

International Max Planck Research School (IMPRS) for Maritime
Affairs at the University of Hamburg

Jan Albers

Responsibility and Liability in the Context of Transboundary Movements of Hazardous Wastes by Sea

Existing Rules and the 1999 Liability Protocol
to the Basel Convention

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Responsibility and Liability in the Context of Transboundary Movements of Hazardous Wastes by Sea

Existing Rules and the 1999 Liability
Protocol to the Basel Convention

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Hamburg
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*Realism should not imply resignation.*¹

¹ English translation of: “Realismus darf nicht zu Resignation führen.” Kunig, *Reform der Charta der Vereinten Nationen*, in: Albrecht (ed.) (1998), at 156.

Preface

This study was accepted as a doctoral dissertation by the University of Hamburg in summer 2013. The topic originated from a suggestion of my doctoral advisor *Professor Dr. Rainer Lagoni*, former Director of the Institute of the Law of the Sea and of Maritime Law at the University of Hamburg. For his inspiring advice, critical feedback and constant support throughout the entire time of my research I am most grateful and deeply indebted to him. I would further like to thank *Professor Dr. Dr. h.c. Peter Ehlers* for his second opinion on my dissertation and his very valuable comments.

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My deepest gratitude goes to *Nadja*. She supported me most and suffered most. Without her backing and untiring patience, I would have lacked the strength to make this book a reality.

This book is written in remembrance of my father *Dieter*.

Hamburg, March 2014

Jan Albers

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Abbreviations

ADN	European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways
ADR	European Agreement Concerning the International Carriage of Dangerous Goods by Road
AHWG	Ad Hoc Working Group of Legal and Technical Experts to Consider and Develop a Draft Protocol on Liability and Compensation for Damage Resulting from Transboundary Movements of Hazardous Wastes and their Disposal
ACP Group	African, Caribbean, and Pacific Group of States
<i>Acta Jur.</i>	<i>Acta Juridica</i>
add.	addendum
<i>Afr. J. Int'l & Comp. L.</i>	<i>African Journal of International and Comparative Law</i>
AJIL	<i>American Journal of International Law</i>
<i>Am. U. J. Int'l L. & Pol'y</i>	<i>American University Journal of International Law and Policy</i>
<i>Ann. Dr. Mar. Océanique</i>	<i>Annuaire de Droit Maritime et Oceanique</i>
ArchVR	<i>Archiv des Völkerrechts</i>
AU	African Union
BAN	Basel Action Network
BDGVR	<i>Berichte der Deutschen Gesellschaft für Völkerrecht</i>
<i>Buff. L. Rev.</i>	<i>Buffalo Law Review</i>
BYIL	<i>British Year Book of International Law</i>
<i>Cath. U. L. Rev.</i>	<i>Catholic University Law Review</i>
CILSA	<i>Comparative and International Law Journal of Southern Africa</i>

CLC	International Convention on Civil Liability for Oil Pollution Damage
<i>Colo. J. Int'l Env'tl. L. & Pol'y</i>	<i>Colorado Journal of International Environmental Law and Policy</i>
<i>Colum. J. Env'tl. L.</i>	<i>Columbia Journal of Environmental Law</i>
<i>Colum. J. Transnat'l L.</i>	<i>Columbia Journal of Transnational Law</i>
conf.	Conference
COP[no.]	Conference of the Parties to the Basel Convention, indicating its respective meeting
COTIF Convention	Convention Concerning International Carriage by Rail
CRTD Convention	Convention on Civil Liability for Damage Caused During Carriage of Dangerous Goods by Road, Rail and Inland Navigation Vessels
<i>Delhi L. Rev.</i>	<i>Delhi Law Review</i>
<i>Denv. J. Int'l L. & Pol'y</i>	<i>Denver Journal of International Law and Policy</i>
DGR	Dangerous Goods Code
<i>Dick. J. Int'l L.</i>	<i>Dickinson Journal of International Law</i>
<i>Dir. Marit.</i>	<i>Il Diritto Marittimo</i>
doc.	document
<i>DVIS, Reihe A</i>	<i>Schriften des Deutschen Vereins für Internationales Seerecht : Reihe A: Berichte und Vorträge</i>
e.g.	exempli gratia [for example]
EC	European Commission
<i>Ecology L. Q.</i>	<i>Ecology Law Quarterly</i>
ed. (eds.)	edition/editor (editors)
EEA	European Environment Agency
EEZ	Exclusive Economic Zone
<i>EJIL</i>	<i>European Journal of International Law</i>
<i>Emory Int'l L. Rev.</i>	<i>Emory International Law Review</i>
<i>Env't Sci. & Tech.</i>	<i>Environmental Science & Technology</i>
<i>Env'tl. L.</i>	<i>Environmental Law</i>
<i>Env'tl. Pol'y & L.</i>	<i>Environmental Policy and Law</i>
ESM	Environmentally Sound Management
et al.	et aliae [and others]
et seq.	et sequens [and the following one/ones]
etc.	et cetera
EU	European Union
EU15/25/27	European Union, at the time when it consists of the indicated number of Member States
EUR	Euro
<i>Eur. Env'tl. L. Rev.</i>	<i>European Environmental Law Review</i>
FAZ	<i>Frankfurter Allgemeine Zeitung</i>
<i>Fla. J. Int'l L.</i>	<i>Florida Journal of International Law</i>

Fund Convention	International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage
<i>Ga. J. Int'l. & Comp. L.</i>	<i>Georgia Journal of International and Comparative Law</i>
GATT	General Agreement on Tariffs and Trade
GBP	Great Britain pound sterling
<i>Geo. Int'l Env'tl. L. Rev.</i>	<i>Georgetown International Environmental Law Review</i>
<i>GYIL</i>	<i>German Yearbook of International Law</i>
<i>Hague Y. B. Int'l L.</i>	<i>Hague Yearbook of International Law</i>
<i>Harv. Int'l L. J.</i>	<i>Harvard International Law Journal</i>
HCR	Human Rights Council of the General Assembly to the United Nations
<i>HKLJ</i>	<i>Hong Kong Law Journal</i>
HNS	Hazardous and Noxious Substances
HNS Convention	International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea
i.e.	id est [that is]
IATA	International Air Transport Association
IBCs	Intermediate Bulk Containers
ibid.	ibidem [in the same place]
ICAO	International Civil Aviation Organization
ICC	International Chamber of Commerce
ICJ	International Court of Justice
<i>ICJ Reports</i>	<i>International Court of Justice Reports of Judgments, Advisory Opinions and Orders</i>
IGO	Intergovernmental Organisation
<i>IJMCL</i>	<i>International Journal of Marine and Coastal Law</i>
ILC	International Law Commission
<i>ILM</i>	<i>International Legal Materials</i>
ILO	International Labour Organization
IMCO	Inter-Governmental Maritime Consultative Organization
IMDG Code	International Maritime Dangerous Goods Code
IMO	International Maritime Organization
INCOTERMS	International Commercial Terms
<i>Ind. Int'l & Comp. L. Rev.</i>	<i>Indiana International & Comparative Law Review</i>
<i>Ind. J. Global Legal Studies</i>	<i>Indiana Journal of Global Legal Studies</i>
<i>Int'l & Comp. L. Q.</i>	<i>International and Comparative Law Quarterly</i>
<i>Int'l Comm. L. Rev.</i>	<i>International Community Law Review</i>

<i>Int'l J. Hum. Rts.</i>	<i>International Journal of Human Rights</i>
<i>Int'l Law.</i>	<i>International Lawyer</i>
<i>Int'l Rev. L. & Econ.</i>	<i>International Review of Law and Economics</i>
IOPC	International Oil Pollution Compensation
ISA	International Seabed Authority
ITLOS	International Tribunal for the Law of the Sea
<i>ITLOS Reports</i>	<i>International Tribunal for the Law of the Sea Reports of Judgments, Advisory Opinions and Orders</i>
<i>J. Env. & Dev.</i>	<i>Journal of Environment & Development</i>
<i>J. Environ. Econ. Manage.</i>	<i>Journal of Environmental Economics and Management</i>
<i>J. Envtl. L.</i>	<i>Journal of Environmental Law</i>
<i>J. L. & Econ.</i>	<i>Journal of Law and Economics</i>
<i>J. Nat. Resources & Envtl. L.</i>	<i>Journal of Natural Resources & Environmental Law</i>
<i>J. W. T.</i>	<i>Journal of World Trade</i>
<i>JIML</i>	<i>Journal of International Maritime Law</i>
ldt	Light displacement ton
<i>LHD</i>	<i>Legal Hukuk Dergisi</i>
LLMC Convention	Convention on Limitation of Liability for Maritime Claims
<i>LMCLQ</i>	<i>Lloyd's Maritime and Commercial Law Quarterly</i>
LNG	Liquefied Natural Gas
LOF 2000	Lloyd's Standard Form of Salvage Agreement of 2000
<i>Loy. L. A. Int'l & Comp. L. J.</i>	<i>Loyola of Los Angeles International and Comparative Law Journal</i>
LPG	Liquefied Petroleum Gas
LWG	Legal Working Group of the Basel Convention
M/V	Motor Vessel
<i>Mar. Pol'y</i>	<i>Marine Policy</i>
MARPOL 73/78 Convention	International Convention for the Prevention of Pollution from Ships
<i>Max Planck YBUNL</i>	<i>Max Planck Yearbook of United Nations Law</i>
MEAs	Multilateral Environmental Agreements
MEGCs	Multiple-Element Gas Containers
MOP	Meeting of the Parties to the Basel Protocol
<i>Multinatl. Monit.</i>	<i>Multinational Monitor</i>
<i>N. Y. U. J. Int'l. L. & Pol.</i>	<i>New York University Journal of International Law & Politics</i>
NGOs	Non-Governmental Organisations
no.	Number
<i>Nord. J. Intl. L.</i>	<i>Nordic Journal of International Law</i>

NUCLEAR Convention	Convention Relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material
<i>NuR</i>	<i>Natur und Recht</i>
<i>NYIL</i>	<i>Netherlands Yearbook of International Law</i>
OAU	Organisation of African Unity
OBO-carrier	Cargo vessel carrying oil, bulk and ore cargos
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
OECD	Organisation for Economic Co-operation and Development
OEWG	Open-ended Working Group of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal
OILPOL Convention	International Convention for the Prevention of Pollution of the Sea by Oil
OPRC Convention	International Convention on Oil Pollution Preparedness, Response and Cooperation
OPRC-HNS Protocol	Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances
OSPAR Convention	Convention for the Protection of the Marine Environment of the North-East Atlantic
<i>Österr. Z. öffentl. Recht</i>	<i>Österreichische Zeitschrift für öffentliches Recht und Völkerrecht</i>
p.	Page
p.a.	Per annum [per year]
para.	Paragraph/paragraphs
PCBs	Polychlorinated Biphenyls
PCIJ	Permanent Court of International Justice
<i>PCIJ Series A</i>	<i>Permanent Court of International Justice Series A: Judgments and Orders</i>
<i>PCIJ Series A/B</i>	<i>Permanent Court of International Justice Series A/B: Collection of Judgments, Orders and Advisory Opinions</i>
PCTs	Polychlorinated Terphenyls
PIC	Prior Informed Consent
PIF	Pacific Island Forum
<i>Polish Y. B. Int'l L.</i>	<i>Polish Yearbook of International Law</i>
POPs	Persistent Organic Pollutants
pp.	Pages
<i>RabelsZ</i>	<i>Rabel Journal of Comparative and International Private Law</i>
<i>RdC</i>	<i>Recueil des Cours</i>

<i>RECIEL</i>	<i>Review of European Community and International Environmental Law</i>
res.	Resolution
<i>Resour. Conserv. Recycl.</i>	<i>Resources, Conservation and Recycling</i>
<i>Rev. Int. Econ.</i>	<i>Review of International Economics</i>
RIAA	<i>Reports of International Arbitral Awards</i>
S.S.	Steam Ship
SCOPIC	Special Compensation P&I Clause
SDR	Special Drawing Rights
<i>SIMPLY</i>	<i>Scandinavian Institute of Maritime Law Yearbook</i>
SOLAS Convention	International Convention for the Safety of Life at Sea
<i>Stan. J. Int'l L.</i>	<i>Stanford Journal of International Law</i>
<i>Suffolk Transnat'l L. Rev.</i>	<i>Suffolk Transnational Law Review</i>
<i>Temp. Envtl. L. & Tech. J.</i>	<i>Temple Environmental Law & Technology Journal</i>
transl.	Translated
TOR	Terms of Reference of the Mechanism for Promoting Implementation and Compliance with the Basel Convention
<i>Tul. Envtl. L. J.</i>	<i>Tulane Environmental Law Journal</i>
<i>Tul. J. Int'l & Comp. L.</i>	<i>Tulane Journal of International and Comparative Law</i>
<i>TWQ</i>	<i>Third World Quarterly</i>
<i>UCLA J. Envtl. L. & Pol'y</i>	<i>UCLA Journal of Environmental Law & Policy</i>
UN	United Nations
UNCC	United Nations Compensation Commission
UNCLOS	United Nations Convention for the Law of the Sea
UN-ECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNGA	General Assembly of the United Nations
<i>Unif. L. Rev.</i>	<i>Uniform Law Review</i>
<i>UPR</i>	<i>Umwelt- und Planungsrecht</i>
USA/US	United States of America
USD	United States dollar
USSR	Union of Soviet Socialist Republics
v.	Versus
<i>V and. J. Transnat'l L.</i>	<i>Vanderbilt Journal of Transnational Law</i>
<i>VersR</i>	<i>Versicherungsrecht</i>
<i>VRÜ</i>	<i>Verfassung und Recht in Übersee</i>
<i>Vt. L. Rev.</i>	<i>Vermont Law Review</i>

<i>Wm. & Mary Envtl. L. & Pol'y Rev.</i>	<i>William and Mary Environmental Law and Policy Review</i>
<i>WTAM</i>	<i>World Trade and Arbitration Materials</i>
<i>WTO</i>	World Trade Organization
<i>WWF</i>	World Wildlife Fund
<i>Yale J. Int'l L.</i>	<i>Yale International Journal of International Law</i>
<i>Yb. Int'l Env. L.</i>	<i>Yearbook of International Environmental Law</i>
<i>YBICED</i>	<i>Yearbook of International Co-operation on Environment and Development</i>
<i>YBILC</i>	<i>Yearbook of the International Law Commission</i>
<i>ZaöRV</i>	<i>Zeitschrift für ausländisches öffentliches Recht und Völkerrecht</i>
<i>ZUR</i>	<i>Zeitschrift für Umweltrecht</i>

Chapter 1

Introduction

In December 1999, in the wake of the 5th Conference of the Parties to the Basel Convention held in Basel, Switzerland, the then Executive Director of the United Nations Environmental Programme (UNEP), *Klaus Töpfer*, praised the recent adoption of the Basel Protocol on Liability and Compensation¹ as a “major breakthrough”.² He claimed that “[f]or the first time, we have a mechanism for assigning responsibility for damage caused by accidental spills of hazardous waste during export or import”. However, it did not take long before voices were being raised that cast a rather poor light on the Basel Protocol. The Protocol was criticised by legal scholars as being “far from perfect and in many respects [...] unclear and confusing”.³ Others used even stronger language: “The Liability Protocol is [...] a text with as many holes and exclusions as Swiss cheese” and “[it] is a dangerous precedent and is unlikely to ever, provide adequate relief for victims of toxic waste or serve as an incentive to avoid hazardous waste trafficking”.⁴ Similarly, it was charged that “the treaty offers very little that is positive and much that is highly negative”, and, “[w]hat was adopted in Basel in 1999 [...] represents a successful attack on the Basel Convention’s own fundamental principles and a dangerous international precedent”.⁵ By means of this juxtaposition the nature of the major burden facing the Basel Protocol becomes plainly apparent: Diverging political, commercial and environmental interests put high requirements on a legal regime governing civil liability for damage resulting from the

¹ Basel Protocol on Liability and Compensation for Damage Resulting from Transboundary Movements of Hazardous Wastes and Their Disposal (to the Basel Convention) of 10 December 1999.

² Quoted from UNEP, press release of 14 December 1999, ‘Compensation and Liability Protocol Adopted by Basel Convention on Hazardous Wastes’.

³ Tsimplis, ‘The 1999 Protocol to the Basel Convention’, 16 *IJMCL* (2001), at 296.

⁴ Kevin Stairs, political adviser with Greenpeace International, as quoted from Basel Action Network, press release of 10 December 1999, ‘Hazardous Waste Agreement on Liability Protocol Reached at Basel Conference of Parties’.

⁵ Sharma, ‘The Basel Protocol’, 26 *Delhi L. Rev.* (2004), at 196.

transboundary movement of hazardous wastes, and these can hardly be met by a compromise regulation as represented by the 1999 Basel Protocol.

The Basel Protocol on Liability and Compensation was adopted in 1999 to supplement the legal framework established by the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and to provide for rules imposing civil liability and making compensation available for the victims of pollution caused by hazardous wastes. The Basel Protocol, however, has yet not entered into force, and keeping in mind the harsh criticisms as outlined above, it is also questionable whether it will ever receive sufficient support from States to obtain the required number of ratifications in order to enter into force.

The present work starts exactly at this juncture. Its primary purpose is to outline the legal rules and regimes applicable for the imposition of responsibilities and liabilities for damage resulting from the transboundary movement of hazardous wastes by sea. Given the fact that the entry into force of the Basel Protocol is uncertain, it is necessary that this work begins with an analysis of responsibility and liability according to the rules of customary international law and according to the regulations of international conventions and regulations that are currently in force and applicable to the cases under consideration. The prospective regime of liability and compensation as proposed by the Basel Protocol can only be examined in detail in a second step, which may then illuminate the possible advantages and disadvantages of this potential solution *de lege ferenda*. As a result of this consideration it will be possible to make a recommendation whether it seems appropriate to agree with *Klaus Töpfer* and to further expedite and promote ratification of the Basel Protocol, or whether the criticisms voiced against the Protocol are actually true and efforts should rather be made to develop and strengthen other mechanisms to protect victims of pollution and the environment.

A. The Factual Perspective: Transboundary Movements of Hazardous Wastes by Sea

The transboundary movement of hazardous wastes represents a commercial activity promising huge returns for the persons engaged in the movement. On the downside, hazardous waste movements may pose a substantial threat for human health and the environment. Since, moreover, hazardous wastes are usually shipped in large amounts, incidents involving hazardous wastes are likely to affect large areas with adverse effects on a potentially large number of humans, animals and natural resources. The fact that incidents may occur during each stage of a transboundary movement of hazardous wastes by sea can be illustrated in the following examples⁶:

⁶ It should be added, though, that the facts of the following cases have not been officially established. These cases are depicted as far as they are described in publicly assessable articles and contributions to newspapers and journals.

The *M/V “Khian Sea”* case⁷: In 1986 the city of Philadelphia in Pennsylvania (USA) instructed a private waste management company to export 14,000 tons of toxic ash derived from a municipal incineration plant. The bulk cargo was loaded on board the *M/V “Khian Sea”*, which headed for the Caribbean to dump the ash on a man-made island in the Bahamas. The Bahamian government, however, refused to permit the discharge. The ash was then relabelled and the vessel tried to call at several other ports in the Caribbean, South America and Western Africa.⁸ In spring 1988, the crew finally succeeded in discharging the ash onto a beach near Gonaives in Haiti by declaring it as topsoil fertilizer. After approximately 4,000 tons had been discharged, the Haitian government recognised the true nature of the cargo and ordered the vessel to reload, which, however, left Haitian waters without reassuming the ash.⁹ Thereafter, the crew of the *M/V “Khian Sea”* was unsuccessful in its attempts to unload the remaining ash at several ports around the globe. The vessel was sold, reflagged and renamed, and when she arrived at Singapore in November 1988 her cargo was missing. It is assumed that the ash had been dumped into the Indian Ocean.¹⁰ Whereas two executives of the vessel operating company were sentenced to imprisonment by US courts for the dumping into the high seas, no one could be held liable for the costs of re-importation and clean-up at the Haitian shore.¹¹ It was only in 2000 that a major part of the ash located in Haiti was re-shipped to the US and finally deposited at a landfill in Pennsylvania.¹²

The *M/V “Khian Sea”* case is only one striking example of major environmental incidents that have occurred in the context of transboundary movements of hazardous wastes by sea. Another example of wastes being sent around the globe is the *M/V “Zanoobia”* case from 1987. An Italian waste management company shipped approximately 2,200 tons of chemical waste to Djibouti where the drums were intended to be buried. After the local authorities refused to allow the

⁷ For a detailed description of the *M/V “Khian Sea”* Incident see Gilmore, ‘The Export of Nonhazardous Waste’, 19 *Envtl. L.* (1988/1989), at 879–883; Pellow, *Resisting Global Toxics* (2007), at 107–123; see also Bruno, ‘Philly Waste Go Home’, 19 *Multinatl. Monit.* (1998).

⁸ Gilmore, ‘The Export of Nonhazardous Waste’, 19 *Envtl. L.* (1988/1989), at 880; Pellow, *Resisting Global Toxics* (2007), at 108; Walsh, ‘The Global Trade in Hazardous Wastes’, 42 *Cath. U. L. Rev.* (1992/1993), at 106.

⁹ Pellow, *Resisting Global Toxics* (2007), at 108; Rosenthal, ‘Ratification of the Basel Convention’, 11 *Temp. Env’tl. L. and Tech. J.* (1992), at 62–63.

¹⁰ Liu, ‘The Koko Incident’, 8 *J. Nat. Resources and Env’tl. L.* (1992/1993), at 130; Pellow, *Resisting Global Toxics* (2007), at 108; Walsh, ‘The Global Trade in Hazardous Wastes’, 42 *Cath. U. L. Rev.* (1992/1993), at 106.

¹¹ Pellow, *Resisting Global Toxics* (2007), at 110; Tsimplis, ‘The 1999 Protocol to the Basel Convention’, 16 *IJMCL* (2001), at 298.

¹² Pellow, *Resisting Global Toxics* (2007), at 110–119. See also Greenpeace, press release of 29 October 1998, ‘Philadelphia Incinerator Ash to Return from Haiti to the U.S.’; Haitian Government, press release of 22 April 2000, ‘The Haitian People Achieve Environmental Justice for Earth Day’; ‘Homeless for 16 Years, Barge of Garbage Returns to Pa.’, *Los Angeles Times* of 11 August 2002.

discharge, the cargo was sent to Venezuela for interim storage, then to Syria and finally back to Italy. Several people that came into contact with the wastes during the movement fell ill.¹³

Further examples include, amongst others, the Kassa Island incident in Guinea,¹⁴ the Koko Beach incident in Nigeria,¹⁵ the *Thor Chemicals* incident in South Africa¹⁶ and the *Formosa* incident in Cambodia.¹⁷

The *M/V “Probo Koala”* case¹⁸: The *M/V “Probo Koala”* was a Greek OBO-carrier chartered by an oil trading company with head offices in Amsterdam, Lucerne and London. In 2006, the vessel was used to temporarily store and process petrol blend stocks and naphtha while she anchored in the Mediterranean off the coast of Gibraltar. During this caustic washing process (“sweetening”), naphtha or petrol blends are mixed with caustic soda (liquid sodium hydroxide) to reduce the level of mercaptans in order to obtain tradable petrol for the African market. The highly toxic residues of this caustic washing were collected in the vessel’s slop tanks.¹⁹ In June 2006, the *M/V “Probo Koala”* called at the port of Amsterdam to refuel and to empty her slop tanks, whose content was declared as ordinary slops from oil tank washings. However, an unusual and pungent odour emanated from the samples taken by the port operator, so that the further discharging of the slop tank contents was prohibited.²⁰ The vessel then sailed to Paldiski in Estonia and loaded approximately 26,000 tons of petrol to be shipped to Nigeria. After delivery

¹³ See Liu, ‘The Koko Incident’, 8 *J. Nat. Resources and Envtl. L.* (1992/1993), at 127–128; Wiedemann, ‘Die schlimmste Fracht meines Lebens’, *SPIEGEL* of 30th May 1988.

¹⁴ See Gilmore, ‘The Export of Nonhazardous Waste’, 19 *Envtl. L.* (1988/1989), at 882; Liu, ‘The Koko Incident’, 8 *J. Nat. Resources and Envtl. L.* (1992/1993), at 130; Vir, ‘Toxic Trade with Africa’, 23 *Env’t Sci. and Tech.* (1989), at 24.

¹⁵ See on this case: Eguh, ‘Regulations of Transboundary Movement of Hazardous Wastes’, 9 *Afr. J. Int’l and Comp. L.* (1997), at 130–134; Liu, ‘The Koko Incident’, 8 *J. Nat. Resources and Envtl. L.* (1992/1993), at 131–134; Vir, ‘Toxic Trade with Africa’, 23 *Env’t Sci. and Tech.* (1989), at 23–24.

¹⁶ See Glazewski, ‘Regulating Transboundary Movement of Hazardous Waste’, 26 *CILSA* (1993), at 235; Lipman, ‘Transboundary Movements of Hazardous Waste’, *Acta Jur.* (1999), at 268; Poulakidas, ‘Waste Trade and Disposal in the Americas’, 21 *Vt. L. Rev.* (1996/1997), at 874.

¹⁷ This incident is described by: Lohnes, ‘Taiwanese Company Dumps 3000 Tons of Toxic Waste in Cambodia’, 11 *Colo. J. Int’l Envtl. L. and Pol’y* (2000), at 264–270; Markus, ‘Taiwanese Waste Sent to Europe’, *BBC News* of 2nd March 2000.

¹⁸ HRC Doc. A/HRC/12/26/Add. 2; COP8 Doc. UNEP/CHW.8/16, at 6–9. See also Fagbohun, ‘The Regulation of Transboundary Shipments of Hazardous Waste’, 37 *HKLJ* (2007), at 834–837; Knauer, *et al.*, ‘Profits for Europe, Industrial Slop for Africa’, *SPIEGEL ONLINE* of 18th September 2006; Ognibene, ‘Dumping of Toxic Waste in Côte d’Ivoire’, 37 *Envtl. Pol’y and L.* (2007), at 31; Pratt, ‘Decreasing Dirty Dumping?’, 35 *Wm. and Mary Envtl. L. and Pol’y Rev.* (2011), at 582–584.

¹⁹ HCR Doc. A/HRC/12/26/Add. 2, at 7–8; OCHA Doc. OCHA/GVA/2006/0190; Frenk, ‘Was geschah an Bord der “Probo Koala”?’, *FAZ* of 27th October 2006.

²⁰ The port operator instead suggested delivering the slop to a disposal facility based in Rotterdam possessing the required capability to incinerate the chemical residues. The costs, however, amounted to EUR 900 instead of EUR 20 per cubic metre.

of the cargo the vessel called at Abidjan in Ivory Coast on 19 August 2006 and emptied her slop tanks. Approximately 528 cubic metres of chemical wastes were delivered to a local waste management company²¹ that had been founded only recently.²² The liquid wastes were simply dumped at various sites in and around Abidjan lacking any kind of soil sealing. It is officially estimated that as a result of direct contact and indirect exposure by consumption of contaminated water, groundwater and food products, 15 residents died, 69 were hospitalised and more than 108,000 people sought medical attention because of intestinal and respiratory problems, nausea and vomiting.²³ When the international public became aware of this incident the oil trading company attempted to settle this matter by mutual agreement with the Ivorian government. According to this agreement the Ivorian government received a contribution of GBP 100 million towards the costs of restoration of environmental damage and towards compensation payments for the families of killed and injured residents.²⁴ Notwithstanding this step, a class action lawsuit aggregating 31,000 residents was instituted before the London High Court in 2009, this later being withdrawn after the oil trading company agreed to an out-of-court settlement paying GBP 1,000 to each victim.²⁵ The oil trading company was, furthermore, sentenced by an Amsterdam Court to pay a fine of one million Euros for concealing the hazardous character of the wastes when they were initially unloaded in Amsterdam.²⁶

B. The Legal Perspective: Existing Rules and the 1999 Liability Protocol to the Basel Convention

International environmental law is a comparably young field of law. The vast majority of international conventions and agreements concerned with the protection of the environment and the conservation of natural resources have been

²¹ The disposal fees amounted to USD 30–35 per cubic metre.

²² OCHA Doc. OCHA/GVA 2006/0184; Ognibene, 'Dumping of Toxic Waste in Côte d'Ivoire', 37 *Envtl. Pol'y and L.* (2007), at 31.

²³ HCR Doc. A/HRC/12/26/Add. 2, at 8–9; COP8 Doc. UNEP/CHW.8/16, at 7.

²⁴ Fagbohun, 'The Regulation of Transboundary Shipments of Hazardous Waste', 37 *HKLJ* (2007), at 836; Pratt, 'Decreasing Dirty Dumping?', 35 *Wm. and Mary Env'tl. L. and Pol'y Rev.* (2011), at 584.

²⁵ Dowell, 'Trafigura Settlement: A Drop in the Ocean?', *The Lawyer* of 28th September 2009; Leigh, 'Trafigura Offers £1,000 Each to Toxic Dumping Victims', *The Guardian* of 18th September 2009.

²⁶ 'Trafigura found guilty of exporting toxic waste', *BBC News* of 23rd July 2010; Corbett, 'Implications from 'Probo Koala' ruling', *Trade Winds* of 30th July 2010; Evans, 'Trafigura fined €1m for exporting toxic waste to Africa', *The Guardian*, of 23rd July 2010.

created subsequent to the 1972 Stockholm Conference.²⁷ Those multilateral environmental agreements (MEAs) are almost exclusively designed as sectoral or regional conventions dealing with the protection of specific environmental resources or with particular dangers to the environment.²⁸ A coherent conception or a structured development of international environmental law does not exist. International law rather emerges where States recognise a current need for binding rules in a specific sector. This, however, also means that as soon as a certain environmental issue vanishes from the public debate, it is questionable whether there will be sufficient political support to establish a new and far-reaching international legal regime.²⁹ Toxic waste exports represent such an environmental issue.

The question of liability and compensation for damage resulting from the transboundary movement of hazardous wastes by sea is an interdisciplinary matter that touches on several aspects and, hence, constitutes an area particularly ripe for disagreement. It not only involves different commercial interests on the waste exporting, handling and disposing side, but it also needs to take account of the shipping and insurance industries as well as the industrial sectors demanding a steady supply of raw materials. Moreover, diverging political interests and positions are involved and there is a strong need for the protection of human health and the environment as well as for the conservation of natural resources. All these different interests and positions require a careful balancing by a legal regime addressing this issue. This applies all the more since the exportation of toxic waste is a highly emotional issue that encompasses not only an “environmental component”, but rather a conglomeration of human, social and ethical questions, the global distribution of responsibilities, the right to develop and to take part in the world trade market, and the burden of significant faults and failures from the past.³⁰

The issue of liability and compensation for damage resulting from the transboundary movement of hazardous wastes by sea needs to be considered in the context of the surrounding branches of law. The most important legal framework of substantive rules, in which this topic is embedded, is provided by the widely accepted 1989 Basel Convention on the Control of Transboundary Movements of

²⁷ The United Nations Conference on the Human Environment held in Stockholm in June 1972 was concerned with the international protection of the environment and resulted in the foundation of the UNEP and the adoption of the 1972 Stockholm Declaration as well as the formulation of an Action Plan with 109 recommendations.

²⁸ A global convention dealing in general with the protection of the global environment does not exist. Non-binding rules are however contained in the 1972 Stockholm Declaration and in the 1992 Rio Declaration.

²⁹ Examples of crucial environmental issues that have vanished from the current focus of public awareness are: liability for nuclear damage, use of outer space, depletion of the ozone layer, acid rain and forest dieback, dumping of wastes and nuclear wastes, and pollution from ships.

³⁰ As to the difficulties generally faced by the international environmental law, see also Crawford, *Brownlie's Principles of Public International Law* (8th ed., 2013), at 352–355.

Hazardous Wastes as well as a number of regional conventions and agreements. Since waste movements mostly take part using the seas as a transport medium, the international law of the sea also provides for applicable substantive rules. While the general legal framework is defined by the UNCLOS, further sectoral conventions and agreements apply to specific aspects of marine transportation. This involves, for example, the MARPOL 73/78 Convention and the diverse Regional Seas Conventions, the latter also partially providing for specific rules dealing with the transboundary movement of hazardous wastes.³¹ Overlaps in respect of this issue may arise from the existing and nascent legal regimes of civil liability, such as the 1996/2010 HNS Convention, the CRTD Convention or the regional or domestic liability regimes. Apart from all these connections to the existing and nascent treaty law, the issue of liability in the context of hazardous waste movements must also be related to the existing rules and principles of customary international law. The rules of State responsibility are subject to a steady process of development³² and concern the question under which conditions particularly States may be held liable for damage due to internationally wrongful acts.

The particular difficulties related to the regulation of liability in the context of waste movements and their complex thematic classifications arise in the question of how to argumentatively approach this issue. The following steps of reasoning should be taken:

1. Which rules and provisions of the international law apply *de lege lata* as to the determination of responsibilities and liabilities for damage resulting in the context of transboundary movements of hazardous wastes by sea?
2. Does this existing law provide for a sufficient level of protection? Or is there a need for the establishment of a further legal regime? Are there general requirements on the prospective legal regime?
3. What solutions does the 1999 Basel Protocol provide for? Are these approaches *de lege ferenda* suitable and appropriate to meet the requirements?
4. In conclusion, is it appropriate to promote ratification of the Basel Protocol, or does it rather make sense to focus on the elaboration or further development of new or other legal instruments?

The objective of this book is to provide for an analysis and assessment of the existing rules and legal instruments relevant to the determination of responsibilities and liabilities for damage resulting from the transboundary movement of hazardous wastes by sea, as well as to give an estimation whether or not the regime of civil liability as envisaged by the 1999 Protocol to the Basel Convention

³¹ See 1996 Izmir Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal; 1998 Tehran Protocol on the Control of Marine Transboundary Movements and Disposal of Hazardous Wastes.

³² In this respect, particularly the 1938/1941 *Trail Smelter Arbitration Award*, 3 RIAA (1949), at 1905 *et seq.*, represents a milestone in the development of an international legal regime on the responsibility of States for transboundary harm, which finally led to the adoption of the ILC Draft Articles on State Responsibility in 2001.

constitutes a suitable and appropriate mechanism to compensate damage and provide a remedy to those who have been victimised by pollution. This work is intended to make a small contribution towards legal clarity in the area of liability in the context of hazardous waste movements. In the best case scenario, it should serve as a plea for the entry into force of the Basel Protocol, offering further stimulus for an arguably overdue ratification of the Protocol by the Contracting States of the Basel Convention.

C. The Structure of This Book

The structure of this book basically follows the steps of reasoning as outlined above. It is furthermore complemented by a description of the factual and economic background of hazardous waste movements.

As a first step, this book outlines the economic background of the international trade in hazardous wastes (Chap. 2). It describes common properties of hazardous wastes and explains why they are traded on a global scale. In this context, particular emphasis is put on a description of the respective commercial and political interests involved in hazardous waste movements. Subsequently, the applicable rules and provisions of current international law are outlined (Chap. 3). By means of this survey it is possible to obtain an overview of which branches of law currently provide for rules of liability applying to the cases under consideration. Conversely, it can be assessed which aspects of hazardous waste movements remain unregulated *de lege lata*. The analysis of current international law first outlines the legal conception of international responsibility and liability and its current state of development (Sects. “The Legal Concept of International Responsibility” and “The Contribution of the International Law Commission” in Chap. 3). It, then, addresses the customary principle of State responsibility and examines in which scenarios of a hazardous waste movement States may be held responsible for a failure to comply with the relevant international obligation. To this end, the relevant obligations deriving from international conventions, agreements and international customary law are analysed (Sects. “State Responsibility in the Context of Transboundary Movements of Hazardous Wastes by Sea” in Chap. 3). Following this, it is outlined which international civil liability conventions may apply and provide relevant rules regarding the movement of hazardous wastes (Sect. “Existing Civil Liability Conventions” in Chap. 3). The comprehensive analysis of current international law is, subsequently, followed by an intermediate examination regarding the necessity of the establishment of a regime of civil liability and compensation as a legal means to prevent and remedy pollution damage (Chap. 4). This intermediate examination also includes the determination of the necessary elements of an effective regime of liability and outlines the economic ramifications of environmental liability. In the final step, this book addresses in particular the provisions of the 1999 Basel Protocol and attempts to provide an assessment of whether this legal instrument is to be considered a reasonable and well-balanced legal regime of liability and

compensation (Chap. 5). To this end, the individual provisions of the Protocol are examined and the overall concept and implications of the Basel Protocol are assessed. The work ends with a short summary and a final conclusion as regards the future steps that should be taken (Chap. 6).

Chapter 2

The International Trade in Hazardous Wastes and Its Economic Background

Before providing an examination of the existing legal framework governing the transboundary movement of hazardous wastes by sea and prior to an assessment of the particular provisions of the Protocol to the Basel Convention, it is necessary to first outline the practical circumstances of the underlying problem area and the typical constellations of hazardous waste shipments by sea. Consequently, at the outset of this work a whole series of questions arise: What is the practical significance of hazardous waste movements and what amounts of wastes are shipped across the globe? What are the economic drivers and the interests of the parties involved? Which economic and political impulses influence States, economies and private players? How does “hazardous waste shipment” typically take place? And at what point might liability function as a trigger to correct possible misconduct by the parties involved? A brief introduction to these issues shall be given in this second chapter.

A. Hazardous Wastes: Properties and Economic Importance

The basic substance at issue throughout this book is described by the term “hazardous wastes”. The meaning, properties and the economic importance of this substance shall thus be described at the outset.

1. Sources and Composition of Hazardous Wastes

Wastes may appear in diverse forms and originate from various activities. Consequently, many descriptions of this term can be found in common parlance. A rather pointed but also appealing version describes wastes as “the wrong material

at the wrong time at the wrong place”.¹ The most typical description defines wastes as unusable or unwanted substances or materials remaining from any production or consumption process.² This general understanding of wastes shows that a definition of this term cannot be made by means of purely objective criteria, but needs to take into account subjective elements of the person in possession of the wastes. Accordingly, the legal definitions of wastes in most international conventions combine objective and subjective elements and, as a general criterion, are based on the actual, intended or legally required disposal (including recovery operations) of the substances or materials in question.³

The term hazardous wastes (generally used synonymously with the terms toxic or dangerous wastes) is commonly understood as denoting wastes that are actually or potentially harmful to human health or the environment due to certain adverse characteristics or specific components of the wastes. The definitions of hazardous wastes used in international conventions follow this approach and provide for detailed lists of categories of waste streams and hazardous characteristics.⁴ The hazardousness of wastes is usually defined by a combination of two elements, (1) the category of the waste stream, which is determined either by its origin or by certain compounds, and (2) certain hazardous characteristics or properties of these wastes. While some definitions cumulatively require both elements,⁵ others only require that either the one or the other element applies to the wastes in question.⁶ Again other definitions make the hazardousness of wastes merely conditional on whether the wastes display certain hazardous characteristics.⁷ Household wastes and residues of the incineration of household wastes are either included in this definition or they are legally placed on the same level.⁸

It follows from this sophisticated legal definition that the term “hazardous wastes” basically covers a wide range of substances and materials. Individual waste streams, which represent the major part of hazardous wastes, include oil

¹ See the term “Abfall” (transl. “waste”), in the German Wikipedia as of June 2010.

² See e.g. “Abfall” in: *Brockhaus*, Vol. I, (21st ed. 2006); “Abfall” in: *Meyers Enzyklopädisches Lexikon*, Vol. I, (9th ed. 1971); “Waste” in: *The Oxford English Dictionary*, Vol. XII, (1978).

³ Basel Convention, Article 2(1); Bamako Convention, Article 1(1); Waigani Convention, Article (1); OECD Council Decision C(2001)107/FINAL, A(1); EU Directive 2008/98/EC, Article 3(1); Izmir Protocol to the Barcelona Convention, Article 1(c); Tehran Protocol to the Kuwait Convention, Article 2(1).

⁴ See also O'Neill, *Waste Trading Among Rich Nations* (2000), at 26–29.

⁵ Basel Convention, Article 1(1)(a) in connection with Annexes I, III; Waigani Convention, Article 2(1)(a) in connection with Annexes I, II; OECD Council Decision C(2001)107/FINAL, A(2) in connection with Appendixes 1, 2; Tehran Protocol to the Kuwait Convention, Article 1(1)(a) in connection with Annexes I, III.

⁶ Bamako Convention, Article 2(1)(a) and (c) in connection with Annexes I, III; Izmir Protocol to the Barcelona Convention, Article 3(1)(a) and (c) in connection with Annexes I, II.

⁷ EU Directive 2008/98/EC, Article 3(2) in connection with Annex III.

⁸ See Basel Convention, Article 1(2) in connection with Annex II; Tehran Protocol to the Kuwait Convention, Article 1(1)(b) in connection with Annex II.

mixtures, residues from industrial waste disposal, clinical waste, lead and lead compounds, tars, zinc compounds, paints and dyes, acids and asbestos.⁹ But typical hazardous wastes are represented also by other remnants of chemical and industrial treatment processes associated with the production of, for example, pharmaceuticals, biocides, organic solvents, varnishes, resins, plasticisers and glues, as well as waste materials containing abstractly harmful components, such as certain metallic compounds, arsenic selenium and cadmium compounds, mercury, acidic and basic solutions, phenols, PCBs and PCTs.¹⁰ Finally, hazardous wastes may display several characteristics and properties. They may, for example, be explosive, flammable, poisonous, infectious, toxic or ecotoxic, corrosive, oxidising or thermally unstable.¹¹

II. Volumes of Generated Hazardous Wastes

The absolute amount of hazardous wastes generated annually around the world is unknown. It is, moreover, unlikely that reliable figures in this regard will ever be available.

This is to be explained by several reasons: On a global scale data regarding the generation of hazardous wastes are collected only by the Secretariat of the Basel Convention. However, the reporting requirement under the Basel Convention regarding such data is of a voluntary nature only.¹² Thus, only 37 States (about 20 % of all Contracting States) have reported data on the generation of hazardous wastes for 2009.¹³ Further reasons for incomplete and unreliable data reports involve differences in the national definitions of hazardous wastes, deficiencies in national data collection, monitoring and enforcement capacities as well as missing explanations for large fluctuations in the reported data.¹⁴ On a regional level, data and statistics regarding the generation of hazardous wastes are best available from the EU¹⁵ and, to a lesser extent, also from the OECD. The data collected by the EU do not show the same deficiencies as those data collected by the Secretariat of the

⁹ Basel Secretariat (ed.), *Global Trends 1993–2000*, at 15.

¹⁰ See for example the enumerations in Annex I of the Basel Convention. See also Gwam, ‘Adverse Effects of the Illicit Movement of Hazardous Wastes’, 14 *Fla. J. Int’l L.* (2001/2002), at 431–432; Krueger, *International Trade and the Basel Convention* (1999), at 7–8 and 99–106.

¹¹ See for example the characteristic listed in Annex III of the Basel Convention.

¹² Basel Convention, Article 13(3)(b).

¹³ See the “Reporting Database” on www.basel.int.

¹⁴ See for a detailed analysis: COP10 Doc. UNEP/CHW.10/INF/4, at 6; Basel Secretariat (ed.), *Global Trends 1993–2000*, at 1, 8–11; Friedrich-Ebert-Stiftung (ed.), *Zehn Jahre Basler Übereinkommen* (1999), at 14–15; Walsh, ‘The Global Trade in Hazardous Wastes’, 42 *Cath. U. L. Rev.* (1992/1993), at 108–110.

¹⁵ See Regulation (EC) No 2150/2002 of the European Parliament and of the Council of 25.11.2002 on waste statistics.

Basel Convention or the OECD, which is to be explained by the fact that by means of the EU regulations, reporting obligations are compulsory and the Member States, which mostly rank among industrial countries, also possess sufficient administrative capacities.¹⁶ Nevertheless, the statistics provided by the EU only display a part of the worldwide production of hazardous wastes and only represent countries with a certain economic capability. These data, thus, cannot simply be projected on a global scale.

Data on hazardous waste generation are available as of 1990, as far as the level of the EU is concerned.¹⁷ In EU15¹⁸ the amount of generated hazardous wastes increased by 5 % *p.a.* from 36 million tons in 1997 up to 40 million tons in 2000.¹⁹ Between 2000 and 2005 this amount increased by 4 % *p.a.* in EU15 and by 2 % *p.a.* in EU25.²⁰ Finally, in EU27 the amount of generated hazardous wastes increased from 88.5 million tons in 2004 to 100.6 million tons in 2006, followed by a slight decrease to 97.6 million tons in 2008, which corresponds to an average increase of 5.2 % *p.a.* between 2004 and 2008.²¹ The generation of hazardous wastes accounted for a share of 3.7 % of the overall production of wastes in EU27 in 2008.²² In contrast to these data provided by the EU, OECD statistics regarding hazardous waste generation are of little significance. The only conclusion that can be drawn from these data is that there has been, similarly, an increase in the overall production of hazardous wastes in OECD countries in the period between 1990 and 2005.²³ According to a rough estimate the share of the OECD countries in the overall production of hazardous wastes accounted for approximately 75 %.²⁴

Although it is not possible to obtain reliable figures on the absolute amount of hazardous wastes generated worldwide, it is nevertheless possible to identify global trends in development, based on the fragmentary data available. For the

¹⁶ As to the quality of the waste statistics provided by the EU see Report of the EC on waste statistics and their quality, EC Doc. COM(2011) 131 final.

¹⁷ For an analysis of the data covering the period between 1990 and 1998 see European Environment Agency (ed.), *Hazardous Waste Generation in EEA Member Countries* (2002), at 14 *et seq.*

¹⁸ The abbreviations EU15, EU25 and EU27 denote the number of Member States of the EU at that time.

¹⁹ See Report of the EC, EC Doc. COM(2006) 430 final, at 6. See also the data provided in EC Doc. SEC(2006) 1053.

²⁰ Report of the EC, EC Doc. COM(2009) 282 final, at 5–6. See also the data provided in EC Doc. SEC(2009) 811 final, and European Environment Agency (ed.), *Transboundary Shipments in the EU* (2008), at 25–28.

²¹ Data obtained from the database on hazardous waste generation on <http://epp.eurostat.ec.europa.eu>.

²² European Union (ed.), *Eurostat Yearbook 2011*, at 481, 485.

²³ See OECD (ed.), *OECD Environmental Data, Compendium 2006–2008: Waste*, at 18–22; Basel Secretariat (ed.), *Global Trends 1993–2000*, at 11–12 and Appendix 3; Basel Secretariat (ed.), *Global Trends 2004–2006*, at 10 and Annex 2.

²⁴ COP10 Doc. UNEP/CHW.10/INF/4, at 6; Basel Secretariat (ed.), *Global Trends 2004–2006*, at 8–10.

period between 1950 and 1985 it has been estimated that the total amount of hazardous wastes generated annually increased 35-fold.²⁵ Rough estimates suggest that the absolute amount of hazardous wastes produced worldwide in 1990 lies between 250 and slightly over 600 million tons.²⁶ As of 1990 the data available for the EU and the OECD show that there is a constant increase in the average annual production of hazardous waste amounting to approximately 4–5 %. Since there is no obvious reason that in non-OECD or non-EU States the increase of hazardous waste generation would be less significant, it must be assumed that also on a global level the production of hazardous wastes has increased by not less than 4–5 %.²⁷

A constant increase in the global generation of hazardous wastes, one which may be placed in the range of 4–5 % *p.a.*, is the only reasonable data that can be drawn from the available data. Although there are some attempts to estimate absolute amounts of global hazardous waste generation, such estimations must fail due to the large amount of missing and unreliable data. A further conclusion that can be drawn from the available data is that the entry into force of both the Basel Convention as well as the numerous regional conventions and regulations has obviously had no significant impact on the ever-increasing production of hazardous wastes.

III. Forms of Waste Treatment and Disposal

“Waste management” is used as an umbrella term to describe the entirety of all policies, research, tasks and measures related to the prevention, reduction, recovery and disposal of wastes. The particular tasks related to the handling and treatment of wastes include their collection and transport, the monitoring and collection of data, and the processing and disposal of waste materials. Waste disposal, in turn, comprises several methods.²⁸ The choice of the method used in a given case depends on various factors, like the amount of the particular waste stream, the availability of specialised disposal facilities, financial resources and the existing laws. Reliable figures on the respective disposal methods are available only at the level of the EU. According to this, landfilling and recovery are the most common disposal methods with a share of about 45 % each, while incineration

²⁵ This was calculated according to the increasing production of organic chemicals, see Kummer, *The Basel Convention* (1995), at 4. See also Walsh, ‘The Global Trade in Hazardous Wastes’, 42 *Cath. U. L. Rev.* (1992/1993), at 110–111.

²⁶ Kummer, *The Basel Convention* (1995), at 4; Poulakidas, ‘Waste Trade and Disposal in the Americas’, 21 *Vt. L. Rev.* (1996/1997), at 873; Rutinwa, ‘Liability and Compensation’, 6 *RECIEL* (1997), at 8; Williams, ‘Trashing Developing Nations: The Global Hazardous Waste Trade’, 39 *Buff. L. Rev.* (1991), at 276.

²⁷ A moderate increase is also assumed by COP10 Doc. UNEP/CHW.10/INF/4, at 6; Basel Secretariat (ed.), *Global Trends 1993–2000*, at 11–15; Basel Secretariat (ed.), *Global Trends 2004–2006*, at 8–10.

²⁸ A comprehensive list of disposal operations can also be found in Annex IV of the Basel Convention.

constitutes approximately 10 %.²⁹ But again here, one cannot simply assert that these figures claim global validity.

On a global scale, the most common method for hazardous waste disposal is geologic disposal at landfill sites. It is the least expensive option and, in the simplest case, it only requires a suitable storage ground. Therefore, it is the preferred disposal method especially in developing countries. On the downside, landfills that do not meet the technological minimum standards pose a significant risk of contamination of the ground and surface water. As can be seen in the case of the *M/V "Probo Koala"*,³⁰ this may lead to significant environmental damage and present a serious health threat for a large number of people.³¹

Marine disposal or dumping at sea, including shipboard incineration, is also a cheap and easy method of hazardous waste disposal, particularly where no international regulation applies to the respective flag State or State of origin. Since marine dumping is not locally bound and since the dumping vessel in most cases cannot be identified, marine disposal often takes place outside any legal control. Moreover, the adverse long-term effects of hazardous substances dumped into the sea are unknown and cannot adequately be anticipated.

Incineration of hazardous wastes aims at the final destruction of the wastes and the neutralisation of the harmful substances. Due to air emissions and highly toxic residues, it generally poses a significant threat to human health and the environment. This risk is significantly minimised by modern incineration plants specialised for specific types of wastes. However, since the operation of such plants involves high financial expenditure and requires a steady supply of the target wastes, it is often not economically feasible for smaller economies.³²

Recycling and the recovery of hazardous wastes are also widely prevalent. It should be considered the most environmentally sound disposal method since a large portion of the harmful substances can be recovered and is not yet released from the production circle. A major obstacle, however, is presented by the unstable market price for recycled products and, thus, the resulting disparity between supply and demand.³³

Finally, processing or (pre)treatment of hazardous wastes should be mentioned. It may reduce the hazard level of wastes and may encompass physical, chemical and biological processes. Pre-treatment may take place at the site of generation of the wastes or it may be conducted in specialised facilities.³⁴

²⁹ European Union (ed.), *Eurostat Yearbook 2011*, at 486.

³⁰ See *supra*, Sect. "The Factual Perspective: Transboundary Movements of Hazardous Wastes by Sea" in Chap. 1.

³¹ Louka, *International Environmental Law* (2006), at 425.

³² Louka, *International Environmental Law* (2006), at 427; see also Avery, 'Our Rubbish: Someone Else's Problem?', 2 *Int'l J. Hum. Rts.* (1998), at 24–25.

³³ Louka, *International Environmental Law* (2006), at 427.

³⁴ See for instance the required reception facilities for ship tank washing residues according to Annex II of MARPOL 73/78 Convention; *infra*, Sect. "MARPOL 73/78 Convention" in Chap. 3.