

## Chapter 24. Solid Waste Disposal

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### 1. Introduction – the regulatory system

The disposal at sea of waste generated on land and loaded on board vessels for dumping is the object of long-standing global, and (in many areas) regional, systems of regulation. (These systems also cover, for completeness, dumping from aircraft and waste (other than operational discharges) from fixed installations in the sea). Such dumping must be distinguished from discharges into rivers and directly from land into the sea and emissions to air from land-based activities discussed in Chapter 20 (Land-based inputs).

When concerns about the environment developed in the 1960s, growing constraints on the land disposal of waste and discharges into rivers led to pressures to find new routes for waste disposal. Concerns about these pressures led to action in several forums. Several United Nations specialized agencies set up the Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP<sup>1</sup> – later altered to “Marine Environmental Protection”).

The preparatory committee for the 1972 Stockholm Conference on the Human Environment, set up by the United Nations General Assembly, established an intergovernmental working group on marine pollution. At the national level, several countries started developing approaches to control such dumping. The United States of America put forward proposals for an international agreement on the subject. Spurred from the national level by an attempt by the vessel *Stella Maris* to dump 650 tons of chlorinated waste, several countries started developing approaches to control such dumping. States adjoining the North-East Atlantic adopted an international convention regulating dumping in that area in Oslo, Norway, on 15 February 1972 (OSPAR, 1982; IMO, 1991).

Later that year, the Stockholm Conference adopted a set of principles for international environmental law and called, among other things, for an international instrument to control dumping of waste at sea. The United Kingdom, in consultation with the United Nations Secretariat, organized a further conference in London, and the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (the 1972 London Convention) was signed on 13 November 1972 in London, Mexico City and Moscow (ICG, 1982, IMO, 2014f).<sup>2</sup>

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<sup>1</sup> At present, it is jointly sponsored by IMO, FAO, IAEA, WMO, UNESCO-IOC, UN, UNDP, UNEP and UNIDO.

<sup>2</sup> United Nations, *Treaty Series*, vol. 1046, No. 15749.

## 1.1 The 1972 London Convention

The main provisions of the 1972 London Convention can be summarized as follows:

- (a) A definition of “dumping” to cover the deliberate disposal of waste and other matter at sea from ships, aircraft, platforms or other man-made structures in the sea;
- (b) A ban on dumping at sea of any of the substances on the “black list” (Annex I to the Convention): toxic organohalogen compounds, agreed carcinogenic substances, mercury and cadmium and their compounds, crude oil and petroleum products<sup>3</sup> taken on board for the purpose of dumping them, high-level radioactive substances as defined by the International Atomic Energy Agency and persistent synthetic substances (including plastics) liable to float or remain in suspension. Exceptions were allowed for *force majeure* and for trace amounts not added for disposal purposes;
- (c) A requirement for a special prior permit for any dumping of any substances on the “grey list” (Annex II to the Convention) – arsenic, lead, copper and zinc and their compounds, organosilicon compounds, cyanides, fluorides and pesticides not in Annex I, bulky objects and tar likely to obstruct fishing or navigation, medium-level and low-level radioactive waste and substances to be dumped in such quantities as to cause harm;
- (d) A requirement for at least a general prior permit for all other dumping. Such permits were required to follow an approach set out in Annex III to the Convention, which required consideration of alternative land-based disposal and the avoidance of harm to legitimate uses of the sea;
- (e) A requirement to appraise the effectiveness of the regulatory assessment process through compliance monitoring and field monitoring of effects;
- (f) An obligation to report to the Secretariat of the Convention (which is hosted by the International Maritime Organization (IMO) in London) on dumping permits issued and amounts permitted to be dumped (IGC, 1982; LC-LP, 2014a).

When the 1972 London Convention entered into force in 1975, dumping at sea was still a major disposal route for many kinds of waste. Over the years, the meetings of the Contracting Parties have tightened the requirements of the Convention, with the result that the amounts of waste that may be dumped were reduced significantly:

- (a) Guidance was adopted on the approaches to the grant of special and general permits for dumping. In many respects this guidance was gradually made more precise and restrictive (IMO, 2014a);

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<sup>3</sup> “Petroleum products” includes wastes from crude oil, refined petroleum products, petroleum distillate products, and any mixtures containing these substances.

- (b) In 1972 incineration of hazardous waste at sea was just beginning to be practised. In 1978 an amendment was adopted clarifying that the incineration at sea of oily wastes and organohalogen compounds was permitted as an interim solution, but requiring a special prior permit in accordance with agreed guidelines for this practice. This amendment came into force in 1979 (IGC, 1982). In 1988, the Consultative Meeting of the States parties called for such incineration to be minimized and for a re-evaluation of the practice (LDC, 1988). In 1993 an amendment to prohibit this practice was adopted and entered into force from 1994 (IMO, 2012);
- (c) In 1990, the Contracting Parties adopted a resolution calling for the phasing out of the dumping of industrial waste (LDC, 43(13)). Following this, an amendment to Annex I of the Convention was adopted in 1993, which entered into force in 1994, to prohibit the dumping of industrial waste from the end of 1995 (IMO, 2012; IMO, 2014c).
- (d) Even though the 1972 London Convention, as adopted, prohibited the dumping of high-level radioactive waste, many Contracting Parties remained unhappy with any dumping of radioactive waste of any kind. In 1983, a voluntary moratorium on such dumping was agreed. In 1993 an amendment was adopted to prohibit all dumping of radioactive waste, subject to a review before February 2019, and every twenty-five years thereafter. The Consultative Meeting of the Contracting Parties is beginning preparations for this review (IMO, 2012; LC-LP, 2014).

## 1.2 *The 1996 London Protocol*<sup>4</sup>

The generally restrictive policy of the Contracting Parties to the 1972 London Convention towards the dumping of waste and other matter at sea resulted in a further development in 1996, when a protocol to the convention was adopted. This Protocol is intended gradually to replace the 1972 London Convention. The London Protocol entered into force in 2006. Among a number of other changes, the fundamental difference between the 1972 Convention and the 1996 London Protocol is that the Protocol adopts a “reverse list” approach. All dumping of waste is prohibited, except for a limited number of categories where dumping could be permitted, in contrast to the 1972 Convention approach, which prohibited dumping only of a specified list of substances, while requiring a permit (general or special) for everything else. The limited number of categories where dumping can still be permitted under the Protocol as originally adopted are:

- (a) Dredged material;
- (b) Sewage sludge;
- (c) Fish waste, or material resulting from industrial fish processing operations;

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<sup>4</sup> 36 *International Legal Materials* 1 (1997).

- (d) Vessels and platforms or other man-made structures at sea;
- (e) Inert, inorganic geological material;
- (f) Organic material of natural origin;
- (g) Bulky items primarily comprising iron, steel, concrete and similar unarmful materials for which the concern is physical impact and limited to those circumstances, where such wastes are generated at locations, such as small islands with isolated communities, having no practicable access to disposal options other than dumping.

Shortly after the Protocol entered into force in 2006, the Meeting of Contracting Parties to the London Protocol adopted an amendment to add “sub-seabed carbon-dioxide (CO<sub>2</sub>) streams from CO<sub>2</sub> capture processes for sequestration” to the list of permitted forms of disposal (LP.1(1)). States Parties may therefore issue permits to allow the injection into a sub-seabed geological formation of CO<sub>2</sub> streams from CO<sub>2</sub> capture processes. This amendment entered into force in 2007. In 2012, specific guidelines were adopted to for such disposal activities and the potential effects on the marine environment in the proximity of the receiving formations. In 2009, a further amendment was adopted, allowing the export of CO<sub>2</sub> from CO<sub>2</sub> capture processes for sequestration in sub-seabed geological formations (LP.3(4)). This amendment is not yet in force. Guidance on the implementation of the export of CO<sub>2</sub> streams for disposal in sub-seabed geological formations for the purposes of sequestration was adopted in 2013. The intention of carbon dioxide sequestration in sub-seabed geological formations is to prevent release into the biosphere of substantial quantities of carbon dioxide derived from human activities, by retaining the carbon dioxide permanently within such geological formations.

In 2008, the Contracting States to both the 1972 London Convention and the 1996 London Protocol adopted a resolution agreeing that the scope of the London Convention and Protocol includes ocean fertilization activities, that is, any activity undertaken by humans with the principal intention of stimulating primary productivity in the oceans. (Ocean fertilization does not include ordinary aquaculture, or mariculture, or the creation of artificial reefs). It was further agreed that:

- (a) In order to provide for legitimate scientific research, such research should be regarded as placement of matter for a purpose other than the mere disposal thereof under Article III.1(b) (ii) of the London Convention and Article 1.4.2.2 of the London Protocol;
- (b) Scientific research proposals should be assessed on a case-by-case basis using an assessment framework to be developed by the Scientific Groups under the London Convention and Protocol;
- (c) Such an assessment framework should include, *inter alia*, tools for determining whether the proposed activity is contrary to the aims of the Convention and Protocol;
- (d) Until specific guidance is available, Contracting Parties should be urged to use utmost caution and the best available guidance to evaluate the

scientific research proposals to ensure protection of the marine environment consistent with the Convention and Protocol;

- (e) For the purposes of the resolution, legitimate scientific research should be defined as those proposals that have been assessed and found acceptable under the assessment framework;
- (f) Given the present state of knowledge, ocean fertilization activities other than legitimate scientific research should not be allowed. To this end, such other activities should be considered as contrary to the aims of the Convention and Protocol and should not currently qualify for any exemption from the definition of dumping in the Convention and the Protocol (LC-LP, 2008).

In 2010, the Contracting Parties to the 1972 London Convention and the 1996 London Protocol adopted the Assessment Framework for Scientific Research Involving Ocean Fertilization (LC-LP, 2010). In 2013, the Contracting Parties to the London Protocol adopted amendments to incorporate into the Protocol provisions regulating the placement of matter for ocean fertilization and other marine geo-engineering activities (LP.4(8)). These amendments are not yet in force (LC-LP, 2013). Guidance on implementing the provisions was adopted in 2014 (LC-LP, 2014).

### 1.3 Acceptance of the system of regulation

As of October 2014, there are 87 parties to the 1972 London Convention, and 45 parties to the 1996 London Protocol. Thirty-four States are parties to both the Convention and the Protocol (IMO, 2014b). There are, however, many regional conventions on marine environmental protection that have specific references to, or contain provisions relating to, the regulation of disposal of wastes into the sea. Most regional conventions (the Abidjan, Antigua, Barcelona, Bucharest, Cartagena, Helsinki, Jeddah, Kuwait, Lima, Nairobi, Noumea, OSPAR Conventions<sup>5</sup>) have specific

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<sup>5</sup> Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region (Abidjan Convention). [http://abidjanconvention.org/index.php?option=com\\_content&view=article&id=100&Itemid=200&lang=en](http://abidjanconvention.org/index.php?option=com_content&view=article&id=100&Itemid=200&lang=en)

The Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific (Antigua Convention). [http://www.unep.org/regionalseas/programmes/nonunep/nepacific/instruments/nep\\_convention.pdf](http://www.unep.org/regionalseas/programmes/nonunep/nepacific/instruments/nep_convention.pdf)

Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention). United Nations *Treaty Series*, vol. 1102, No. 16908.

Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention). United Nations *Treaty Series*, vol. 1764, No. 30674.

Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention). United Nations *Treaty Series*, vol. 1506, No. 25974.

Convention on the protection of the marine environment of the Baltic sea Area, 1992 (Helsinki Convention). United Nations *Treaty Series*, vol. 2099, No. 36495.

Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (Jeddah Convention). [http://www.persga.org/Documents/Doc\\_62\\_20090211112825.pdf](http://www.persga.org/Documents/Doc_62_20090211112825.pdf).

provisions that regulate sea dumping. The dumping clauses are largely based on, or are more stringent than, the London Convention or London Protocol. (An overview of Contracting Parties to the London Protocol, London Convention and Regional Agreements that include management of sea dumping issues is set out in IMO 2014e). Most States are therefore Contracting Parties to an international agreement that relates to the management of sea dumping of solid waste or other matter. However, there remain some States, including some of the world's 20 largest economies, which are not party to any of these agreements. It is not known how far such States apply policies along the lines of those required by the 1972 London Convention or the 1996 London Protocol.

## 2. Amounts and nature of current dumping

Agreements in, and under, the 1972 London Convention and the 1996 London Protocol provide for annual reporting of the number of permits and the quantity and nature of the waste dumped under them. However, reporting under the Convention and the Protocol is not consistent. Figure 1 shows, for 1976 to 2010, the number of States that are Contracting States of the 1972 London Convention, the number submitting reports and the proportion that the latter are of the former.

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Kuwait Regional Convention for Co-operation on the Protection of the Marine Environment from Pollution (Kuwait Convention). United Nations *Treaty Series*, vol. 1140, No. 17898.  
Agreement on the Protection of the Marine Environment and Coastal Area of the South-East Pacific (Lima Convention). United Nations *Treaty Series*, vol. 1648, No. 28325.  
The Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (Nairobi Convention).  
[http://www.unep.org/NairobiConvention/The\\_Convention/index.asp](http://www.unep.org/NairobiConvention/The_Convention/index.asp).  
Convention for the Protection of Natural Resources and Environment of the South Pacific Region (Noumea Convention).  
[https://www.sprep.org/attachments/Legal/Files\\_updated\\_at\\_2014/NoumeaConvProtocols.pdf](https://www.sprep.org/attachments/Legal/Files_updated_at_2014/NoumeaConvProtocols.pdf)  
Convention for the protection of the marine environment of the north-east Atlantic (the 'OSPAR Convention'). United Nations *Treaty Series*, vol. 2354, No. 42279.

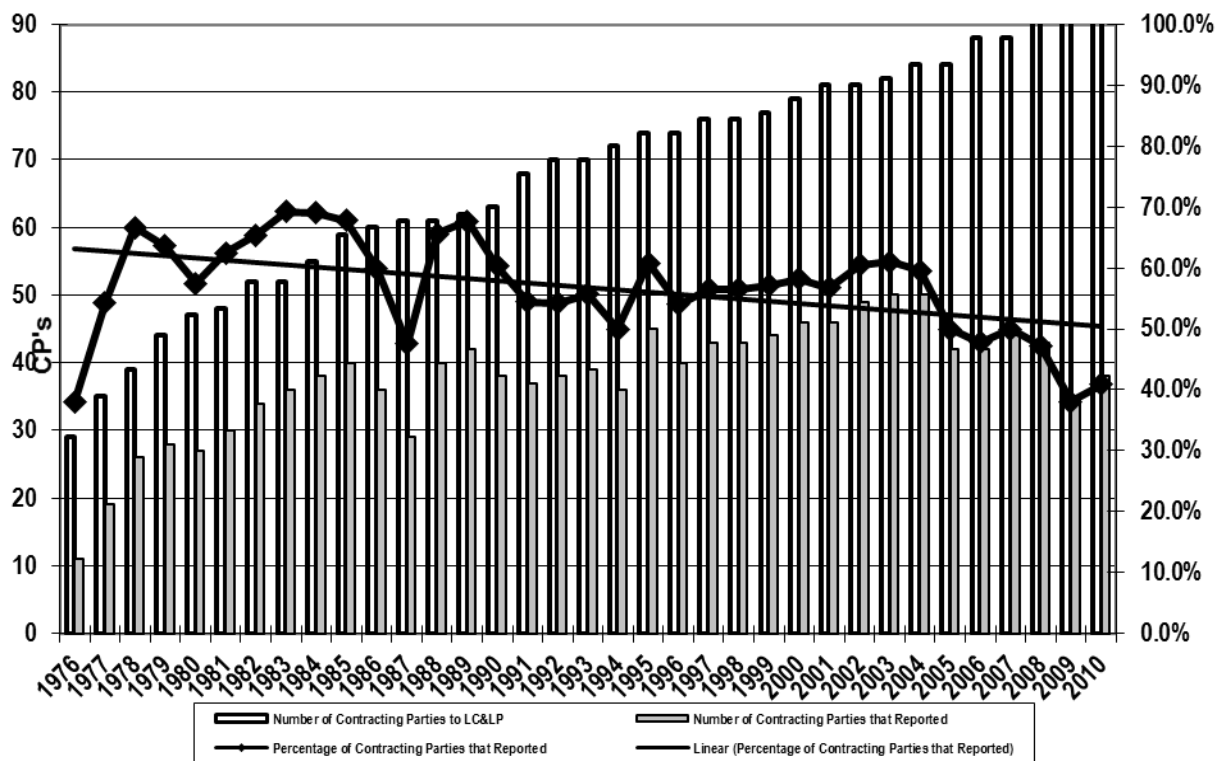


Figure 1. Contracting Parties to the 1972 London Convention, Contracting Parties submitting reports to the Convention Secretariat and the latter as a proportion of the former, 1976 – 2010. Source: IMO, 2014g.

When the Meeting of Contracting Parties to the 1996 London Protocol set up a compliance mechanism in 2007, the worrying decline in reporting led it to include the issue of reporting in the terms of reference of the Compliance Group, which formed part of that mechanism (LC-LP, 2007). Reports under the London Convention and Protocol take some time to be compiled and submitted. It is usually only in the fourth year after the year being reported on that it is possible to take a final view on the reporting for that year. It is worth noting that non-reporting is the highest amongst London Convention parties, while reporting from London Protocol parties is above 75per cent. It may well be that some or all of the 59 per cent of Contracting States that did not submit reports had not authorized any dumping –like eight of the States in 2010 that did submit reports – but the absence of reports makes it impossible to draw clear conclusions. Also, several non-reporting States are land-locked, and therefore may also not have had any dumping to report. There is also a substantial degree of variation from year to year in which States submit reports.

The Meetings of the Contracting Parties have made efforts to try to improve the level of reporting on the dumping of waste at sea, but so far with limited success. The steps taken include reviews and simplifications of the reporting forms and more recently the introduction of on-line reporting. Improved outreach to Parties and contact with the industrial organizations (such as the International Association of Ports and Harbours) involved in dumping is beginning to produce some results. Some States (such as Nigeria and South Africa) have also sought to assist neighbours to set up reporting systems (LC-LP, 2013).

In spite of these efforts, it is therefore difficult to derive a clear picture of the quantity and nature of wastes and other matter being dumped at sea from the reports under the 1972 London Convention and 1996 London Protocol.

Nevertheless, it is clear that the overwhelming type of dumping is of dredged material. For the last year for which a summary of the national reports is available (2010), 35 of the 38 reports submitted recorded the dumping of dredged material. Most, if not all, of this is derived from dredging for navigational purposes. Some is “capital dredging” for the creation of new berths or shipping channels, but most is “maintenance dredging” for the maintenance of existing harbours and shipping channels. The quantity of material involved is considerable. For example, Belgium reported dumping 52 million tons in 2010: over 200,000 tons per working day. It is not, however, possible to give an overall picture of how much is the result of regular dredging and how much is new construction, because many reports do not differentiate between capital dredging and maintenance dredging.

The impacts of this dumping of dredged material are essentially twofold (although there can be other effects): the smothering of the seabed by the dredged material, and the remobilization of hazardous substances contained in the dredged material. The effects of smothering depend essentially on the nature of the dump area. If the dumpsite were to have a biodiverse benthic life, such smothering would be catastrophic. Where tidal action is very dynamic and there is a sedimentary bottom, effects are limited, because much of the seabed material will be kept in motion by the tidal action. The choice of dumpsite is therefore important. The regular use of the same dumpsites (which is reported to be common) limits adverse effects. The remobilization of hazardous substances is a different matter. The Guidance under the London Convention and Protocol sets out procedures and criteria for deciding whether it is safe to dump contaminated dredged material. Where the harbour from which the dredged material comes is on the estuary of a river with a history of heavy industry (for example, the Rhine), it is frequently contrary to this Guidance (or, in the example quoted, parallel guidance from OSPAR, the local regional organization) to dump the material at sea, and it should be returned to land.

In the past, a substantial number of States dumped sewage sludge or animal slurry at sea. Where this was done, of course, it was an addition to the nutrient input. In many areas, this has now been stopped because it was a potential contributor to eutrophication problems. In 2010, only Australia (up to 20,000 litres) and the Republic of Korea (556,534 tons) reported dumping of this kind (IMO, 2014b). The Republic of Korea has also reported that dumping of sewage sludge will end by the end of 2015 (LC-LP, 2013).

The other substances reported as dumped cover a miscellaneous range. Dumping of fish waste was reported in 2010 by six countries. The total amount dumped was around 100,000 tons (not all reporting was in terms of tonnage). The other categories of material dumped included rock, sand and gravel, spoilt cargoes (for example, wheat, rice and fertilizer), molasses waste and a handful of ships and platforms (some of the latter being intended to create artificial reefs). In addition, permits were granted for a few burials at sea (see Chapter 8 Cultural ecosystem services). The overall impression is that, for the countries submitting reports,



disposal of waste at sea is now a minor impact on the marine environment and human uses of the sea, except for the dumping of dredged material.

### **3. Dumping of radioactive material**

As noted above, the dumping of high-level radioactive waste has been prohibited under the 1972 London Convention since 1975, and dumping of medium- and low-level radioactive waste has been prohibited also under the 1996 London Protocol (subject to a review every 25 years) since 1994. The first reported sea disposal of radioactive waste took place in 1946 and the last authorized disposal appears to have been in 1993. During the 48-year history of sea disposal, 14 countries have used more than 80 sites to dispose of approximately 85,000 terabecquerels of radioactive waste. Some countries used this waste management option only for small quantities of radioactive waste. Two countries conducted only one disposal each and one country conducted only two disposals (IAEA, 1999).

In 1992, reports that the former Soviet Union had dumped large amounts of high-level radioactive wastes for over three decades in shallow waters in the Arctic Ocean caused widespread concern, especially in countries with Arctic coastlines. In 1992, a joint Norwegian-Russian Expert Group was established to investigate radioactive contamination due to dumped nuclear waste in the Barents and Kara Seas. The Russian Federation provided information on the dumping, some of which had taken place before 1975. It arranged exploratory cruises to the dumping areas, with the participation of the International Atomic Energy Agency. The results obtained during the cruises did not indicate any significant radioactive contamination at the dumping sites, although the levels near some dumped objects are slightly elevated compared with elsewhere (IAEA, 1995).

Norway undertook further radiological monitoring of the Barents Sea in 2007, 2008 and 2009. Activity concentrations of the anthropogenic radionuclides usually used to trace the impact of radioactive waste were reported as low, and up to an order of magnitude lower than in previous decades, including in marine biota. Weighted absorbed dose rates to biota from anthropogenic radionuclides were low, and orders of magnitude below a predicted no-effect screening level of 10 micrograys per hour ( $\mu\text{Gy/hr}$ ). Dose rates to man from consumption of seafood and dose rates to biota in the marine environment were found to be dominated by the contribution from naturally occurring radionuclides (Gwynn et al., 2012). In 2012, a further joint Norwegian-Russian project examined radioactive pollution in the Kara Sea (Stråleverninfo, 2012). It concluded that the situation gave rise to no immediate cause for concern, but that further monitoring of the situation is warranted (JNREG, 2014). A further joint Norwegian-Russian study of radioactive contamination in the Barents Sea has been launched.

#### 4. Dumped explosives and military chemicals

After both World Wars, States were faced with the problem of how to dispose of the residues of explosive materials and other warlike stores (“munitions”), including a number of containers of poisonous gases. The solution adopted for substantial quantities was to dump them in the sea. During peacetime, some States have also adopted this method of disposal for unwanted explosives and military chemicals. The dump sites were usually chosen to avoid seabed areas then being used by people, but over time some of these areas have come into use as a result of improved technologies and pressures from other uses of the sea.

In 2010, the United Nations General Assembly adopted a resolution noting the importance of raising awareness of the environmental effects related to waste originating from chemical munitions dumped at sea, and invited relevant international organizations to keep the issue under review (UNGA, 2010).

Munitions dumped at sea present a risk to several classes of users of the sea. Fishers in the location of the dump sites can bring the munitions up in their nets, especially bottom-trawling nets. Construction of offshore installations, submarine cables and submarine pipelines can interact with dumped munitions. Some munitions based on phosphorus can break out from the (often wooden) boxes in which they were stored at the time of disposal, float to the surface, be stranded on beaches and then (as the tide recedes and they dry out) spontaneously burst into flame, and burn at temperatures around 1,000 degrees centigrade. These present potential risks to users of beaches, especially tourists (HELCOM, 2013).

Exercises have been carried out in several parts of the world to map the dump sites and to establish what was dumped there. The Baltic Marine Environment Protection Commission (HELCOM) estimated that 40,000 tons of munitions were dumped in the Baltic at the end of World War II. Some of these munitions are contained in ships onto which they were loaded and which were then scuttled. Others were thrown overboard piece by piece, a process which means that the munitions can end up scattered over a wide area. Similar conclusions about dispersed dumping have been reached in other areas. The four main dumping areas in the Baltic were south-east of the Swedish island of Gotland and south-west of the Latvian city of Liepaja, east of the Danish island of Bornholm and south of the Little Belt between the main Danish islands and Schleswig-Holstein in Germany. There is also evidence that munitions were thrown overboard as the ships left port (HELCOM, 2013). The OSPAR Commission has carried out a similar exercise, resulting in an “Overview of Past Dumping at Sea of Chemical Weapons and Munitions”, together with a database on encounters with dumped conventional and chemical munitions, which it is intended to keep up-to-date. Best estimates suggest that over one million tons of munitions were dumped in Beaufort’s Dyke (a trough in the United Kingdom of Great Britain and Northern Ireland between Scotland and Northern Ireland), some 168,000 tons of ammunition were dumped in the Skagerrak, some 300,000 tons of munitions of various types, such as bombs, grenades, torpedoes and mines, were dumped in the North Sea and an estimated 35,000 tons were dumped off Knokke-Heist, Belgium (OSPAR, 2010).

In other parts of the world, problems have arisen with dumped munitions. For example, in 2006 New Zealand had problems with munitions that had been dumped improperly at the end of the Second World War. An estimated 1,500 tons of munitions had ended up in relatively shallow water and were posing threats to fisheries and recreational uses of the sea. The New Zealand authorities concluded that the best solution was to lift them and re-dump them in much deeper water before they dried out: if they were brought ashore and allowed to dry, there was a high risk that they would become unstable (LC-LP, 2006).

A non-governmental organization, the James Martin Center for Nonproliferation Studies, conducted a general survey of dumped chemical warfare munitions and published an interactive map of 168 munitions dump-sites, with the publicly available information about them, on the internet (<https://www.google.com/maps/d/viewer?mid=zwm9Gb8KEKxl.kMpXo9rjqLZM&hl=en>).

In 2010, the Research and Technology Organization of the North Atlantic Treaty Organization (NATO) reviewed the environmental aspects of the disposal of unwanted munitions. The overall conclusion was that the technology and expertise existed to deal with immediate problems and with the current generation of munitions, including the legacy of munitions dumped at sea, but that the expertise and technology was often lodged in countries where there was no significant problem, and that a mechanism was required to assist in the transfer of the technology and expertise to the places where it was needed. It was noted that this could be significant in measures to control terrorism (NATO, 2010).

## **5. Illegal dumping**

If there are problems in obtaining an overall global picture of dumping authorized under the London Convention and London Protocol, trying to gain an overview of the potential effects of illegal dumping presents much greater problems. While the 1972 London Convention and the 1996 London Protocol have a mechanism for reporting illegal dumping<sup>6</sup>, no report has been received in the recent past. An alleged case of illegal dumping in Canadian waters is currently under investigation with a report expected to be provided to the governing bodies of the London Convention and Protocol in the near future.

Several cases have been reported of illegal export of waste from industrialized countries for disposal in States in Africa. Most of these have concerned disposal on land. There have also been persistent informal reports of dumping of radioactive or toxic waste in the sea off the coast of the Federal Republic of Somalia. Informal information given to INTERPOL suggested that the naval force present off the coast of the Federal Republic of Somalia to combat piracy may have detected vessels suspected of illegal dumping of waste. Following the tsunami on 26 December 2004,

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<sup>6</sup> See <http://www.imo.org/OurWork/Environment/LCLP/Reporting/incidents/Pages/default.aspx>

UNEP responded to an urgent request from the authorities in the Puntland region of the Federal Republic of Somalia for help in assessing potential environmental damage. After an initial UNEP report, an inter-agency mission, which included FAO, UNDP, UNEP and WHO, went to Puntland in March 2005. It investigated three sample sites along a 500-kilometre coastal stretch between the three main populated coastal locations of Xaafuun, Bandarbeyla and Eyl where toxic waste had reportedly been uncovered by the tsunami. No evidence of toxic waste was found by the mission. In June 2010, Greenpeace International claimed to have proof of the dumping of toxic waste in the Federal Republic of Somalia by European and American companies in the period from 1990 to 1997, citing testimony from an Italian parliamentary commission, evidence uncovered by an Italian prosecutor (including wiretapped conversations with alleged offenders) and warnings by the Special Representative of the Secretary-General for Somalia in 2008 of possible illegal dumping in the Federal Republic of Somalia. While INTERPOL and some of the entities cited in the Greenpeace International report have uncovered fragmentary evidence and signs of the dumping of toxins, no international investigation has ever been able to verify the dumping of illegal waste in the Federal Republic of Somalia, largely because of the security situation (UNSC, 2011).

Other evidence of illegal dumping appears from time to time as a result of ocean monitoring. For example, the authorities in Japan have detected within areas under its jurisdiction high levels of polychlorinated biphenyls (PCBs) and butyl tin and phenyl tin compounds. The origins of such pollution could not be identified (Japan MOE, 2009).

## **6. Conclusions on knowledge gaps and capacity-building gaps**

The disposal of solid waste at sea has been regulated under international agreements for the past 40 years. The majority of coastal States have accepted this regime. If the 1972 London Convention and the 1996 London Protocol were effectively and consistently applied, this source of inputs of harmful substances would be satisfactorily controlled. The problem is basically that we do not know whether this regime is generally being fully implemented, since there is substantial under-reporting of what is happening.

There is therefore a major knowledge gap about the implementation of the 1972 London Convention and the 1996 London Protocol, as has been acknowledged by the Meetings of the Contracting Parties to the two agreements. Some capacity-building is available from the International Maritime Organization and some of the Contracting Parties, to promote better implementation of the agreements and better reporting of what is being done. However, a significant capacity-building gap remains.

The information gap about the scale and nature of dumping of waste and other matter that is taking place is further compounded by the absence of information about dumping under the control of States which are subject to any formal reporting system under the 1972 London Convention, the 1996 London Protocol or regional

dumping agreements and which do not publish any national data. This category includes some of the world's largest economies.

Much work has been done to identify the locations where munitions have been dumped. However, some gaps in the knowledge remain on this subject. There are gaps in building capacities to help fishers and other users of the sea to draw on this knowledge, in order to reduce the risks to which they are subjected and to know how they should respond if they bring up dumped munitions in their nets.

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