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Managing Marine Litter: Exploring the Evolving Role of International and European Law in Confronting a Persistent Environmental Problem

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Abstract
The contamination of the world's oceans by human garbage, especially plastics, ranks among those environmental problems whose resolution appears remote, despite the considerable public attention paid to the 'Great Garbage Patch' in the Pacific, 'plastic soup', and the like. This 'marine litter' (or 'marine debris') problem is characterized by diffuse sources and an array of adverse environmental impacts, including entanglement of and ingestion by albatrosses, fulmars, turtles, seals and a variety of other marine wildlife. This article explores the evolving role of international law in the efforts to manage marine litter, including recent developments involving the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) and the European Union's Marine Strategy Framework Directive (MSFD).

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Seeing a parent albatross gagging up a toothbrush changed my worldview. [...] No matter what coordinates you choose, from waters polar, to solar coral reefs, to the remotest turquoise atoll – no place, no creature remains apart from you and me.

– C Safina, *Eye of the Albatross* (Henry Holt and Co 2002) 279.

In a high-tech era of radiation, carcinogenic chemicals, and human-induced climate change, the problem of the trash produced by ocean-going vessels or litter swept out to sea must seem old-fashioned by comparison. [...] Regrettably, that perception is wrong.

– US Senator Daniel Inouye, 'Statements on Introduced Bills and Joint Resolutions'.[1]

I. Introduction

The purpose of this article is to review the role of international law in managing the problem of 'marine litter' (or 'marine debris'), with a particular focus on recent developments regarding global and regional instruments, including the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention)[2] and the Marine Strategy Framework Directive (MSFD) of the European Union (EU).[3] Central questions guiding the analyses in this article are to what extent international law is already contributing to solving the marine litter problem, and how much room for improvement remains.

Section II introduces the nature of the problem, including the sources, distribution and environmental impacts of marine litter. Section III explores the applicable international legal framework and contains discussion of recent developments at global and regional levels, including in the context of the OSPAR Convention and the MSFD. Section IV evaluates the contribution of this international legal framework to the control of marine litter. Section V, finally, sets out succinct conclusions.

II. Marine Litter

Before discussing applicable legal instruments, an introduction is called for regarding the origins, environmental impacts and other characteristics of marine litter. This introduction of relevant facts draws on a large and steadily increasing number of expert reports and scientific papers.[4]

II.1. Key Features of Marine Litter

Two United Nations Environment Programme (UNEP) reports dedicated to the topic define marine litter as 'any persistent,

1 151 *Congressional Record*, S1261-02, S1295-S1296 (10 February 2005); cited in SL Dautel, 'Transoceanic Trash: International and United States Strategies for the Great Pacific Garbage Patch' (2009) 3 Golden Gate University Environmental Law Journal 181, 181.

2 Convention for the Protection of the Marine Environment of the North-East Atlantic (adopted 22 September 1992, entered into force 25 March 1998) 32 ILM 1069 (OSPAR Convention).

3 Directive 2008/56/EC of the European Parliament and the Council of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy [2008] OJ L164/19 (Directive 2008/56/EC).

4 For readers wishing to obtain a more detailed understanding of the marine litter problem, the following selected sources constitute a proper starting point: JM Coe and DB Rogers (eds), *Marine Debris: Sources, Impacts, and Solutions* (Springer 1997); RC Thompson and others, 'Lost at Sea: Where is All the Plastic?' (2004) 304 Science 838; JGB Derraik, 'The Pollution of the Marine Environment by Plastic Debris: A Review' (2008) 44 Marine Pollution Bulletin 842; S Katsanevakis, 'Marine Debris, a Growing Problem: Sources, Distribution, Composition, and Impacts' in TN Hofer (ed), *Marine Pollution: New Research* (Nova Science Publishers 2008) 53; RC Thompson and others, 'Our Plastic Age' (2009) 364 Philosophical Transactions of the Royal Society B 1973; RC Thompson and others, 'Plastics, the Environment and Human Health: Current Consensus and Future Trends' (2009) 364 Philosophical Transactions of the Royal Society B 2153; MP Gregory, 'Environmental Implications of Plastic Debris in Marine Settings – Entanglement, Ingestion, Smothering' (2009) 364 Philosophical Transactions of the Royal Society B 2013; UNEP *Marine Litter: An Analytical Overview* (UNEP 2005); UNEP/GPA *State of the Marine Environment: Trends and Processes* (UNEP/GPA 2006) 26-28; UNEP *Marine Litter: A Global Challenge* (UNEP 2009); UNEP *UNEP Year Book 2011* (UNEP 2011) 20-33; Committee on the Effectiveness of International and National Measures to Prevent and Reduce Marine Debris and its Impacts, *Tackling Marine Debris in the 21st Century* (National Academies Press 2008). The five International Marine Debris Conferences which have taken place since 2000 – the last of which took place in Honolulu in March 2011 – also merit attention <www.5imdc.org>. Selected popular accounts concerning marine litter are C Safina, *Eye of the Albatross* (Henry Holt and Co 2002) 152-158; A Weisman, *The World Without Us* (Thomas Dunne Books 2007) 112-128; J Goossens, *Plastic Soup* (Lemniscaat 2011); and D Hohn, Moby-Duck (Viking 2011).

manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment'.[5] This definition, which apparently builds on the definition used in the 1995 Global Programme of Action (GPA)[6] on land-based marine pollution discussed below, is also employed in a 2010 MSFD report on marine litter.[7] As the latter goes on to explain, marine litter consists of 'items that have been made or used by people and deliberately discarded or unintentionally lost into the sea or coastline including such materials transported into the marine environment from land by rivers, drainage or sewage systems or wind', for instance 'plastics, wood, metals, glass, rubber, clothing, paper etc'.[8] The report clarifies that 'this definition does not include semi-solid remains of for example mineral and vegetable oils, paraffin and chemicals that sometimes litter sea and shores'.[9] Plastic accounts for an estimated eighty percent of all marine litter. The sources of all this debris are diffuse and nearly as varied as the litter itself:

> Human behaviours and actions – accidental or intentional – are the sources of marine litter. The majority of sea or ocean-based sources of marine litter come from merchant shipping, ferries and cruise liners; fishing vessels; military fleets and research vessels; pleasure craft; offshore oil and gas platforms and drilling rigs; and aquaculture installations. Marine litter dispersion and deposition are strongly influenced by ocean currents, tidal cycles, regional-scale topography, including sea-bed topography and wind. Land-based sources of marine litter originate from coastal or inland areas including beaches, piers, harbours, marinas, docks and riverbanks. Municipal landfills (waste dumps) located on the coast, water bodies such as rivers, lakes and ponds that are used as illegal dump sites, riverine transport of waste from landfills and other inland sources, discharges of untreated municipal sewage and storm water, industrial facilities, medical waste, and coastal tourism involving recreational visitors and beach-goers, are the primary sources of land-based marine litter. Natural storm-related events such as hurricanes, tsunamis, tornadoes and floods can all create large amounts of materials that are washed from coastal areas that can end in the marine environment. High winds, large waves and storm surges produced by these natural events cause land-based items to be introduced into the marine environment.[10]

Globally, land-based sources are estimated to account for some four-fifths of marine litter, with the remaining one-fifth stemming from marine sources. The division between sources differs from region to region, however. In the densely navigated North Sea, for example, half of all marine litter found on beaches originates from ships. Marine litter can be encountered on the surface, in the water column, and on the ocean floor. Moreover, it can be found in *all* sea areas, as ocean currents and winds distribute litter across the Seven Seas. One illustrative example concerns nearly thirty thousand rubber ducks and other bath toys called 'Floatees' which were lost from a container ship during a voyage from Hong Kong to the United States in 1992 and have been tracked by oceanographers. Floatees have since turned up on beaches in Japan, Alaska, South America, Australia and Indonesia. Many are still doing circles in the Pacific, and still others even journeyed the Northwest Passage through the Arctic ice. The first Floatees appeared in the Atlantic in 2000 and several have bobbed onto shore in the United Kingdom in recent years.[11] In some places, marine debris occurs in especially dense concentrations on account of ocean gyres. Although such denominated 'garbage patches' or 'plastic continents' have formed around the globe, including in the North Atlantic,[12] the 'Great Pacific Garbage Patch' in the North Pacific remains the best publicized instance of this phenomenon.[13] High concentrations also occur in enclosed seas like the Mediterranean, and some coastlines accumulate larger amounts of debris than others.[14]

5 UNEP 2005 (n 4) 3; UNEP 2009 (n 4) 13.

6 '1995 Global Programme of Action on the Protection of the Marine Environment from Land-Based Activities' (1995) 6 Yearbook of International Environmental Law 883.

7 F Galgani and others, *Marine Strategy Framework Directive Task Group 10 Report: Marine Litter* (European Union, IFREMER and ICES 2010) 4.

8 ibid.

9 ibid. The aforementioned UNEP reports (n 4) contain roughly similar clarifications.

10 UNEP 2009 (n 4) 13.

11 For a detailed chronicle see Hohn (n 4).

12 See eg V Gill, 'Plastic Rubbish Blights Atlantic Ocean', (24 February 2010) BBC News <http://news.bbc.co.uk/2/hi/8534052.stm> accessed 25 March 2011.

13 Weisman (n 4) 121. One example is the following excerpt from Weisman, describing the discovery of the garbage patch in the North Pacific Subtropical Gyre in 1997: 'For a week, Moore and his crew found themselves crossing a sea the size of a small continent, covered with floating refuse. It was not unlike an Arctic vessel pushing through chunks of brash ice, except what was bobbing around them was a fright of cups, bottle caps, tangles of fish netting and monofilament line, bits of polysterene packaging, six-pack rings, spent balloons, filmy scraps of sandwich wrap, and limp plastic bags that defied counting.' It should be noted that the comparison with a ship pushing through ice is probably an overstatement, given the actual density and average small size of marine litter in the 'garbage patches'.

14 The following account from Safina (n 4) 153-154, concerns a beach on the Hawaiian island of Laysan: 'A quick scan around confronts your eye with plastic beverage bottles, pieces of plastic pipe, empty containers of everything from laundry detergent to talcum powder to chocolate syrup. And various cast-up footwear. Glass bottles abound, too. [...] Every step reveals new types of junk: A golf tee. A small perfume bottle, a plastic folding hairbrush, a toy cowboy, a thread spool, a vacuum tube like one from an old television set. A syringe. A refrigerator door. Small rubber balls. A human skull – of plastic. A toy truck. Toy soldier.

Marine litter comes in many shapes and sizes. Typical examples of the larger items composing marine debris are (pieces of) plastic and glass bottles, plastic bags, cups and packaging materials of all kinds (including the infamous six-pack rings), cans, cigarette lighters, styrofoam, balloons, rope and fishing lines and nets.[15] According to a recent review, the 'most common items are plastic films, such as carrier bags, which are easily carried by the wind, as well as discarded fishing equipment and food and beverage packaging'.[16] Smaller in size, but at the same time very numerous and widespread, are the pea-sized plastic resin pellets used in plastic manufacturing called nurdles or 'mermaid tears' and similar tiny plastic fragments. Yet more plentiful and virtually omnipresent are the plastic particles of microscopic size ('microplastics') which ultimately result when larger plastic debris disintegrates.

II.2. Impacts of Marine Litter

As the 2009 UNEP report summarizes, marine litter is 'an environmental, economic, health and aesthetic problem'.[17] The two best studied environmental impacts of marine litter are the entanglement of, and ingestion by, marine wildlife. As a recent review reports: 'Over 260 species, including invertebrates, turtles, fish, seabirds and mammals, have been reported to ingest or become entangled in plastic debris, resulting in impaired movement and feeding, reduced reproductive output, lacerations, ulcers and death'.[18] These include over 25 cetacean species and over 100 seabird species. The consequences of marine litter ingestion and entanglement are catalogued in another recent literature review as follows:

> The literature on ingestion (and entanglement) of plastic items in marine debris is voluminous and often repetitive, and the widely reported environmental problems identified are global in character. These include: wounds (internal and external), suppurating skin lesions and ulcerating sores; blockage of digestive tract followed by satiation, starvation and general debilitation often leading to death; reduction in quality of life and reproductive capacity; drowning and limited predator avoidance; impairment of feeding capacity; and the possibility that plastic resin pellets may adsorb and concentrate potentially damaging toxic compounds from sea water.[19]

'Plastic Cups Found in Fish' is a representative title among the many scientific publications on marine debris ingestion.[20] Other examples of plastic litter ingestion include sea turtles mistaking floating plastic bags for jellyfish, predatory fish mistaking 'mermaid tears' for fish eggs and invertebrate filter feeding organisms ingesting microplastics along with zooplankton. Particularly well documented instances involve fulmars (*Fulmarus glacialis*) in the North Sea – almost one hundred percent of dead fulmars washed ashore in the region carry plastic litter in their guts, with an average of around 30 plastic pieces[21] – and Laysan albatrosses (*Phoebastria immutabilis*) in the Pacific foraging for plastic items and feeding them to their young.[22] Entanglement also affects a host of marine creatures, with lost and abandoned monofilament lines and other fishing gear and plastic packaging bands among the main culprits. Specific mention should be made of discarded or lost fishing nets made of durable synthetic materials, which can keep on 'ghost fishing' for extended periods of time. Unpleasant photographs abound of ensnared turtles, gannets, whales and fur seals. The following account suffices to illustrate the matter:

> Young fur seals are attracted to floating debris and dive and roll about in it. They will approach objects in the water and often poke their heads into loops and holes. Though the plastic loops can easily slip onto their necks,

A three-inch plastic dinosaur (*Tyrannosaurus rex*). A plastic elephant. Plastic cat. Even some of the fish on this beach are plastic ones. [...] The most ironic piece of trash ever found on Laysan was a sign in Japanese saying SAVE OUR OCEANS AND RIVERS – DON'T POLLUTE.'

15 See (n 13-14) for a further impression of the variety of marine litter.

16 DKA Barnes and others, 'Accumulation and Fragmentation of Plastic Debris in Global Environments' (2009) 364 Philosophical Transactions of the Royal Society B 1985, 1995.

17 UNEP 2009 (n 4) 13. Accessible analyses of the environmental impacts of marine litter can be found, inter alia, in Derraik (n 4) 844-847; Gregory (n 4); and Thompson and others 2009 (n 4) 2155-2156.

18 Thompson and others 2009 (n 4) 2155.

19 Gregory (n 4) 2015-2016.

20 Anonymous, 'Plastic Cups Found in Fish' (1975) 6 Marine Pollution Bulletin 148.

21 See JA van Franeker and others, '*Save the North Sea' Fulmar Study 2002-2004: A Regional Pilot Project for the Fulmar-Litter-EcoQO in the OSPAR Area* (Alterra 2005) and various other studies which can be downloaded from the Dutch Seabird Group's website <www.zeevogelgroep.nl>.

22 The following narrative from Safina (n 4) 156, probably renders as adequate an idea as the pertinent statistics from scientific studies: 'A few steps farther is one small albatross chick's carcass with bright bits of plastic sticking through its ribs. You get the feeling the plastic will remain here even after the bones themselves bleach and pulverize into dust and blow away. A little farther along lies another dead albatross chick, its whole rib cage packed with plastic – various shades of blues, pinks, orange, various pieces of bottles, the legs of a toy soldier. And a colored cigarette lighter. [...] In fact, every decomposed chick carcass seems to have plenty of little colored bits of plastic. You can often tell where chicks died last year because piles of colorful plastic particles that used to fill their stomachs mark their graves like Technicolor tombstones.'

> the lie of the long guard hairs prevents the strapping from slipping off. Many seal pups grow into the plastic collars, and in time as it tightens, the plastic severs the seal's arteries or strangles it. Ironically, once the entangled seal dies and decomposes, the plastic band is free to be picked up by another victim, as some plastic articles may take 500 years to decompose.[23]

Through ingestion and entanglement, marine litter thus evidently causes widespread suffering of marine animals. Animal welfare considerations do not exhaust the topic, however, as plastic ingestion and entanglement raise serious conservation concerns for a long list of species. To illustrate, packaging bands and discarded nets are believed to be responsible for a fair share of the decline of northern fur seal (*Callorhinus ursinus*) populations; entanglement is also a major cause of mortality of endangered Hawaiian monk seals (*Monachus schauinslandi*), and of northern gannets (*Morus bassanus*) in the North Sea; and ingestion is adversely affecting the conservation status of endangered species including manatees, marine turtles and an array of seabird species.

In connection with ingestion, concerns have also been raised about plastic litter transferring toxic chemicals into marine food chains. Nurdles and microplastics have been found to contain high concentrations of PCBs, DDT, and a range of other persistent organic pollutants (POPs). Some of these substances are added to plastics during manufacture whereas others are adsorbed by and accumulate in plastic litter from the environment. Toxics can thus become 'orders of magnitude more concentrated on the surface of plastic debris than in the surrounding sea water'.[24] Once ingested by organisms at the bottom of marine food chains, the effects of the substances magnify at each higher level in the food chain because of their accumulation in fatty tissues, resulting in especially strong impacts on top predators such as seabirds.

Environmental impacts of marine litter which are less publicized than ingestion and entanglement include the smothering of the ocean floor when marine litter sinks; the transport of invasive alien species which occurs when organisms cling to drifting debris and thus hitch-hike into ecosystems where they do not belong; and the damage done to coastal habitats by repeated strandline cleanup operations with heavy equipment in order to keep beaches attractive to tourists. Clearly, the durability that plastics are appreciated for is also to blame for a considerable share of the problems posed by marine litter. Plastic decomposes extremely slowly, as it does not biodegrade, and although it *photo*degrades under influence of sunlight, it does so only very gradually when immersed in seawater. Consequently, plastic litter accumulates in the marine environment. As the title of a chapter on the topic by Alan Weisman states: 'Polymers are Forever'.[25] It should be noted here that not all marine litter is necessarily environmentally harmful. Concrete and iron are good examples. Depending on the circumstances, the net environmental effects of ship wrecks and artificial reefs composed of these materials may indeed be positive, as they can provide welcome dwelling places for species dependent on hard surfaces.

Besides the impacts on wildlife and marine ecosystems indicated above, marine litter affects *human* interests in a number of ways, ranging from aesthetic to economic considerations. For instance, few people wish to spend their free time on beaches covered in litter, which has obvious implications for the tourism industry. Reportedly, each year 'marine litter results in tremendous economic costs and losses to individuals and communities around the world'.[26] The 2009 UNEP report contains the following enumeration of impacts:

> Damage to people, property and livelihoods caused by marine litter can be grouped into a number of general categories. These include damage to fisheries, fishing boats and gear; damage to cooling-water intakes and blocking water-flow in power stations and desalination plants; contamination of beaches (requiring cleaning and removal operations and beach closures for public health reasons); contamination of commercial harbours and marinas (resulting in cleaning and removal operations); and contamination of coastal grazing land, causing injury to livestock. Problems with propeller fouling, blocked engine intake pipes and damaged drive shafts have also been attributed to marine litter. Marine litter-related damage to people also includes safety risks at sea (resulting in rescue services) due to fouling of propellers, accidents involving SCUBA divers and snorkelers who encounter submerged debris, as well as damage to people's health (physical injuries, disease) from litter on beaches and in bathing water.[27]

23 Derraik (n 4) 846; literature references omitted.

24 Thompson and others (n 4) 2156.

25 Weisman (n 4) 112-128.

26 UNEP 2009 (n 4) 14.

27 ibid.

III. Marine Litter and International Law

This section (1) generally addresses the (potential) role of law, and international law in particular, in remedying the marine litter problem; (2) provides an overview of applicable legal instruments at global and regional levels; and discusses in more detail (3) the OSPAR Convention and (4) the Marine Strategy Framework Directive.

III.1. The Role of International Law in Managing Marine Litter

As shown by the two quotes preceding this article, marine litter illuminates the sheer dimensions of humanity's ecological footprint, and the difficulty of reducing it. The wide-ranging sources, widespread distribution, persistence and other characteristics of marine litter, especially plastics, make solving the problem an exceedingly complex and challenging enterprise. This applies both to *preventing* more litter from entering the marine environment, to *removing* and to *countering* the effects of, litter that has already entered it. To be effective, efforts to reduce or prevent marine litter need to be implemented 'across all sectors of society', and require 'changing the attitudes and ultimately the behaviours of individuals in many different circumstances'.[28] Such efforts also need to factor in that global plastic production is likely to continue growing fast – the quantity of plastics produced in the first decade of the 21st century roughly equals the total amount produced in the entire 20th century.[29]

For some aspects of the marine debris problem, apparently straightforward solutions are available, for instance ensuring that litter is not thrown overboard from ships but instead handed in at waste reception facilities when in port.[30] Preventing land-based litter from ending up in the oceans seems a more complicated affair. Typical strategies involve, among other things, promotion of the 'three Rs' – reduce, reuse and recycle – and campaigns to curb littering. Several options also exist for the removal of existing debris from the marine environment, for example encouraging or requiring fishermen to collect and land any litter they net. Removing marine debris from shores or reefs is also possible, but tends to be labour-intensive, especially when conducted with the care required to avoid clean-up operations from inflicting damage on the habitats in question. The removal of microplastics from the marine environment does not currently seem feasible, and similar considerations apply to periodic suggestions to clean up the various 'garbage patches' in ocean gyres.

As with most other environmental challenges, drawing on legal instruments alone is unlikely to render a satisfactory solution to the problem of marine debris. At the same time, law would seem to be a useful, and probably indispensable, ingredient of the larger toolbox needed to adequately manage marine litter. Furthermore, the conspicuously international nature of the marine litter problem indicates that a potential role of significance is reserved in this regard for *international* law. These considerations appear to fit in with Daniel Bodansky's general qualification of international environmental law as a 'thirty percent solution'.[31]

The legal framework that is (potentially) applicable to marine litter is voluminous and complex, and consists of global, regional, national and local regulations which cover ocean-based as well as land-based sources. Even when limited to the international level, an exhaustive overview and analysis of all applicable legal instruments would be far beyond the remit of a single paper. It should be noted in this context that the issue of marine litter has already been addressed from time to time in academic contributions in the disciplines of (inter)national law and policy – although the arena appears nowhere near as crowded as in respect of some other environmental problems.[32] Recent reviews of legal instruments relevant to marine litter

28 ibid 13.

29 Thompson and others 2009 (n 4) 2164.

30 See eg the 2010 documentary 'Any Waste Any Time', about reception facilities at the port of Rotterdam. <www.portofrotterdam.com/en/Port/port-in-picture/video-gallery.>.

31 D Bodansky, *The Art and Craft of International Environmental Law* (Harvard University Press 2009) 24-27.

32 See, inter alia, SA Lentz, 'Plastics in the Marine Environment: Legal Approaches for International Action' (1987) 18 Marine Pollution Bulletin 361; PE Hagen, 'The International Community Confronts Plastics Pollution from Ships: MARPOL Annex V and the Problem that Won't Go Away' (1990) 5 American University Journal of International Law and Policy 425; CC Joyner and S Frew, 'Plastic Pollution in the Marine Environment' (1991) 22 Ocean Development and International Law 33; JP Leous and NB Parry, 'Who is Responsible for Marine Debris? The International Politics of Cleaning Our Ocean' (2005) 59 Journal of International Affairs 257; D Hassan, *Protecting the Marine Environment from Land-Based Sources of Pollution: Towards Effective International Cooperation* (Ashgate 2006); DL Vanderzwaag and A Powers, 'The Protection of the Marine Environment from Land-Based Pollution and Activities: Gauging the Tides of Global and Regional Governance' (2008) 23 International Journal of Marine and Coastal Law 423; U Kazarian, 'Islands of Garbage Continue to Grow in Pacific' (2009) 7 Sustainable Development Law and Policy 63; Dautel (n 1); JR Coulter, 'A Sea Change to Change the Sea: Stopping the Spread of the Pacific Garbage Patch with Small-scale Environmental Legislation' (2010) 51 William and Mary Law Review 1959; M Schroeder, 'Forgotten at Sea – An International Call to Combat Islands of Plastic Waste in the Pacific Ocean' (2010) 16 Southwestern Journal of International Law 265.

can be found in the aforementioned UNEP reports.[33] Needless to say, the present article seeks to build on rather than repeat existing publications, and this influences the degree of detail in which selected instruments are discussed below.

III.2. A Bird's-Eye View of the International Legal Framework for Marine Litter

A foremost position in the global legal framework regarding marine litter is occupied by the MARPOL Convention, which regulates operational vessel-source pollution.[34] Significantly, a legally binding ban on the discarding of plastic waste from ships anywhere into the ocean applies to the 140 states – accounting for almost one hundred percent of the world's shipping tonnage – that have ratified the Convention's optional Annex V on garbage, which came into force in 1988.[35] Complementing this total ban on plastic garbage discharges, Annex V severely restricts the disposal of other kinds of ship-source waste in designated special areas, including the Antarctic, the Mediterranean and the North Sea. Other relevant provisions include obligations to provide for adequate reception facilities in ports and terminals. MARPOL Annex V has been comprehensively reviewed in recent years and revisions are expected to be formally adopted in 2011.[36] These include a 'reverse approach' whereby disposal at sea of *any* vessel-source garbage is in principle prohibited, save for expressly provided exceptions – for example the disposal of food wastes under certain conditions.

Other pertinent global conventions include the London Dumping Convention[37] and its 1996 Protocol,[38] the Basel Convention on Hazardous Wastes[39] and the 1982 Law of the Sea Convention.[40] The latter imposes various generally phrased duties regarding marine litter on its 160-plus contracting parties. These include an overall 'obligation to protect and preserve the marine environment',[41] and a duty to take *all* measures 'that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities',[42] which measures 'shall include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life'.[43] Specifically with respect to land-based pollution, Article 207 of the Convention provides that parties 'shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment from land-based sources, including rivers, estuaries, pipelines and outfall structures,' and 'shall take other measures as may be necessary to prevent, reduce and control such pollution'.[44] Such laws, regulations and measures 'shall include those designed to minimize, to the fullest extent possible, the release of toxic, harmful or noxious substances, especially those which are persistent, into the marine environment'.[45] To make certain that such action will not be limited to paper exercises, the Convention stipulates that parties 'shall enforce their laws and regulations adopted in accordance with Article 207'.[46] Also, parties are to cooperate at regional and global levels, and 'endeavour to establish global and regional rules, standards and recommended practices and procedures' regarding land-based pollution.[47]

Some form of global cooperation on land-based pollution was pledged in 1995, when 108 states and the European Commission adopted the Washington Declaration and the Global Programme of Action on the Protection of the Marine Environment from Land-Based Activities.[48] The 'common goal' set out in the Washington Declaration is to take 'sustained and effective

33 UNEP 2005 (n 4) 10-24; UNEP 2009 (n 4).

34 1973/1978 International Convention for the Prevention of Marine Pollution from Ships (opened for signature 15 January 1974, entered into force 2 October 1983) 12 ILM 1319 (MARPOL Convention).

35 ibid, annex V: Regulations for the Prevention of Pollution by Garbage from Ships (entered into force 31 December 1988). See Hagen (n 32) for an analysis of the regime dating from that period.

36 The revisions were approved at the 61st session of the Marine Environmental Protection Committee (MEPC) of the International Maritime Organization (IMO) (October 2010), with a view to formal adoption at the 62nd session in July 2011.

37 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (adopted 13 November 1972, entered into force 30 August 1974) 11 ILM 1294 (London Dumping Convention).

38 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (adopted 7 November 1996, entered into force 24 March 2006) 36 ILM 7.

39 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (opened for signature 22 March 1989, entered into force 5 May 1992) 28 ILM 657 (Basel Convention on Hazardous Wastes).

40 United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 3 (UNCLOS).

41 ibid, art 192.

42 ibid, art 194 (1).

43 ibid, art 194 (5).

44 ibid, art 207 (1-2).

45 ibid, art 207(5).

46 ibid, art 213.

47 ibid, art 207(3-4). Other potentially applicable provisions in the Convention include arts 61 and 117; see also Lentz (n 32) 361-362.

48 Global Programme of Action (n 6); 'Washington Declaration on Protection of the Marine Environment from Land-Based Activities' (1995) 6 Yearbook of

action to deal with all land-based impacts upon the marine environment, specifically (inter alia) litter'.[49] The objective regarding marine debris laid down in the GPA is 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'.[50] The GPA proposes the following concrete actions:

> Actions, policies and measures of States within their capacities should include:
> (a) Introductions of appropriate measures – which could include regulatory measures and/or economic instruments and voluntary agreements – to encourage reduction in the generation of solid wastes;
> (b) Installation of garbage containers for citizens in public areas for the purposes of appropriate collection and/or recycling;
> (c) Establishment and ensuring the proper operation of solid-waste-management facilities on shore for wastes from all sources, including shipping and harbour wastes;
> (d) Formulation and implementation of awareness and education campaigns for the general public, industry, and municipal authorities, as well as recreational and commercial vessels, on the need to reduce waste generation and the need for environmentally sound disposal and reuse;
> (e) Increasing local planning and management capacity to avoid location of waste-dump sites near coastlines or waterways or to avoid litter escape to the marine and coastal environment;
> (f) Formulation and implementation of improved management programmes in small rural communities to prevent litter escape into rivers and the marine and coastal environment;
> (g) Establishment of campaigns and/or permanent services for collecting solid wastes that pollute coastal and marine areas.[51]

Despite its rather comprehensive scope, the provision uses the word 'should' instead of 'shall', and it should in any case be borne in mind that the GPA itself is not legally binding. The latter applies as well to the various UN General Assembly (UNGA) resolutions addressing marine litter that were adopted in recent years. One instance is Resolution 60/30 (2005), which:

> *Urges* States to integrate the issue of marine debris into 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 programmes for marine debris;[52]
>
> *Calls upon* States to take all appropriate measures to control, reduce and minimize, to the fullest extent possible, marine pollution from land-based sources as part of their national sustainable development strategies and programmes, in an integrated and inclusive manner, and to advance the implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities.[53]

Several global nature conservation agreements are also directly or indirectly relevant to the topic of marine litter, such as the 1992 Biodiversity Convention[54] and the regime of the 1979 Convention on Migratory Species (CMS).[55] To cite one instance, the CMS Agreement on Albatrosses and Petrels[56] contains a provision on 'Pollutants and marine debris' which imposes an obligation on the thirteen state parties to 'take appropriate measures, within environmental conventions and by other means, to minimise the discharge from land-based sources and from vessels, of pollutants which may have an adverse effect on

International Environmental Law 883.

49 ibid Washington Declaration, para 1.

50 Global Programme of Action (n 6), para 144 (b).

51 ibid 146.

52 UNGA Res 60/30 (29 November 2005) UN Doc A/RES/60/30, para 66; this is repeated verbatim in, inter alia, UNGA Res 64/71 (4 December 2009) UN Doc A/RES/64/71, para 121.

53 ibid UNGA Res 60/30, para 69.

54 Convention on Biological Diversity (opened for signature 5 June 1992, entered into force 29 December 1993) 31 ILM 818 (CBD).

55 Convention on the Conservation of Migratory Species of Wild Animals (adopted 23 June 1979, entered into force 1 November 1983) 19 ILM 15 (CMS).

56 Agreement on the Conservation of Albatrosses and Petrels (adopted 1 February 2001, entered in to force 1 February 2004; as amended at the 3rd session of the Meeting of State Parties in Bergen, 2009) <www.acap.aq>.

albatrosses and petrels either on land or at sea'.[57]

Many regional instruments exist that apply implicitly or explicitly to marine debris, including several protocols on land-based pollution adopted within the framework of the UNEP Regional Seas Programme. A comprehensive inventory of action taken under the various Regional Seas conventions and protocols was conducted recently as part of an initiative by UNEP and the GPA to boost efforts to control marine litter in regional settings – the 'Global Initiative on Marine Litter', which has been underway since 2003.[58] Also in this context, guidelines were developed for monitoring marine debris on coastlines.[59] These were published in 2009 and are currently in varying stages of application in several regions.

Other regional fora of interest include the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)[60] and (other) regional fisheries management organizations (RFMOs), in particular with a view to their potential role in curbing the problems posed by lost and discarded fishing gear and other litter such as plastic packaging bands. Furthermore, an assortment of EU legislation exists regarding marine debris, including directives on port reception facilities,[61] waste generally,[62] packaging materials,[63] landfills,[64] bathing water quality[65] and nature conservation[66], as well as the Water Framework Directive and the Water Framework Directive[67] and the Marine Strategy Framework Directive.[68] On account of its novelty and potential significance, the latter is treated separately below. First, however, another regional instrument, the OSPAR Convention, is discussed by way of illustration.

III.3. The OSPAR Convention and Marine Litter

The OSPAR Convention applies to a large 'maritime area' in the North-East Atlantic, including the North Sea.[69] The sixteen contracting parties to the OSPAR Convention, among them the EU,[70] are under a general obligation to 'take the necessary measures to protect the maritime area against the adverse effects of human activities so as to safeguard human health and to conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected'.[71] The control of marine litter is covered, inter alia, by the prescription that parties 'shall take, individually and jointly, all possible steps to prevent and eliminate pollution from land-based sources in accordance with the provisions of the Convention, in particular as provided for in Annex I'.[72] The latter contains somewhat more concrete provisions, and a mandate for the OSPAR Commission, in which all parties are represented, to develop further plans and programmes. Similarly relevant is Annex V on the conservation of ecosystems and biodiversity, which specifies that parties 'shall take the necessary measures to protect and conserve the ecosystems and the biological diversity of the maritime area, and to restore, where practicable, marine areas which have been adversely affected',[73] and shall 'cooperate in adopting programmes and measures' for the control of harmful human activities.[74] The OSPAR Commission is called upon to 'collect and review information on' and to 'draw up programmes and measures for the control of' such activities, which are to be identified utilizing criteria in Appendix 3 to the

57 ibid, annex 2 para 3.3.1. The Action Plan is an integral and binding part of the Agreement.

58 See UNEP 2009 (n 4).

59 AC Cheshire and others, *UNEP/IOC Guidelines on Survey and Monitoring of Marine Litter* (UNEP/Intergovernmental Oceanographic Commission 2009).

60 Established under the Convention on the Conservation of Antarctic Marine Living Resources (adopted 20 May 1980, entered into force 7 April 1982) 19 ILM 837 (CCAMLR).

61 Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residues [2000] OJ L332/81.

62 Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste [2006] OJ L114/9.

63 Directive 94/62/EC of the European Parliament and of the Council of 20 December 1994 on packaging and packaging waste [1994] OJ L365/10; as amended by, inter alia, Directive 2004/12/EC of the European Parliament and of the Council of 11 February 2004 [2004] OJ L47/26.

64 Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste [1999] OJ L182/1.

65 Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC [2006] OJ L64/37.

66 Directive 2009/147/EG of the European Parliament and the Council of 30 November 2009 on the conservation of wild birds [2010] OJ L20/7; and Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora [1992] OJ L206/7.

67 Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy [2000] OJ L327/1.

68 Directive 2008/56/EC.

69 OSPAR Convention; see art 1(a) for the geographical area of application.

70 Besides the EU, parties include Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

71 OSPAR Convention, art 2(1)(a).

72 ibid, art 3.

73 ibid, annex V art 2(a).

74 ibid, annex V art 2(b).

Convention.[75] One of these criteria is the 'irreversibility or durability' of adverse effects.[76]

Marine litter has been on the agenda of the OSPAR Commission for some time, and attention for the issue has been on the rise of late. Action taken hitherto includes the development of standard methodology for, and the promotion of, the monitoring of marine litter on beaches in the OSPAR area.[77] Such monitoring was initiated in 2001 Regarding actual mitigation action, the OSPAR Commission promotes so-called 'fishing for litter', whereby marine debris caught in fishermen's nets is not thrown overboard again but collected and landed in port.[78] Encouraged by experiences in the Netherlands and the United Kingdom, where fishing for litter programmes turned out to constitute successful and cheap contributions to the removal of litter from the marine environment, the Commission is now aiming for the implementation of such programmes by all contracting parties. In 2010 it was agreed that:

> Contracting Parties should promote the establishment of Fishing for Litter initiatives in line with OSPAR Agreement 2007-10 whereby:
> (a) fishermen are provided, at no cost to them, with large hardwearing bags, or other suitable receptacles, in which they can collect marine litter that accumulates in their nets as part of their normal fishing activity [...];
> (b) facilities are available for these bags to be deposited in harbour at no cost to the fishermen and disposed of, where possible, in line with the waste hierarchy: reuse, recycle, recover and dispose;
> (c) the number of vessels and harbours taking part in Fishing for Litter initiatives and the weight and, where possible, composition of the waste brought ashore is recorded locally and collected by Contracting Parties for OSPAR reporting purposes;
> (d) a communication plan is developed and implemented to promote the project and to raise awareness of fishermen and the fishing industry to the impacts of marine litter.[79]

Parties are to report on the implementation of this (non-binding) decision by 2013 and, in case they have not established any such initiatives, explain why not and also how they are reducing marine litter instead.[80] So as to keep track of the quality status of the marine environment of the North-East Atlantic and to determine what measures should be adopted by OSPAR parties, a set of Ecological Quality Objectives (EcoQOs) has been developed.[81] One of these concerns marine litter, whereby trends are deduced from the stomach contents of northern fulmars in the North Sea. The EcoQO in question is formulated as follows: 'There should be less than 10% of northern fulmars having more than 0.1g of plastic particles in the stomach in samples of 50 to 100 beach-washed fulmars found from each of 4 to 5 areas of the North Sea over a period of at least five years'.[82] As the Quality Status Report compiled by the OSPAR Commission in 2010 reports, achieving this objective will be quite a challenge:

> Over the period 2002 to 2006, the stomachs of 1090 beached fulmars from the North Sea were analysed. The percentage of fulmars with more than 0.1g of plastic in the stomach ranged from 45% to 60%. The Channel is the most heavily polluted area while the Scottish Islands are the 'cleanest' with a mean mass for plastics in fulmars of about a third of the level encountered in the Channel. [...] The EcoQO is probably only achieved in Arctic populations.[83]

For a proper understanding of this EcoQO, it should be noted that the fulmar was *not* chosen as an indicator species because of any particular conservation concerns regarding the impact of plastics on this species, but rather because certain traits – it is a strictly marine species occurring in high numbers throughout a large region, with a propensity for mistaking plastic debris for food – make it an apparently suitable 'thermometer' for the marine litter problem at large. This is not to say that marine litter is harmless for the fulmars themselves. Even though it is not known precisely to what extent plastic ingestion influences fulmar population trends, there is 'no doubt that the ingestion of plastic negatively affects the body condition' of individual

75 ibid, Annex V arts 3(1)(b)(i) and 3(1)(a).

76 ibid, Appendix 3 para 1(d).

77 OSPAR Agreement 2010-02: Guideline for Monitoring Marine Litter on the Beaches in the OSPAR Maritime Area (2010); OSPAR Agreement 2010-06: Agreement on a Voluntary Marine Beach Litter Monitoring Programme (2010) (replaces Agreement 2007-07).

78 OSPAR Agreement 2007-10: Guidance on How to Develop a Fishing for Litter Project (2007); OSPAR Recommendation 2010/19: OSPAR Recommendation 2010/19 on the Reduction of Marine Litter through the Implementation of Fishing for Litter Initiatives (2010).

79 ibid OSPAR Recommendation 2010/9, para 3.1.

80 ibid, para 5.3.

81 See eg OSPAR *The OSPAR System of Ecological Quality Objectives for the North Sea, Update 2010* (OSPAR Commission 2010).

82 ibid 14; see also OSPAR *Background Document for the EcoQO on Plastic Particles in Stomachs of Seabirds* (OSPAR Commission 2008).

83 OSPAR *Quality Status Report 2010* (OSPAR Commission 2010) 118.

fulmars, which will in turn 'reduce its chances for survival and successful reproduction'.[84] In the most contaminated parts of the southern North Sea, beached fulmars presently have an average of 0.6 grams of plastic in their stomachs. A comparison with humans, which weigh about 100 times more than a fulmar, is enlightening, as this would amount to an average of 60 grams of plastic. 'If such a quantity of plastic was the AVERAGE amount of litter in stomachs of humans around the southern North Sea, ambient levels of litter would certainly be considered harmful and immediate action would be taken.'[85]

An extensive OSPAR marine litter assessment, carried out in 2009 in connection with the abovementioned UNEP initiative, states in general terms that 'it can be concluded that marine litter is having a significant effect on the marine environment of the North East Atlantic'.[86] The ministers attending the last meeting of the OSPAR Commission held in 2010 were reminded of the urgency of the marine litter challenge when Jan van Franeker, a leading expert on the topic, performed a live dissection of a fulmar, laying bare the plastic debris in its stomach.[87] The North-East Atlantic Environment Strategy (NAES) for 2010-2020 adopted at the meeting appears to reflect some of this urgency.[88] The NAES identifies action on marine litter as a key component of achieving the Commission's strategic objective to 'halt and prevent by 2020 further loss of biodiversity in the OSPAR maritime area, to protect and conserve ecosystems and to restore, where practicable, marine areas which have been adversely affected'.[89] In this regard, 'the OSPAR Commission will [...] 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'.[90]

This ambitious formulation suggests that the Commission means business. The target is *no harm at all* and the Commission simply announces that it *will* achieve the required marine litter reduction, rather than 'aim to ensure' or 'endeavour' to achieve this – formulations which *are* employed in later targets in the same list.[91] To attain this target, the NAES commits the Commission to developing '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,' including for instance the fostering of 'enforcement and prosecution of offences under [MARPOL] Annex V on garbage'.[92] In the ministerial statement adopted at the 2010 meeting, the Recommendation on 'fishing for litter' cited above was qualified as merely 'a first step' in this process.[93] It should be noted that the NAES as such, like other Commission recommendations and agreements, is not legally binding. Nevertheless, these instruments do obviously inform the interpretation of the parties' collective and individual treaty obligations under the OSPAR Convention itself as reviewed above.

III.4. The EU Marine Strategy Framework Directive and Marine Litter

A rapidly growing literature reflects the potential significance of the MSFD for the protection of the marine environment in the EU.[94] This significance also extends to the issue of marine litter. The MSFD, which applies to all maritime areas under

84 Galgani and others (n 7) 5.

85 ibid (emphasis as in original).

86 OSPAR *Marine Litter in the North-East Atlantic Region: Assessment and Priorities for Response* (OSPAR Commission 2009), Addendum 1, 4.

87 A video of the dissection can be viewed at <www.bt.no/nyheter/lokalt/AEsj---se-hva-de-fant-i-havhesten-1784668.html>.

88 OSPAR Agreement 2010-03: Strategy of the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic 2010-2020 (2010) (NAES).

89 ibid, pt II para 1.1.

90 ibid, pt II para 1.2(d).

91 ibid, pt II paras 1.2(c), (e) and (f).

92 ibid, pt II paras 4.2(j) and (k).

93 Bergen Statement adopted by the Ministerial Meeting of the OSPAR Commission (23-24 September 2010 Bergen), para 21.

94 See, inter alia, R Barnes and D Metcalfe, 'Current Legal Developments – The European Union: The Marine Strategy Framework Directive' (2010) 25 International Journal of Marine and Coastal Law 81; A Borja, 'The New European Marine Strategy Directive: Difficulties, Opportunities, and Challenges' (2006) 52 Marine Pollution Bulletin 239; S Fletcher, 'Converting Science to Policy through Stakeholder Involvement: An Analysis of the European Marine Strategy Directive' (2007) 54 Marine Pollution Bulletin 1881; E Hey, 'Multi-Dimensional Public Governance Arrangements for the Protection of the Transboundary Aquatic Environment in the European Union: The Changing Interplay between European and Public International Law' (2009) 6 International Organizations Law Review 191; W Howarth, 'The Marine Strategy Framework Directive' (2008) 19 Journal of Water Law 95; L Juda, 'The European Union and Ocean Use Management: The Marine Strategy and the Maritime Policy' (2007) 38 Ocean Development & International Law 259; L Juda, 'The European Union and the Marine Strategy Framework Directive: Continuing the Development of European Ocean Use Management' (2010) 41 Ocean Development & International Law 34; T Markus, S Schlacke and N Maier, 'Legal Implementation of Integrated Ocean Policies: The EU's Marine Strategy Framework Directive' (2011) 26 International Journal of Marine and Coastal Law 59; M Salomon, 'Recent European Initiatives in Marine Protection Policy: Towards Lasting Protection for Europe's Seas?' (2009) 12 Environmental Science & Policy 359; N Westaway, 'The New European Marine Strategy Directive' (2008) 10 Environmental Law Review 218.

the jurisdiction of EU member states,[95] establishes a framework within which EU member states 'shall take the necessary measures to achieve or maintain good environmental status in the marine environment by the year 2020 at the latest'.[96] The directive purports to 'address all human activities that have an impact on the marine environment'.[97] Good environmental status (GES) is defined in the Directive as follows:

> 'good environmental status' means the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations, i.e.:
>
> (a) the structure, functions and processes of the constituent marine ecosystems, together with the associated physiographic, geographic, geological and climatic factors, allow those ecosystems to function fully and to maintain their resilience to human-induced environmental change. Marine species and habitats are protected, human-induced decline of biodiversity is prevented and diverse biological components function in balance;
>
> (b) hydro-morphological, physical and chemical properties of the ecosystems, including those properties which result from human activities in the area concerned, support the ecosystems as described above. Anthropogenic inputs of substances and energy, including noise, into the marine environment do not cause pollution effects.[98]

What GES implies can be inferred from the denominated 'qualitative descriptors for determining good environmental status' which are enumerated in Annex I to the directive. These are indicative for determining the characteristics of GES at (sub) regional levels.[99] In a 2010 decision on criteria and methodological standards of GES, the European Commission fleshed out the various descriptors further.[100] Member states are to develop and implement marine strategies for their marine waters in close cooperation with neighbouring states in their respective regions (eg the North-East Atlantic) and subregions (eg, the North Sea) covered by the MSFD.[101] The main procedural and substantive elements of these strategies take the form of a six-step action plan. Member states are obliged to achieve the following within the specified timeframe:

1) Initial assessment of the current environmental status of the waters concerned and the environmental impact of human activities thereon (by July 2012);[102]
2) Determination of good environmental status for the waters concerned (by July 2012);[103]
3) Establishment of a series of environmental targets and associated indicators (by July 2012);[104]
4) Establishment and implementation of a monitoring programme for ongoing assessment and associated regular updating of targets (by 2014);[105]
5) Development of a programme of measures designed to achieve or maintain good environmental status (at the latest by 2015);[106]
6) Entry into operation of the programme of measures designed to achieve or maintain good environmental status (at the latest by 2016).[107]

The general features of each of these elements are outlined in the MSFD, followed by rules containing general and specific exceptions, recommendations for Community action, reporting obligations, updating of marine strategies, public consultation and information.[108] The Commission is to assess, and advise on, the actions taken by the member states to implement the Directive, and is endowed with several related specific tasks and duties.[109]

95 Directive 2008/56/EC, art 3(1).
96 ibid, art 1(1).
97 ibid, preamble para 5.
98 ibid, art 3(5).
99 ibid, arts 3(5), 9(1) and 9(3).
100 Commission Decision 2010/477/EU of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters [2010] OJ L232/14.
101 Directive 2008/56/EC, art 5(1).
102 ibid, arts 5(2)(a)(i) and 8.
103 ibid, arts 5(2)(a)(ii) and 9.
104 ibid, arts 5(2)(a)(iii) and 10.
105 ibid, arts 5(2)(a)(iv) and 11.
106 ibid, arts 5(2)(b)(i) and 13.
107 ibid, arts 5(2)(b)(ii) and 13.
108 ibid, arts 14-19.
109 ibid, arts 12, 16, 20 and 21.

Member states must identify what the necessary measures are – 'on the basis of the initial assessment made pursuant to Article 8(1) and by reference to the environmental targets established pursuant to Article 10(1), and taking into consideration the types of measures listed in Annex VI'[110] and integrate these into a 'programme of measures'.[111] Those programmes 'shall apply an ecosystem-based approach to the management of human activities, ensuring that the collective pressure of [...] activities is kept within levels compatible with the achievement of good environmental status'.[112] In addition, the programmes of measures 'should be devised on the basis of the precautionary principle and the principles that preventive action should be taken, that environmental damage should, as a priority, be rectified at the source and that the polluter should pay'.[113]

Cooperation between member states and coordination with third countries is strongly promoted in the MSFD in order to ensure that measures taken achieve the objectives of the directive and the different elements of the marine strategies are coherent and coordinated across the marine (sub)region in question.[114] Such cooperation is to proceed 'where practical and appropriate' through existing regional institutional cooperation structures and regional seas conventions, for instance the OSPAR Convention in the case of the North-East Atlantic and the North Sea.[115] Those EU member states which are contracting parties to the OSPAR Convention have agreed that the OSPAR Commission should be the main platform for the coordination of the implementation of the MSFD in the region.[116] In the NAES, the OSPAR Commission has indicated its willingness to facilitate the coordinated and coherent implementation of the MSFD's regional components, ensuring 'maximum synergy wherever possible'.[117]

Coping with marine litter, both in terms of monitoring and of actually reducing the problem, is an essential component of the action required from member states under the MSFD. One of the 'qualitative descriptors for determining good environmental status' set out in Annex I to the directive focuses expressly on marine litter, and states: 'Properties and quantities of marine litter do not cause harm to the coastal and marine environment'.[118] On the basis of work done by a task group on the marine litter descriptor,[119] the European Commission in its 2010 Decision formulated the following indicators, 'to be used by the Member States to assess the extent to which good environmental status is being achieved'.[120]

- 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 seafloor, 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)
- Trends in the amount and composition of litter ingested by marine animals (eg stomach analysis) (10.2.1)[121]

As noted in the task group report, implementation of these indicators will require 'common and comparable monitoring approaches, recommendations and guidelines to assess GES on a regional/European scale'.[122] In respect of the fourth indicator (10.2.1), the application is recommended of the OSPAR fulmar EcoQO approach, accompanied by the identification and use of alternative 'thermometer' species in regions where fulmars do not occur, such as the Mediterranean, Baltic and Black Seas.[123] With regard to the 'qualitative descriptor' cited above, which refers to a situation where marine litter does 'not cause harm to the coastal and marine environment', the task group report points out that 'every level of litter in the marine environment causes some level of "harm"'.[124] As a workable overriding objective the task group recommends achievement of

110 ibid, art 13(1).
111 ibid, art 13(2).
112 ibid, art 1(3).
113 ibid, preamble para 27.
114 ibid, arts 5(2) and 6(2).
115 ibid, art 6(1).
116 NAES, pt I para 1.3; see also OSPAR *OSPAR Regional Implementation Framework for the EU Marine Strategy Framework Directive - MSFD Road Map* (OSPAR Commission, 2010), setting out coordination activities for the period 2010-2020.
117 NAES, preamble para 3.
118 Directive 2008/56/EC, Annex I qualitative descriptor 10.
119 Galgani and others (n 7).
120 Commission Decision 2010/477/EU art 1.
121 ibid, Annex pt B descriptor 10.
122 Galgani and others (n 7) 3.
123 ibid 24.
124 ibid 5.

'a measurable and significant decrease (eg 10%/year for litter on coastlines) in the total amount of litter in the environment by 2020'.[125]

In a few years' time, member states must complement these assessment and monitoring exercises with action designed to prevent and reduce marine litter as part of the required programmes of measures.[126] These measures must become operational in 2016 at the latest, and are expected to produce results by 2020. As stated above, these efforts under the MSFD to do away with the marine litter problem will be undertaken in close cooperation with the OSPAR Commission and other regional bodies, depending on the marine (sub)region concerned. All in all, besides adding new duties, the MSFD is likely to provide EU member states with extra impetus to fulfill already existing obligations under international agreements, including the OSPAR Convention, regarding marine litter. The precise future contribution of the MSFD to the control of marine litter in EU waters remains difficult to gauge at present, however, as it depends in part upon the future application and interpretation of exemption options provided for in the directive, and of qualifying clauses concerning cost-effectiveness, technical feasibility and the like.[127]

IV. Taking Stock

The overall assessment made by UNEP in 2005 of the global situation regarding marine litter grimly states: 'Despite actions taken nationally and internationally, the situation with regard to marine litter is continuously getting worse'.[128] As noted before, international environmental law is subject to inherent limitations, and generally cannot provide more than a 'thirty percent solution' to environmental problems. At the same time, in order for those problems to be adequately addressed in concert with the remaining seventy percent – to be provided by politics, economics, technology, public awareness, etcetera – international environmental law should not provide less than those thirty percent either. Thus, whereas international law cannot be expected to provide a 'silver bullet' in respect of marine debris,[129] the central question to be pondered for present purposes is whether the full thirty percent are delivered. Hence, while fully aware of the difficulty of disentangling the influence of international law from other factors involved, a few observations in connection with this question are appropriate in this concluding section.

Many applicable instruments exist at global and regional levels. Not all are legally binding, however, and not all have a strong focus on marine litter. Assessments of the effectiveness of measures taken so far to combat marine litter are not entirely consistent, and the prospects they render vary from outright bleak to, at best, slightly optimistic. Depending on the locations and methods involved, monitoring results indicate mostly increasing, but sometimes stable or decreasing amounts of marine litter. Several studies report that the average size of plastics encountered is decreasing.

Concerning *vessel-source* litter, it has been claimed that temporal trends of plastic debris on remote islands 'suggest that regulations to reduce dumping at sea have been successful to some extent'.[130] Simultaneously, it is clear that the practical effect of MARPOL Annex V in preventing ship-source litter continues to be impaired as a result of bottlenecks concerning the provision of adequate reception facilities and enforcement.[131] This evokes comparison with the bycatch of albatrosses and other seabirds in longline fisheries and other problems which remain far from being resolved despite the availability of 'easy-fix' technological solutions at no great costs.[132]

Worldwide action on *land-based* marine litter, in any event, seems to have remained below par. In connection with the second intergovernmental review conference of the GPA held in Beijing in 2006, UNEP assessed the nine source categories of land-based marine pollution covered by the GPA in its report *The State of the Marine Environment*. According to the report, marine litter is one of the four categories in which the situation has not improved but worsened since the conclusion of the GPA in 1995.[133] The report asserts that the 'problem of marine litter has steadily grown worse, despite both national and international

125 ibid 1.

126 In doing so, they may choose from the wide array of measures indicated in Annex VI to the MSFD.

127 See the literature indicated in n 94.

128 UNEP 2005 (n 4) 4.

129 Coulter (n 32) 1965.

130 Barnes and others (n 16) 1996.

131 See eg P Birnie, A Boyle and C Redgwell, *International Law and the Environment* (3rd ed, Oxford University Press 2009) 409-413.

132 On the international regulation of seabird bycatch, see A Trouwborst, 'Seabird Bycatch – A Precautionary and Holistic Approach?' (2008) 11 Journal of International Wildlife Law and Policy 293.

133 UNEP/GPA (n 4) 26-28.

efforts to control it'.[134] Legislation is deemed to have had 'a limited effect'.[135] There would thus appear to be a lack of decisive and comprehensive action which is as persistent as the plastic litter itself. From a legal perspective, one scholarly review of the GPA regime on land-based marine pollution concludes that '[t]here is nothing in the Washington Declaration or its subsequent history to suggest that it has in any way changed international law relating to pollution of the sea from land-based activities'.[136] Recently, however, the UNEP/GPA Global Initiative on Marine Litter has evidently boosted attention for marine litter in the context of regional seas agreements, although it remains to be seen to what extent the initiative will actually augment *action* by states.

As regards the North-East Atlantic region, the 2009 UNEP marine litter report contains the following assessment:

> There is one clear picture that emerges from the data that has been collected in this assessment of marine litter in the OSPAR Maritime Area and that is that the amount of marine litter remains high and is not decreasing. This is despite areas such as the North Sea being 'Special Areas' under MARPOL Annex V and the introduction of EU legislation such as the Directive on port reception facilities for ship-generated waste and cargo residues (EC2000/59).[137]

According to the report, the OSPAR Commission, notwithstanding commendable efforts in the field of monitoring marine litter, is dragging its feet when it comes to actual preventive and remedial action:

> Despite these examples [this is a reference to beach litter monitoring and 'fishing for litter'] progress has still been slow on developing and implementing the wide range of programmes and measures that are required to reduce the input of marine litter from its many sources or to introduce mechanisms for the remediation of existing litter. Marine litter therefore remains one of the major unresolved outstanding pollution issues throughout the Northeast Atlantic region.[138]

This could change over the next decade if OSPAR parties honour their pledges under the NAES in respect of marine litter. Similarly promising are the commitments of EU member states under the MSFD. These and other regional initiatives, as well as international efforts to improve the effectiveness of Annex V to the MARPOL Convention, could well make a difference when it comes to filling the room for improvement which is still abundantly available.

V. Conclusions

In sum, although the analyses in this article, including the above remarks on effectiveness, are by no means comprehensive, they do allow for at least the following two concise conclusions. On the one hand, it appears safe to state that the situation with regard to marine litter would have been worse without international environmental law. On the other hand, a significant portion of the thirty percent of the solution reserved for international environmental law is clearly still occupied by unfulfilled potential. ■

134 ibid 28.

135 ibid.

136 Birnie and others (n 131) 465-466.

137 UNEP 2009 (n 4) 118.

138 ibid 116.