at preventing the loss of fishing gears. WWF is of the opinion that improved marking of fishing gears that would permit their quick retrieval and creation of port reception facilities where nets could be deposited free of charge are the most effective measures to combat the phenomenon of ghost nets. Considering the number of nets lost annually in the Baltic fishing grounds, estimated in the framework of the project describe above WWF Poland, with financial support of Baltic Sea 2020 decided to extend the Project in 2012 to Polish and Lithuanian waters. By collecting lost nets in the Polish and Lithuanian economic zones and creating internet database of “hooks”, the project will contribute to decreasing unnecessary and uncontrolled impact of ghost fishing on the species which are already heavily affected by commercial fisheries. The project will also contribute to raising awareness of sea users with regard to the lost nets.	WWF Poland	Piotr Prędki/WWF Poland

Cleaning and maintenance of riverbeds and dry rivers (rieras)	In the Mediterranean region in particular, many rivers are intermittent, i.e. their beds are dry for a substantial part of the year (Catalonia has both rieras and torrents - rieras also have water in wet periods of the year, but torrents only after rainfalls). When dry, these river beds are sometimes used for fly tipping. In addition, they can accumulate wind-borne waste. During heavy rains, the accumulation of waste can be then washed to sea. In Barcelona and nearby communities, the local councils employ workers to collect waste in the rieras. This can be carried out as a form of employment for youths and long-term unemployed. Current approaches in the Barcelona area (in the first half of 2012) addressed this problem, but further action could be taken.	Local authorities (not specified).	Tony Zamparutti/ Milieu (tony.zamparutti@milieu.be)
Cleaning and maintenance of sewer network	Many agglomerations in the EU use a 'unitary' sewage system for both rainwater runoff from the streets and domestic wastewater. Litter on streets and in other areas can be swept into the sewer network during rainfall. Some litter may accumulate in the sewer network, and then be released during periods of heavy rains. In such heavy rains, moreover, water overflows are released untreated from the system. The objectives is to improve the collection of domestic solid waste and waste water through better waste water treatment capacity.	Local authorities, water service organizations and potentially other organizations (not specified).	Tony Zamparutti/ Milieu (tony.zamparutti@milieu.be)
Specific conditions for the clean-up of construction sites on a contractual basis	In Oostend, a civil servant from the local (coastal) authorities shall inspect construction sites. Construction companies are currently not systematically taking care of the garbage and waste they produce at or along their construction sites. A key concern is that plastic waste (especially but not limited to packaging) at construction sites can be blown away by the wind if not properly collected and managed, in particular for construction sites near seashores and rivers. A special clause can be added to the contract specifying that construction companies properly manage their waste flows and in particular prevent litter from being flushed, blown or thrown away. This could be a requirement for obtaining a building permit, or in case of a public client, added directly to the contract. This could also be promoted voluntarily among construction companies.	Municipalities (potentially other bodies carrying out inspections of construction sites), construction companies (not specified).	Sibylle Greindl/ Milieu (sibylle.greindl@milieu.be)
Increased capacity of municipal waste services during top season (daily cleaning of beaches in touristic season(between 15 May and 15 September)	Daily cleaning of touristic beaches during high season (May to October) using both mechanical and manual methods.	Coastal municipalities, managers of beach pavilions (esp. in the Netherlands); maybe social employment organizations (not specified).	Stijn Lambert/ARCADIS Belgium (S.Lambert@arcadisbelgium.be)
Microplastic pollution of the Slovenian sea	For the process of MSFD implementation Slovenia convened with the analysis of microplastic pollution of the marine environment in collaboration with University of Nova Gorica. Undergraduate students of Faculty for environmental science have obligatory subject of Group work project in which a group of students is working on one subject for 4 semesters. Institute for Water initiated collaboration with the purpose to make process faster and at the same time to educate students on marine litter problematic. For analysis of microplastic pollution we take samples from sea surface with epineustouen net (manta net, 300 micron) and from beach sediment. Students are collaborating in sampling and sample analysis in the laboratory, with results being collected in reports that are made in english language.Students are being involved also in raising awareness activities. They made their own website with microplastic content and description of their work, Facebook profile has ben made (Mikroplastika) where students are posting results, activities, interesting videos or photos, etc. Students also were interviewed by local radio station and were filmed for documentary on plastic pollution in Slovenia.	Institute for Water of the Republic of Slovenia, University of Nova Gorica http://www.izvrs.si/	Andreja Palatinus, Independent Associate, Institute for Water of the Republic of Slovenia

MARLIN - Baltic Marine Litter	The Baltic Marine Litter Project, MARLIN, is a two-year (2012-2013) project that aims to assess and compare the situation regarding the amount and sources of marine litter on the shores of the Baltic Sea. 25 key areas around the Baltic Sea are monitored. The shores are assessed three times a year in differens seasons by using methods described in the United Nations Environmental Programme (UNEP) guidelines. The litter found on the shores is carefully analysed by amount and type. Owing to the standardised assessment method, the results are, for the first time comparable both for the various regions of the Baltic Sea and globally. The new knowledge of marine litter is believed to be of value to the implementation of the Marine Strategy Framework Directive. Raising awareness and changing attitudes are crucial for the ultimate goal to reduce littering. The Marlin project run several campaigns in order to put marine litter on the political and public agenda. www.projectmarlin.eu	Keep Sweden Tidy; Keep The Archipelago Tidy, Keep Estonia Sea Tidy, FEE Lativa	Jessica Ångström, Project leader, Keep Sweden Tidy
Compilation and assessment of selected anthropogenic pressures in the context of the Marine Strategy Framework Directive - Descriptor 10	As part of a project embedded in the implementation of the Marine Strategy Framework Directive (MSFD), we were commissioned to analyze data from monitoring of marine litter, including microplastics, on beaches and in other compartments of the marine environment. Spatial and temporal trends should be identified, and results should be used to classify European marine waters according to their level of pollution with marine litter. Prior to evaluation, indicators of the Good Environmental Status (GES) should be defined, such as the existing OSPAR-EcoQO on the amount of plastic in the stomachs of northern fulmars. Finally for all marine compartments, recommendations for future monitoring of marine litter have to be given.	University of Osnabrück, Institute of Environmental Systems Research; Regional Agency of Coastal Protection, National Park, and Marine Protection of Schleswig-Holstein; Research and Technology Centre, University of Kiel; Alfred-Wegener-Institute, Helmholtz-Centre for Polar and Marine Research; Federal Environmental Agency of Germany	Marcus Schulz, University of Osnabrueck (Germany), Institute of Environmental Systems Research; Barbarastrasse 12, 49076 Osnabrueck, Germany
Study on land-sourced litter in the marine environment	The plastics industry in Germany, Austria and Switzerland is joining forces against land-sourced litter in the marine environment. On the basis of the "Declaration of the Global Plastics Associations for Solutions on Marine Litter" (www.marinelittersolutions.com), BKV, IK, Swiss Plastics and FCIO commissioned the "Study on Land-sourced Litter in the Marine Environment", which was prepared by Öko-Institut e.V., Darmstadt, Germany. The objective of the study was to carry out a literature review in order to 1) gather available data on quantities, composition and sources of land-sourced litter in the North Sea, the Baltic Sea and the Mediterranean, 2) display possible fields of research and reduction measures of different stakeholders in the field of land-sourced litter, 3) pave the way for sound impact assessment of reduction measures. Öko-Institut was commissioned to study existing literature, focusing its attention on three European seas, i.e. North Sea, Baltic Sea and the Mediterranean. All the available studies regarding land-sourced litter were collected and analyzed. In order to develop a scientifically founded basis for taking specific measures to avoid further dumping, this particular factor was closely examined. The report has not considered other factors, such as ecological impact, the part that legislation has to play, or the significance of education and behavior.	BKV GmbH Platform for Plastics and Recovery (Germany), IK Industrievereinigung Kunststoffverpackungen e.V. (Germany), Swiss Plastics (Switzerland), FCIO Federation of the Chemical Industry of Austria (Austria); Öko-Institut www.bkv-gmbh.de	Stephanie Cieplik, Project Manager, BKV GmbH; Mainzer Landstr. 55

Working Group 40 - Sources, fate and effects of micro-plastics in the marine environment – a global assessment	The question of the degree to which micro-plastics and associated chemical loads present a risk to organisms was raised through the GESAMP emerging issues programme. Following the preparation of a scoping paper in 2009, a Workshop was held in June 2010, hosted by UNESCO-IOC in Paris, bringing together experts from industry, academia, NGOs and policy to examine Plastic particles as a vector in transporting persistent, bio-accumulating and toxic substances in the oceans. The proceedings of this Workshop were subsequently published as GESAMP Reports and Studies No. 82 in 2010. One of the recommendations was that GESAMP should carry out a global assessment. This resulted in the creation of Working Group 40 with the following Terms of Reference. A specific workshop was already organized in 2010. The report summarizing the discussion can be found here. http://www.gesamp.org/	UNESCO – IOC http://www.gesamp.org/work-programme/workgroups/working-group-40	Ralph Schneider, Project Manager, PlasticsEurope; Avenue E. van Nieuwenhuyse 4/3 - 1160 Brussels - Belgium
Biocarrier Report	It is quite easy to end biocarriers pollution even though it is diffuse pollution - leaks due to improper use of the process or poorly adapted installations. Most users of the biocarriers process are industrial companies (print, fish farming, grape-growing,etc.) however individuals too may use them as well (in particular in fish ponds). We know the public water-treatment plants which are using them but we have very little information on the private ones. Identifying potential biocarriers users is a long-term investigation work. Their equipment is poorly adapted and that is why there is a large amount of biocarriers released in the environment.Besides, manufacturers, distributors and users of the process are somewhat relectant to give us information. We are hoping that this report will be a baseline of consultation and information around these procedures. We also expect to establish recommendations for a good use of the process and promote good practices charters. We are hoping to end biocarriers diffuse pollution by 2015.	Surfrider Foundation Europe www.surfrider.eu	Cristina Barreau, Project offier, Surfrider Foundation Europe; 33 allée du Moura
Miscellaneous measures	**Short Description**	**Implementing organization and possible partners**	**Contact Person**
Strengthen and support intra-governmental institutional arrangements consolidating regional activities on marine litter; support enforcement of the measures and actions of the RAPs via national policies	Regional Action Plans for the EU regional seas are action oriented initiatives targeting priority categories of pollutants and activities to be prevented, mitigated or eliminated by the countries bordering specific European regional sea via planned timetable for implementation of specific measures and actions to achieve the positive results.	Regional and nationa competent authorities (not specified).	BiPRO (Vesna.Milankov@bipro.de; Alexander.Potrykus@bipro.de)

Annex II: New initiatives

Measures	Short Description	Implementing organization and possible partners	Contact Person
Mosa Pura	Investigate the amount of litter transported by a river to the seas. Develop sampling methods on floating and suspended litter, relate river litter to sources on land, involve local stakeholders for prevention and clean-up. Supply scientific base to expand knowledge to other rivers (use experience in Global NEWS-model).	Kastoro and River Litter Foundation www.mosapura.org	Gijsbert Tweehuysen, Director, Kastoro Foundation; Luiperbeekstraat 23, Klimmen, 6343PT, NL
Ocean Initiatives	Surfrider Foundation Europe's most emblematic event, Ocean Initiatives are both an awareness campaign to highlight the problem of marine litter and a (beaches / coastlines/ seabed) clean-up operation. They have taken place, worldwide, each year for 18 years. In 2012, they gathered 50,000 participants in over 1230 operations.	Surfrider Foundation Europe www.surfriderfoundation.de	Rainer Uhl, Surfrider Foundation Europe, chapter North Germany; Vereinsstr. 85, 20357 Hamburg, Germany
Rise Above Plastics	Rise Above Plastics Mission: To reduce the impacts of plastics in the marine environment by raising awareness about the dangers of plastic pollution and by advocating for a reduction of single-use plastics and the recycling of all plastics.	Surfrider Foundation Europe www.surfriderfoundation.de	Rainer Uhl, Surfrider Foundation Europe, chapter North Germany; Vereinsstr. 85, 20357 Hamburg, Germany
MARNOBA Project	See: http://www.vertidoscero.com/Marnoba_AVC/index.htm (in Spanish)	Asociacion Vertidos Cero; Financing partners: The Biodiversity Foundation (Spanish Ministry for the Food, Agriculture and Environment), Vertidos Cero Association and Kaine Marine Services.	Estibaliz Lopez- Samaniego, Director (Technical Division), Vertidos Cero Association; Calle Naciones #9 entre planta B 28006, Madrid, Spain
Upcycle the Gyres	Upcycle the Gyres aims to harvest marine pollution and transform it into high value revenue streams. Upcycle the Gyres Society aims to incorporate harvesting and upcycling of marine plastic pollution into the blue economy as a self-sustaining and profitable proposition with positive environmental impact. Our strategy consists of: 1. Education o Educate businesses, schools, and consumers that plastic is too valuable to waste. 2. Prevention o Prevent plastic garbage from reaching waterways and the ocean by dealing with waste at point source. 3. Remediation o Remediation of landfills, rivers, and oceans by implementing Regenerative Technologies, Integrative Design and a Therapeutic Process to cleanup operations.	Upcycle the Gyres Society – PlasticShore http://upgyres.org/	Jose Luis Gutierrez-Garcia, Project Director, Upcycle the Gyres Society; 1062 Lillooet Rd, North Vancouver, Canada
Prevent Pellet Loss from Japan Plastics Industry	Increase the awareness of our industry towards pellet losses in the environment We form a new leaflet promoting attention by 2013 and distribute it to the companies and associations concerned	The Japan Plastics Industry Federation http://www.jpif.gr.jp	Yasuhiko Mizuno, Executive Director, The Japan Plastics Industry Federation; 3-5-2, Nihonbashi-Kayabacho, Chuo-ku, Tokyo 103-0025, JAPAN

Education-Booklets for Kids about marine litter	Create and spread free printed educational information material about recognition and prevention of further entry of plastic waste into the seas (e.g. books, brochures, etc.) for children aged about 6-10 years. Information and instructions for teachers and parents should be included. The material has to be usable internationally just by translation into the local languages. Step 1: Research about existing material (movies, books, booklets, educational material etc.) Step 2: winning authors from different countries to cooperate Step 3: Fundraising Step 4: Implementation Step 5: search of Sponsors for print runs (from local up to international), Step 6: build up distribution and PR work	Angelika Heckhausen http://marine-litter-art.jimdo.com	Angelika Heckhausen, Project Blue Sea; Siemenswerderweg 48, 13595 Berlin, Germany
Riverine Litter Catcher	This modular, floating, static device catches litter from -80cm to surface from flowing rivers, waterways and/or estuaries. Two booms concentrate the litter, to be sorted and recycled on board. Both biomass and plastics are sorted and can be recycled -plastics- or returned to nature -biomass-. The devices' maximum capacity is approx. 3 tons per hour. The development has been financed by the Dutch Ministry of Infrastructure and Environment. Pilot model is available for implementation until max. depth of 6 meters; waterflow is required. Full technical description and economic analyses are available.	Investments in Sustainable Innovations (ISI) http://www.agentschapnl.nl/content/sbir-project-zwerfvuil-uit-rivieren	Yvon Wolthuis, Managing Director, ISI; Regentesselaan 5, Utrecht, The Netherlands
Waste Free Oceans	Waste Free Oceans(WFO)is a ground breaking public-private foundation aimed at mobilizing and uniting the fisheries sector, public authorities and the international plastics industry in combating the growing issue of floating litter on the coastlines, at the rivers and in the seas. Various projects were launched in Europe (France, Belgium and Spain) during 2011 with participation and full support of EU Commissioner Mrs. Maria Damanaki (Maritime Affairs & Fisheries) and MEP Mrs. Anna Rosbach. During 2012 more projects were launched in Portugal, France, Sweden, Austria, Turkey, Denmark, Hungary, The Netherlands and Cyprus. WFO also has pilot operations and offices for the Americas in the Dominican Republic (Santo Domingo), The Middle East & Africa in Turkey (Istanbul) and the Far East & India in Mumbai. WFO is contributing to remediation of existing pollutions and removal of floating marine debris in so-called 'environmental hotspots' in coastal areas. It is a movement that is developing very fast on a global level with an appropriate management structure put in place. WFO is keen to work with international bodies and local authorities to find permanent solutions and avoid littering of seas and rivers. Our goal is to show society how our initiatives and activities help improve the environment. Using existing fishing trawls and new technology, WFO engages fishing community in cleaning up floating marine debris and brings it back to land for sorting, recycling and/or energy recovery.	Waste Free Oceans Foundation www.wastefreeoceans.eu	Alvaro Fernandez de Celis, Communication Manager, Waste Free Oceans Foundation; Avenue de Cortenbergh 71, 1000, Brussels, Belgium

Prevention of Land-Sourced Litter in the Marine Environment - Contributions of the Plastics Industry and Stakeholders Involved	The plastics industry in Germany, Austria and Switzerland is joining forces against land-sourced litter in the marine environment. On the basis of the "Declaration of the Global Plastics Associations for Solutions on Marine Litter" (www.marinelittersolutions.com), BKV, IK, Swiss Plastics and FCIO commissioned the "Study on Land-sourced Litter in the Marine Environment", which was prepared by Öko-Institut e.V. and finished in 2012. This study gave the reason for the above mentioned initiative. The initiative consists of the following steps: Step 1: Development of ideas for measures to prevent land-sourced litter - together with relevant stakeholders Step 2: Assessment of substantial contributions of stakeholders involved Step 3: Definition and implementation of projects A stakeholder workshop in march 2013 marked the beginning of step 1. The participants used the workshop for the brainstorming of measures focusing on "product and material design", "prevention of littering by individuals (behavioural change)" and "waste management and infrastructure". At the beginning of the initiative, BKV, IK, Swiss Plastics and FCIO started publishing the newsletter "Land-sourced Litter". It provides information in German language regarding marine litter and the progress of the initiative. Please send an email to uli.martin[at]bkv-gmbh.de, if you are interested in the newsletter.	BKV GmbH Platform for Plastics and Recovery (Germany), IK Industrievereinigung Kunststoffverpackungen e.V. (Germany), Swiss Plastics (Switzerland), FCIO Federation of the Chemical Industry of Austria (Austria) www.bkv-gmbh.de	Stephanie Cieplik, Project Manager, BKV GmbH; Mainzer Landstr. 55, 60329 Frankfurt am Main
Observation network of marine litter	MerTerre has developed a database for the characterization of marine litter inspired by the OSPAR method, objectives of the MSFD and interventions on the ground. She has created a website dedicated to receive data from actors who perform cleaning / studies beaches in the first place. The goal is to gather as much information to analyze data related to the local geographic and weather. It conducts surveys every two weeks in the spring of Marseille beaches and encourages volunteers to inform the quantities and types of waste collected. The database offers the opportunity to complete three levels of information from the simplest to the most complete (OSPAR - MSFD). This information is intended to help managers and policy makers in the implementation of public policy and awareness. They can also be used in educational programs with school.	MerTerre; Observatoire des Déchets en Milieux Aquatiques (ODEMA) www.resodema.org	Isabelle Poitou, Director, MerTerre; 21 rue Montgrand 13006 Marseille
Project study for a waste recycling ship concept	Based on the longstanding experience in the shipbuilding industry and in particular in the development of environmental, outstanding friendly double-hull tankers, the Kiel, Germany, based entrepreneur Dirk Lindenau has jointly developed a Waste Management, Recycling and Supply Ship concept (WMRS-Ship) with Prof. Meyer-Bohe, Kiel, Dipl.-Ing. Burkhard Schulte, Managing Director of Waste Management Center Pohlsche Heide, Minden-Lübbeke and Prof. Dr. Klaus Fricke, Technical University of Science, Braunschweig.	Dipl.Ing Dirk Lindenau Maritime engineering & projecting Kiel, Prof. Meyer-Bohe, Kiel, Dipl.-Ing. Burkhard Schulte, Managing Director of Waste Management Center Pohlsche Heide, Minden-Lübbeke and Prof. Dr. Klaus Fricke, Technical University of Science, Braunschweig.	Dipl.Ing Dirk Lindenau Maritime engineering & projecting Kiel ,Germany info@lindenau-dirk.com

Annex III: OSPAR Checklist on Marine Litter

Note: Checklist version 3 (provided by OSPAR on 18th March), unformatted.

OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic

OSPAR Contribution to the "International Conference on Prevention and Management of Marine Litter in European Seas" (Berlin, April 10-12, 2013) organized by Germany and the European Commission

OSPAR checklist on Marine Litter

1. Introduction

Over the last few years OSPAR has been examining the feasibility of developing a regional action plan approach to coordinate actions to deliver Good Environmental Status across the MSFD descriptors as well as implementing the North-East Atlantic Environment Strategy. Litter was chosen as a pilot project due to the existence of a dedicated group (the Inter-sessional Correspondence group on Marine Litter - ICG-ML) and the commitment in the North-East Atlantic Environment Strategy to "develop appropriate programmes and measures to reduce amounts of litter in the marine environment and to stop litter entering the marine environment, both from sea-based and landbased sources".

ICG ML was tasked to produce a draft skeleton for a regional action plan, and the OSPAR Coordination Group (CoG) agreed that, the strategies outlined below, capture the main components that may need to be considered to prevent litter from causing harm in the North-East Atlantic, and could form a useful checklist of possible strategic directions for consideration by the conference organised by the European Commission and Germany in April 2013.

OSPAR, through its Environmental Impacts of Human Activities Committee in April 2013 will consider the outcomes of the Conference and, with the assistance of ICG ML, develop an OSPAR Regional Action Plan (RAP) for marine litter focusing on relevant actions to achieve the objective of North-East Atlantic Environment Strategy to "substantially reduce marine litter in the OSPAR maritime area to levels where properties and quantities of marine litter do not cause harm to the coastal and marine environment". The development of the RAP will consider where OSPAR can add value (such as sub-regional or high seas perspectives) to those being taken by the EU and other organisations, and will also draw attention to additional issues or measures that need to be taken up by other competent authorities in the OSPAR region to address the risks posed by litter to the North-East Atlantic.

This Checklist is therefore presented to the Conference on Litter organised by the EC and Germany, highlighting the work which the ICG-ML has done to start the process of identifying the various activities that it believes could be addressed, or better coordinated. The hope is that this work can assist with the development of the regional action and coordination needed to protect the North-East Atlantic and other European Seas from the harmful impacts of litter.

2. Checklist on possible strategic directions for a Regional Action Plan on marine litter

The OSPAR objective with regard to marine litter, as laid down in the Strategy for the protection of the Marine Environment of the North-East Atlantic for the years 2010-2020 is:

Objective: “to substantially reduce marine litter in the OSPAR maritime area to levels where properties and quantities do not cause harm to the marine environment”.

OSPAR Ministers declared in 2010:

21. We will strengthen our efforts to combat adverse impacts on the marine environment that originate from various human activities, such as those resulting from the introduction of marine litter, non-indigenous species and of energy, including underwater noise. We note that quantities of litter in many areas of the North-East Atlantic are unacceptable, and therefore we will continue to develop reduction measures and targets, taking into consideration an ambitious target resulting in a reduction in 2020.

The OSPAR objective is in line with the MSFD definition for Descriptor 10, whereas GES qualitatively can be seen to be achieved, when “litter and its degradation products present in, and entering into EU waters do not cause harm to marine life and damage to marine habitats.” For any strategic considerations it is important to know what is jointly aimed for. OSPAR will also consider how its actions can take into account the Honolulu-strategy:

‘Goal A: Reduced amount and impact of land-based litter and solid waste introduced into the marine environment.

Goal B: Reduced amount and impact of solid waste, lost cargo, derelict fishing gear, and abandoned vessels introduced at sea.

Goal C: Reduced amount and impact of accumulated marine debris on shorelines, in benthic habitats, and in pelagic waters.’

The North East Atlantic Strategy sets out its aims, to develop appropriate programmes and measures to reduce amounts of litter in the marine environment and to stop litter entering the marine environment, both from sea-based and land-based sources, to complement the actions of Contracting Parties. These include a coordinated monitoring programme for marine litter and the promotion of research to improve the evidence base with respect to impact of litter, including micro-particles, on the marine environment.

Building on current knowledge, this checklist as a basis for the later development of a RAP for marine litter covers 4 key components that would need to be addressed in order to have an integrated approach to reducing the harm caused by litter in the marine environment. It lists strategies for:

- the main sources of marine litter, both from land and the sea, and how these sources can be addressed (sections 1 and 2)
- What might be done to remove existing litter from the marine environment (section 3)
- What might be done to prevent particular types of plastic from entering the production chain (section 4)

A cohesive set of strategies is offered to help outline how these 4 key components might be addressed. The checklist is structured in line with the Honolulu strategy as a global approach for an Action Plan on marine litter as it is seen as a helpful tool to be taken into account in the development of an OSPAR RAP on marine litter.

The strategies as suggested below are to be taken as a checklist for consideration. They will need to be evaluated in terms of prioritization based on up-to date knowledge about predominant sources, composition and amounts of marine litter; cost effectiveness, effects on the internal market and legal feasibility. The proposed strategies will also need to be assessed against existing policies and legislation, especially with regard to existing waste management practices. The package of strategies as a whole therefore will have to present added value to what is already happening, especially with regard to solid waste management need to be verified.

An OSPAR Action Plan will need to demonstrate added value from a specific marine perspective on land-based waste related activities, in addition to marine based waste issues. It will also need to show added value for common measures at a region or sub-regional level rather than at national or EU level. This is where the knowledge of marine litter's impacts within the regional and sub-regional ecosystems will be crucial in directing the ultimate form of the Action Plan.

1. Land-based sources to be considered, evaluated and prioritised based on recent knowledge in a Regional Action Plan

E.g. following sources need to be considered:

1. Solid waste management from tourism, recreation and the public (recreational visitors to the coast, beach goers)

2. Discharge of untreated municipal sewage, including storm water (including seasonal overflows)

3. Riverine transport of waste from landfills or other sources along rivers and other inland waterways (canals)

4. Industrial facilities: Solid waste from landfills, and untreated waste water

5. Municipal landfills (waste dumps) located at the coast

1.1 How these sources might be addressed

Strategy A1: Conduct education and outreach on marine debris impacts and the need for improved solid waste management

Strategy A2: Work with private sector and others to play a voluntary role in reducing land based sources/changing customer behaviour.

Strategy A3: Employ market-based instruments to support solid waste management, in particular waste minimization

Strategy A4: Employ infrastructure and implement best practices for improving stormwater management and reducing discharge of solid waste into waterways

Strategy A5: Develop, strengthen, and enact legislation and policies to support solid waste minimization and management

Strategy A6: Improve the regulatory framework regarding stormwater, sewage systems, and debris in tributary waterways

Strategy A7: Build capacity to monitor and enforce compliance with regulations and permit conditions regarding litter, dumping, solid waste management, stormwater, and surface runoff

Strategy A8: Conduct regular cleanup efforts on coastal lands, in watersheds, and in waterways—especially at hot spots of marine debris accumulation

2. Sea-based sources to be considered, evaluated and prioritised based on recent knowledge in a Regional Action Plan

E.g. following sources need to be considered:

1. Littering by fishing vessels
2. Littering by merchant shipping, ferries and cruise liners
3. Littering by pleasure crafts
4. Littering by offshore oil and gas installations
5. Littering by fish farm installations

2.1 How these sources might be addressed

Strategy B1: Conduct ocean-user education and outreach on marine debris impacts, prevention, and management

Strategy B2: Develop incentives and markets to strengthen implementation of waste minimization and proper waste storage at sea, and of disposal at port reception facilities, in order to minimize incidents of ocean dumping

Strategy B3: Develop and strengthen implementation of industry best management practices (BMP) designed to minimize abandonment of vessels and accidental loss of cargo, solid waste, and gear at sea

Strategy B4: Develop and promote use of fishing gear modifications or alternative technologies

Strategy B5: Develop and strengthen implementation of legislation and policies to prevent and manage marine debris from at-sea sources, and implement the requirements of MARPOL Annex V, as well as other relevant international instruments and agreements

Strategy B6: Build capacity to monitor and enforce (1) national and local legislation, and (2) compliance with requirements of MARPOL Annex V and other relevant international instruments and agreements

3. Removal of marine litter already present in the marine environment and associated wider benefits in terms of education of the public and marine users.

Marine compartments to be considered depending on feasibility, costs and benefits are:

1. Shoreline areas
2. Pelagic waters
3. Benthic habitats

3.1 How removal of marine litter might be addressed

Strategy C1: Conduct education and outreach on marine debris impacts and removal to the wider public and relevant stakeholder/industries and politics

Strategy C2: Develop and promote use of technologies and methods to effectively locate and remove marine debris accumulations

Strategy C3: Build capacity to co-manage marine debris removal response

Strategy C4: Develop or strengthen implementation of incentives for removal of abandoned lost or otherwise discarded fishing gear and other large accumulations of marine debris encountered at sea

Strategy C5: Establish appropriate regional, national, and local mechanisms to facilitate removal of marine debris

Strategy C6: Remove marine debris from shorelines, benthic habitats, and pelagic water

4. Producing less litter by means of smart production

4.1 How the issues of smart production might be addressed

Strategy D1: Redesign products that are problematic, both macro and molecular design, via green chemistry approaches and with greater resource efficiency also considering the recycling phase (e.g. avoiding coupling different types of plastic, inclusion of additives that may affect the recycling process, etc.)

Strategy D2: Reduce usage of problematic raw material e.g. by down gauging

Strategy D3: Reduce waste generation through awareness programs

Strategy D4: Apply schemes of incentives and hindrances (e.g. waste tax based on weight/volume of waste generate)

Strategy D5: Implement concept of “producer’s responsibility” (e.g. no new packaging item placed in market before technology has been developed to recycle/convert the product efficiently; producers having a proportional burden to the amount of waste which is not recovered)

Strategy D6: Recycle through product recovery & reuse of packaging materials (e.g. incentives to industry; improvement of coordination between business-designers-producers-recyclers considering the whole life-cycle of a product)

Strategy D7: Propose elimination (through voluntary action/ regulation) of certain products from the market (e.g. plastic beads in hygiene products) which tend to enter aquatic systems directly

Strategy D8: Stimulate the development of new businesses around recovery/conversion of waste, integrated waste management with public benefits and innovative products/materials