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A RAPID RESPONSE ASSESSMENT

WASTE CRIME – WASTE RISKS

GAPS IN MEETING THE GLOBAL WASTE CHALLENGE

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Preface

More than ever, our future depends upon how we manage the future of our waste. As an integrated part of sustainable development, effective waste management can reduce our global footprint. Ignoring or neglecting the challenges of waste, however, can lead to significant health, environmental and economic consequences.

A staggering 1.3 billion tonnes of food is produced each year to feed the world's 7 billion people. Yet, according to the Food and Agriculture Organization (FAO), around US$1 trillion of that food goes to waste. With 200,000 new people added every day, the world can ill afford to waste such a massive amount of food.

Global waste, however, does not stop at food. Consumers are increasingly buying products that are wrapped in plastics and paper. Much of this packaging – and eventually the products themselves – will end up in landfills. This trend has both health and environmental consequences, especially given the rapid rise of hazardous waste such as electronics.

Innovative solutions to combat "e-waste" are emerging. Recovering valuable metals and other resources locked inside electronic products, for example, can reduce e-waste. Not only can recycling reduce pressure on the environment, it can also create jobs and generate income. Indeed, the global waste market sector – from collection to recycling – is estimated to be US$410 billion a year, excluding a very large informal sector.

As with any large economic sector, however, there are opportunities for illegal activities at various stages of the waste chain. In the rush for profits, operators may ignore waste regulations and expose people to toxic chemicals. On a larger scale, organized crime may engage in tax fraud and money laundering.

About 41.8 million metric tonnes of e-waste was generated in 2014 and partly handled informally, including illegally. This could amount to as much as USD 18.8 billion annually. Without sustainable management, monitoring and good governance of e-waste, illegal activities may only increase, undermining attempts to protect health and the environment, as well as to generate legitimate employment.

The evolution of crime, even transnational organized crime, in the waste sector is a significant threat. Whether the crime is associated with direct dumping or unsafe waste management, it is creating multi-faceted consequences that must be addressed.

The Basel, Rotterdam and Stockholm Conventions are at the forefront of global action to track and manage the transboundary flows of hazardous waste. More recent efforts such as the Solving the E-waste Problem (StEP) initiative, led by the United Nations University, are generating additional momentum. We hope that this pioneering report contributes to the debate, and leads to concrete and meaningful action.

Achim Steiner
UN Under-Secretary General and UNEP Executive Director

The evolution of crime, even transnational organized crime, in the waste sector is a significant threat.

Contents

Executive summary

Waste covers a very wide spectrum of discarded materials ranging from municipal, electrical and electronic, industrial and agricultural, to new types including counterfeit pesticides. It also includes anything in size and scale from decommissioned ships, oil or liquid wastes, hundreds of millions of mobile phones to billions of used car tires.

With rising global population, urbanisation and consumption, the amount of waste continues to increase, providing vast environmental, social, health, economic and even criminal challenges of unknown proportions. Due to high costs of treating and disposing hazardous and other wastes, weak environmental regulations, poor enforcement and low environmental awareness, illegal transboundary movements of hazardous wastes and other wasted from developed countries to developing countries have become an increasing global concern. Despite the significant efforts undertaken in the framework of the Basel, Rotterdam and Stockholm Conventions and by some government agencies, detailed knowledge of the illegal transnational flows remains limited and at best fragmented.

The current publication is based on the latest research findings, and involvement from practitioners such as the formal waste sector, inspectors, law enforcement officers and prosecutors. It provides insight into the possible scale and features of the main drivers, along with case studies. It is not an exhaustive or fully comprehensive overview, but it intends to identify major areas of policy deficits and challenges that require further investigation, policy action and intervention for prevention and damage control, as well as to identify opportunities.

The global waste market sector from collection to recycling is estimated to be USD 410 billion a year (UNEP 2011), excluding a very large informal sector. In common with any large economic sector, there are opportunities for illegal activities at various stages of legal operations.

The exact size of the global illegal waste trade is unknown. The latest research on e-waste, a product of one of the world's

largest and fastest growing manufacturing industries, estimates that about 41.8 million metric tonnes (Mt) of e-waste was generated in 2014 and that this number will increase to 50 Mt already by 2018 (Balde et al. 2015). According to various estimates, the amount of e-waste properly recycled and disposed of ranges between 10 to 40 per cent according to different estimates (UNODC 2013). The presence of the informal economy makes solid estimates of the value for the sector difficult. However, using an estimate previously used by INTERPOL of an average value of e-waste at USD 500 per tonne (INTERPOL 2009), the range of e-waste handled informally or unregistered, including illegally, amounts to USD 12.5-18.8 billion annually. It is not known how much of this e-waste that is subject to the illegal trade or simply dumped.

The Basel, Rotterdam and Stockholm Conventions provide the forefront of our global efforts in tracking and managing hazardous waste and chemicals, along with other initiatives such as the UN Solving the E-waste Problem (StEP) Initiative on electronic waste. The Basel Convention is the main global umbrella institution that regulates the transboundary movement and disposal of hazardous and other wastes. One of its provisions includes an obligation for Parties to cooperate in cases where illegally shipped waste has to be repatriated. Regional conventions such as the Bamako Convention, a regional agreement for the African region, and the Waigani Convention for the South Pacific region, are additional legal mechanisms aimed at preventing illegal trade. Lack of legal clarity may lead to both unintentional and intentional breaches of the regulations dealing with waste management and transboundary movement. Furthermore, the Basel Convention allows the Parties to define the wastes in addition to the waste lists under the Convention, and recognizes the right of the Parties to adopt their own national legislation to prevent and control of hazardous wastes and other wastes (Article 3.1 and Article 4.1). These grey zones and different national legislations are clear challenges for the law enforcement community. Enforcement is undoubtedly also a challenge.

The report has a global scope, but it also has a European focus mainly for two reasons. First, Europe has a high consumption level making the region one of the major waste producers in the world. Second, the issue of waste is Gaining increasing attention in the region. Some European countries have a lot of experience and knowledge due to a high incidence of waste crime prosecutions. The assessment focuses on these countries with some illustrations from other regions.

This Rapid Response Assessment report describes the results of the present enforcement efforts, and stops short of delineating actual global illegal waste trade patterns. The assessment highlights known cases and available information. It does not follow that countries and regions that are not discussed in detail are less affected by the problem of waste crimes. The activities in these countries may simply be monitored to a lesser extent.

Serious crimes may take place in any part of the waste chain, including exposing populations to toxic material through improper handling and disposal. They are not necessarily associated with breach of soft, unclear or waste environmental regulations. Rather, serious crimes such as tax fraud or money laundering, take place as the large-scale economic and transport sector of waste receives very little attention. Furthermore, larger business interests may deliberately bypass environmental legislation and tax laws for profit. In some cases some recyclable waste such as plastics, paper or metals may be used directly to cover or hide hazardous waste, although the scale of this remains unknown. Companies can be paid significant sums for appropriate treatment, but instead dump large quantities mixed with regular waste for substantial profit. Thus, these companies may commit environmental crimes (with important health implications), such as fraud through falsification of customs forms, or tax fraud through over- or under invoicing costs and incomes.

Waste is also deliberately classified as other items to deceive law enforcement authorities. This is often done by using non-hazardous waste codes for hazardous wastes or using product codes for hazardous wastes. As e-waste is largely categorized as hazardous due to the presence of toxic materials such as mercury, lead and brominated flame retardants, it requires proper management. E-waste may also contain precious metals such as gold, copper and nickel and rare materials of value such as indium and palladium making it an attractive trade. However, in practice, many shipments of e-waste are disguised as second hand goods.

Inadequate resources for monitoring, enforcement and low penalties provide an environment of major opportunity for transnational organized criminal actors to commit large-scale breaches of environmental laws. As volumes are unknown, this situation in effect generates a permissive environment for tax fraud.

Key destinations for large-scale shipments of hazardous wastes, such as electrical and electronic equipment, include Africa and Asia. In West Africa, a significant recipient is Ghana and Nigeria, but high volumes also go to, but not limited to, Cote D'Ivoire, and the Republic of the Congo. South Asia and Southeast Asia also appear to be major regional destinations, including, but not limited to, China, Hong Kong, Pakistan, India, Bangladesh, and Vietnam.

The key driver for illegal waste shipments to destination countries is the profit generated from payments for safe disposal of waste that in reality is either dumped or unsafely recycled. It may, however, also include an additional profit from recycling certain components. While the latter appears to be positive, in practice it develops environments that are hazardous to health, and typically leads to subsequent dumping of majority of the waste. Profit is the fundamental objective of the different players in illegal waste shipments. These may include exporters, middlemen and informal recyclers. Their activities are usually structured along a legal chain of operations, albeit where the players take advantage of loopholes in control regimes and actual control capacities.

Both small- and large-scale smuggling techniques can be observed all over the world, from organized truck transport across Europe and North America to the use of major smuggling hubs in South Asia, including widespread container transport by sea. Large numbers of abandoned waste containers with unknown contents are stored in different ports in Asia and in other parts of the world. Dumping at sea or even more so in ports is logistically easy. The use of such methods warrants much further investigation given the possible scale of tax fraud and larger organized breaches of environmental regulations.

Stringent enforcement in one country commonly leads to changes in illegal shipment routes through neighbouring countries. Strong enforcement practices, such as China's Green Fence campaign, have been changing the traditional routes for illegal waste shipments.

The shipment of toxic material and electronic waste poses a particular acute threat for involvement and growth of organized crime. It entails money laundering, increased criminal proceeds revenues and an opportunity for further diversification of criminal proceeds. There is likely no other area of organized crime that provides such a significant opportunity for money laundering and tax fraud as waste disposal, with its near complete lack of monitoring, statistics or reporting.

Without any significant enforcement efforts dedicated to the mapping, investigation and possible prosecution of criminals involved in illegal waste collection, illegal dumping and transport activities are likely to grow, as will the associated threats to human health and environmental security.

Recommendations

■ **Strengthen awareness, monitoring and information**

1. Acknowledge and raise further awareness of waste crime as an important threat to security, people and environment.

2. Strengthen mapping of scale, routes and state of hazardous waste and possible involvement of organized crime.
   a. Strengthen awareness and request countries to specifically address the risks associated with organized crime involvement in waste management.
   b. Strengthen awareness in the enforcement chain and of prosecutors of the risks for conducting fraud, tax fraud and money laundering through the waste sector.

3. Encourage non-governmental organizations and other stakeholders to expose waste crimes and build awareness of the massive health risks to waste end-users. If waste recycling activities are taken up there should be an adequate knowledge of sound recycling methods to prevent direct exposure to toxic substances.

■ **Strengthen national legislation and enforcement capacities**

4. Strengthen national legislation and control measures by:
   a. Improving national legislation frameworks as the primary basis for effectively and efficiently combating and monitoring of hazardous waste crimes. Establish the required competences and resources for the responsible law enforcement authorities to perform their duties, including inspections of transboundary movements within their mandates.
   b. Strengthen multi-agency cooperation at the national level between enforcement agencies – customs, police, environment authorities, and prosecutors.
   c. Build capacities of the entire enforcement chains, including customs, police, environmental enforcement officers, prosecutors and judges, to address waste crimes.
   d. Strengthen the capacity of customs authorities to enforce waste crimes mitigationthrough application of the UNODC-WCO Container Control Programme (CCP) or Green Customs Initiative (GCI) protocols.
   e. Promote identification of the tariff codes corresponding with the Codes of Basel Convention present in Annex I, in Annex VIII and Annex IX.

■ **Strengthen international treaties and compliance measures**

5. Strengthen effective monitoring and enforcement approaches at global, regional and sub-regional levels, including sharing of tools, best practices and intelligence for environmental inspectors, police and customs officers using existing networks such as the UNODC and INTERPOL. Environmental inspectors may also consider taking part in networks like IMPEL within the EU to share information with fellow government environmental agencies.

■ **Promote prevention measures and synergies**

6. Facilitate the proper return of illegal waste shipments at cost to shipper as a measure of prevention. Proceed with a technical assessment of quantities and qualities of abandoned containers particularly in Asia and of dumping of hazardous waste worldwide.

7. Take a comprehensive and integrated approach in combating environmental crime and exploring opportunities for building synergies with current efforts in combating wildlife and Ozone depleting substance (ODS) trafficking

8. Encourage waste producers and waste management companies to share experiences and lessons learned and obtain control of the downstream supply chain through a) the contract to document the value chain until the end disposal or recycling, and b) a legal obligation that only players with the necessary licenses all along the chain can handle the waste. This applies for both hazardous and non-hazardous waste. The waste management companies are encouraged to agree upon business standards that exempt so called “grey zones” in legislation to secure environmentally sounds waste management practices.

Legal frameworks

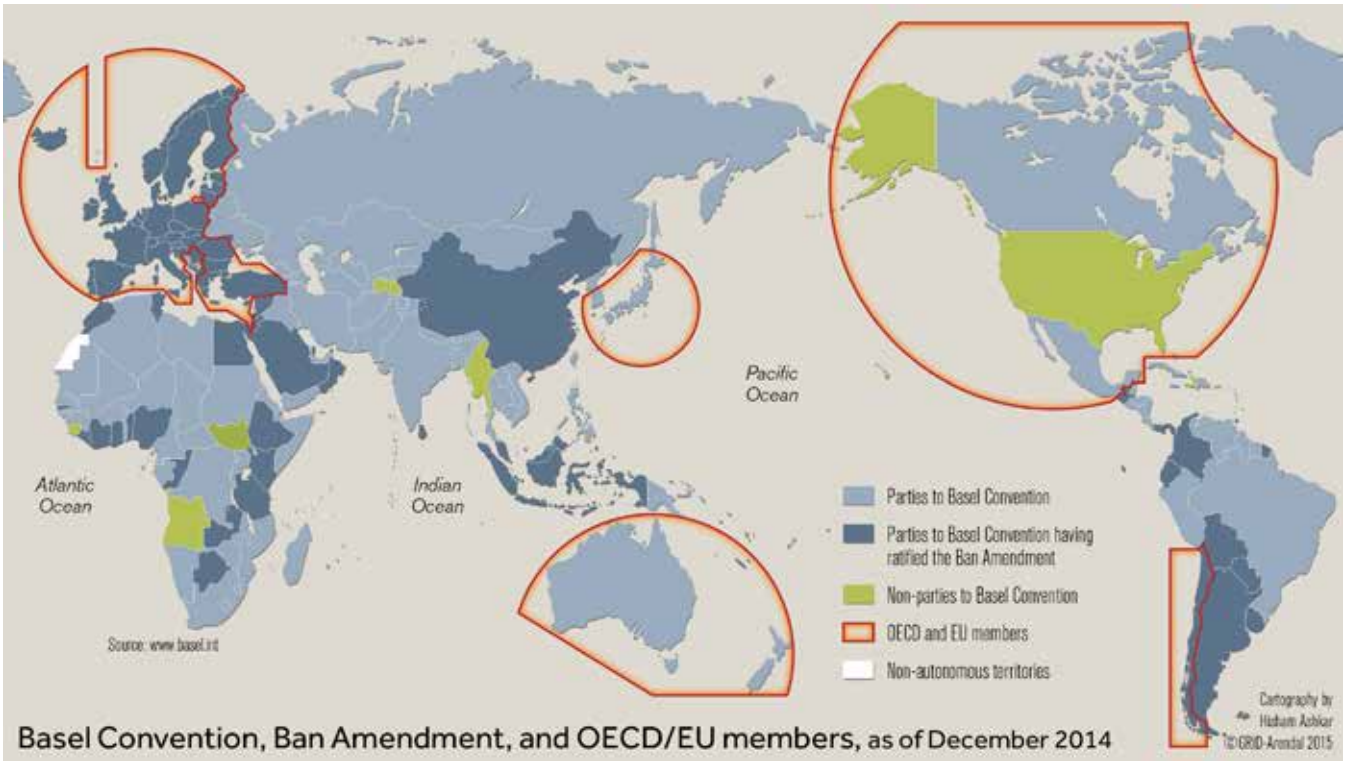
The cross-border movement and management of wastes are regulated by a number of international, regional, and national legislative frameworks.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention) is the major international agreement that regulates the transboundary movement and disposal of hazardous and other wastes. It entered into force in 1992 and has, as of 15 April 2015, 183 Parties. The overarching objective of the Basel Convention is to protect human health and the environment against the adverse effects of hazardous wastes. The provisions of the Convention centre around the following principal aims: the reduction of hazardous waste generation and the promotion of environmentally sound management of hazardous wastes wherever the place of disposal; the restriction of transboundary movements of hazardous wastes, except where it is perceived to be in accordance with the principles of environmentally sound management; and a regulatory system applying to cases where transboundary movements (import, transit, and export) are permissible.

The Basel Convention is one of the few multilateral environmental agreements to define an illegal activity under the Convention as a crime.

Article 4.3 of the Basel Convention:
"The Parties consider that illegal traffic in hazardous wastes or other wastes is a crime."

Article 9 of the Basel Convention:
"For the purpose of this Convention, any transboundary movement of hazardous wastes or other wastes:
(a) without notification pursuant to the provisions of this Convention to all States concerned; or
(b) without the consent pursuant to the provisions of this Convention of a State concerned; or
(c) with consent obtained from States concerned through falsification, misrepresentation or fraud; or
(d) that does not conform in a material way with the documents; or
(e) that results in deliberate disposal (e.g. dumping) of hazardous wastes or other wastes in contravention of this Convention and of general principles of international law, shall be deemed to be illegal traffic."



Basel Convention, Ban Amendment, and OECD/EU members, as of December 2014

In cases of illegal trafficking as a result of misconduct on the part of the exporter or generator, the State of export shall ensure that the waste is taken back by the exporter or the generator, or, if impracticable, disposed of in an environmentally sound manner. The Secretariat of the Basel Convention is mandated to assist Parties upon request in their identification of cases of illegal traffic.

An important tool in the Basel Convention in terms of monitoring and enforcement work is the Basel Ban. This amendment, originally a decision effectively banned as of 1 January 1998, all forms of hazardous waste exports from the wealthiest and most industrialized countries of the Organization of Economic Cooperation and Development (OECD) to all non-OECD countries. As of March 2015, the Ban amendment is not yet in force. Some Parties and regions, however, have already incorporated the Ban amendment in their national or regional legislation.

The European Union Regulation on Shipments of Waste is a regional example of a legislative framework (EC 2006).[1] The predominant objective of the Regulation is the "protec-

1. Eur-Lex Access to European law (2014). Shipments of Waste. [Online]. 10/04/2014. Available from: http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1426682493716&uri=URISERV:l11022

tion of the environment, its effects on international trade being only incidental" (European Parliament 2006). It aims at strengthening, simplifying, and specifying the procedures for controlling waste shipments in order to improve environmental protection. It also seeks to introduce into European Community (EC) legislation the provisions of the Basel Convention, the Ban amendment, as well as the revision of the OECD 2001 Decision on the Control of Transboundary Movements of Wastes Destined for Recovery Operations.

The Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (UNEP n.d.), a regional agreement among some African countries which came into force in 1998, is similar to the Basel Convention in format and language, but much stronger in prohibiting all imports of hazardous wastes from outside the African continent. Unlike the Basel Convention, it does not exclude from its scope radioactive wastes subject to other international control systems. Another example of a regional agreement is the Convention to Ban the Importation of Hazardous and Radioactive Waste and to Control the Transboundary Movement and Management of Hazardous Waste within the South Pacific Region, also known as the Waigani Convention. Like the Bamako Convention, the Waigani Convention also includes radioactive waste. It only applies to the Pacific region, but obligations are similar to the Basel Convention. The Waigani Convention currently has 13 signatories (SREP 2013).

Impact of illegal traffic of waste

- The lack of environmentally sound management of waste, including its dumping, following an illegal transboundary movement may have severe implications for the environment and human health, and the subsequent clean-up is an economic burden.
- Illegal traffic of waste has an adverse effect on trade and competition, putting law-abiding businesses at an economic disadvantage.
- Illegal traffic undermines international policy, the rule of law, and enforcement efforts.

Since March 1992, the transboundary movement of wastes destined for recovery operations between member countries of the OECD has been supervised and controlled under a specific intra-OECD Control System (OECD 2015). It aims at facilitating trade of recyclables in an environmentally sound and economically efficient manner by using a simplified procedure, along with a risk-based approach to assessing the necessary level of control for materials. Wastes exported outside the OECD area, whether for recovery or final disposal, do not benefit from this simplified control procedure.

It should also noted that the Basel Convention allows the Parties to define the wastes in addition to the Convention lists and recognizes the right of the Parties to regulate their import/export of wastes (Articles 3.1 and 4.1). The implementation and enforcement of the Basel Convention and other regional instruments largely depends on national legislation and institutional structures governing transboundary shipments of hazardous waste and other wastes.

What is waste?

The first and probably most complex question is whether a certain substance or object is waste. Modern recycling involves innovative technologies to move waste back into the produc-

tion or consumption chain. Waste with positive value, such as paper, plastic, and metal, can rejoin the value chain and serve as a resource for new products. When investigating waste crimes, it is necessary first to prove the status of the substance or object as waste before applying the laws and regulations that cover waste management and its transboundary movement.

Even though the Basel Convention contains a definition of waste, there are various interpretations of the term and what exactly it covers. Unclear definitions or obligations may lead to both unintentional and intentional breaches of the legal framework dealing with waste management and transboundary movement. The problem is further compounded by a lack of harmonization between the codes of different countries, or by different requirements between countries with respect to the conditions under which a substance or object must be disposed of and thus considered a waste. To remedy this situation, the Indonesian-Swiss Country-Led Initiative was launched in 2011 to provide additional legal clarity with respect to certain terms used in the Convention, such as clarifying the distinction between wastes and non-wastes (Basel Convention 2011). Another initiative developed within the framework of the Basel Convention and aimed at providing greater legal certainty is the development of technical guidelines on transboundary movements of electronic and electrical waste and used electrical and electronic equipment (Basel Convention 2010).

Article 2.1 of the Basel Convention defines wastes as substances or objects that are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law.

Other agreements, such as the Bamako Convention applying to the African Region and the Waigani Convention applying to the South Pacific Region, share the Basel Convention's definition of waste (SREP 2014, Bamako Convention 1994).

Not only do lack of clarity or differing understandings create challenges for the law enforcement community, but they might also be taken advantage of intentionally by organized criminal groups and individuals to export wastes in contravention of the applicable legal framework (EUROPOL 2015).

In addition to defining waste, the Basel Convention defines two types of waste falling within its scope: "hazardous" wastes, based on their origin and/or composition and their characteristics; and "other wastes", such as household waste and incinerator ash as listed in Annex II to the Convention. Hazardous wastes are defined in Annexes I, III, VIII, and IX of the Convention, bearing in mind that a Party has also the possibility to define additional wastes as "hazardous" under its national legislation. Throughout the years, some Parties to

Example of criteria to distinguish e-waste from non-e-waste from the EU Directive on Waste Electrical and Electronic Equipment (WEEE) – Annex VI: Minimum Requirements for Shipments:

"In order to distinguish between EEE and WEEE, where the holder of the object claims that he intends to ship or is shipping used EEE and not WEEE, Member States shall require the holder to have available the following to substantiate this claim:

(a) a copy of the invoice and contract relating to the sale and/or transfer of ownership of the EEE which states that the equipment is destined for direct re-use and that it is fully functional;

(b) evidence of evaluation or testing in the form of a copy of the records (certificate of testing, proof of functionality) on every item within the consignment and a protocol containing all record information according to point 3;

(c) a declaration made by the holder who arranges the transport of the EEE that none of the material or equipment within the consignment is waste as defined by Article 3(1) of Directive 2008/98/EC; and

(d) appropriate protection against damage during transportation, loading and unloading in particular through sufficient packaging and appropriate stacking of the load.

the Convention have developed further criteria to support the process of distinguishing waste from non-waste. In the European Union, end-of-waste criteria (European Comisssion 2015) have been developed to specify when certain waste ceases to be waste and achieves the status of a product or a secondary raw material – for example, if the substance or object is commonly used for specific purposes; if there is an existing market or demand for the substance or object and the use is lawful (substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products); and the use will not lead to overall adverse environmental or human health impacts.

It is estimated that thousands of tonnes of e-waste declared as second-hand goods are regularly exported from developed countries to developing countries (Secretariat of the Basel Convention 2011). The Basel Convention technical guidelines referred to above have the potential to draw a clear line between used electronic and electrical equipment and waste electronic and electrical equipment falling within the scope of the Basel Convention and its export and import control regime.

What is hazardous waste?

Once the waste status has been established or assumed (in some cases, in court as a result of legal proceedings), the question is whether the waste is "hazardous" or "other," given

Basel Convention	Examples
Annex I *Hazardous wastes requiring prior informed consent (Y codes)*	Clinical wastes, waste mineral oils, or residues arising from industrial waste operations
Annex II *Other wastes requiring prior informed consent (Y codes)*	Wastes collected from households
Annex III *List of hazardous characteristics*	Explosive, corrosive, or toxic
Annex VIII (List A) *List of hazardous wastes covered by the Convention (A codes) unless the use of Annex III demonstrates that a waste is not hazardous*	Waste lead-acid batteries, glass from cathode ray tubes, or fluff-light fraction from shredding
Annex IX (List B) *List of wastes not covered by the Convention (B codes), unless they contain Annex I material to an extent causing them to exhibit an Annex III characteristic*	Waste end-of-life motor vehicles containing neither liquids nor other hazardous components, paper wastes, or textile wastes.

that this determines whether the Basel Convention's regulatory regime applies to its export, transit, and import.

The OECD Decision on Control of Transboundary Movements of Wastes Destined for Recovery Operations C (2001)107/FINAL (OECD 2015) introduces the so-called green-listed and amber-listed waste. This system has been adopted in the European Union legislation on shipments of waste (European Commisssion 2015). Wastes included in Annex III of the OECD decision are generally considered non-hazardous (also referred to as green-listed waste) and do not require any prior informed consent or notification before the shipment takes place. However, wastes included in Annex IV exhibit hazardous characteristics, and a notification or approval from the destination country is needed to proceed with the export. These waste streams are referred to as amber-listed waste. For example, the vast majority of notified waste shipments are destined for EU member countries or one of the EFTA countries (i.e., Iceland,

OECD Decision	Examples
Appendix 1 (identical to Annex I of the Basel Convention) *Categories of wastes to be controlled (Y codes)*	Asbestos, waste containing PCB or arsenic compounds
Appendix 2 (identical to Annex III of the Basel Convention) *List of hazardous characteristics*	Explosive, corrosive, or toxic
Appendix 3 *List of wastes subject to the green control procedure (in general, the non-hazardous wastes are listed here)*	Glass fibre, electrical assemblies consisting only of metals or alloys, or metal-bearing wastes
Appendix 4 *List of wastes subject to the amber control procedure (in general, the hazardous wastes are listed in this appendix)*	Used blasting grid, chlorofluorocarbons, or sewage sludge

Liechtenstein, Norway, and Switzerland). In 2009, only 84 000 tonnes of notified wastes were exported from the EU to non-OECD countries. One example of such waste is agriculture sheeting for recovery purposes (EUROSAI 2013). It should be noted that export of hazardous wastes from EU/OECD to non-OECD is banned; therefore it is not subject to notification or licensing.

The United States is not a Party to the Basel Convention. There are however federal regulations in place that regulate the import and export of certain waste streams, such as cathode ray tubes. As an OECD country, the United States is also bound by provisions laid down in the OECD Decision on Transboundary Movements of Wastes Destinated for Recovery Operations. Parties to the Basel Convention can only trade waste with non-Parties in cases where bilateral or multilateral agreements are in place, ensuring an equally sound management structure for transboundary movements of waste, as included in the Basel Convention.

In Asia, many countries have adopted regulations prohibiting or restricting the import of hazardous and other wastes that are, in some cases, even more stringent than the requirements of the Basel Convention. However, due to the need for resources and raw materials for their development, many of them allow the import of second-hand materials and used electrical and electronic equipment (EEE). For example, China and Vietnam regulate the import and export of scraps and second-hand EEE through permits. Yet most of the countries that allow the import of scraps or second-hand EEE do not have more specific requirements for distinguishing scraps and second-hand EEE, rubber/tires, plastic, and metal scraps from wastes. This leads to an enormous "grey area" for distinguishing legal from illegal waste shipments and makes enforcement very difficult.

To address the grey area, some countries have set certain criteria for the percentage of waste contents (allowable percentage of contamination) in shipments. For example, China's allowable percentage of contaminated wastes in a shipment is the following:

0.5%	1.0%	1.5%	2.0%
Scrap plastics, PET beverage bottles	Refining residue, waste textiles, compressed auto	Waste wood, waste paper	Waste steel, non-ferrous metals, motors, cables, and assorted metals

However, inconsistency in the regulations between the exporting and the importing countries pose challenges for effectively controlling illegal waste trafficking. For example, EU countries may allow a certain percentage of contaminated waste to be exported to other countries, while the importing countries may have different criteria. Indonesia has adopted a "zero tolerance" policy for contaminated waste. If any contamination is found, a shipment has to turn back to the country of export. This can lead to a dispute between the exporting country and the importing country, since a shipment that is legal in one country might be illegal in the other country.

Clear criteria for and a consistent understanding of the allowed percentage of polluted waste may be helpful for both exporting countries and importing countries.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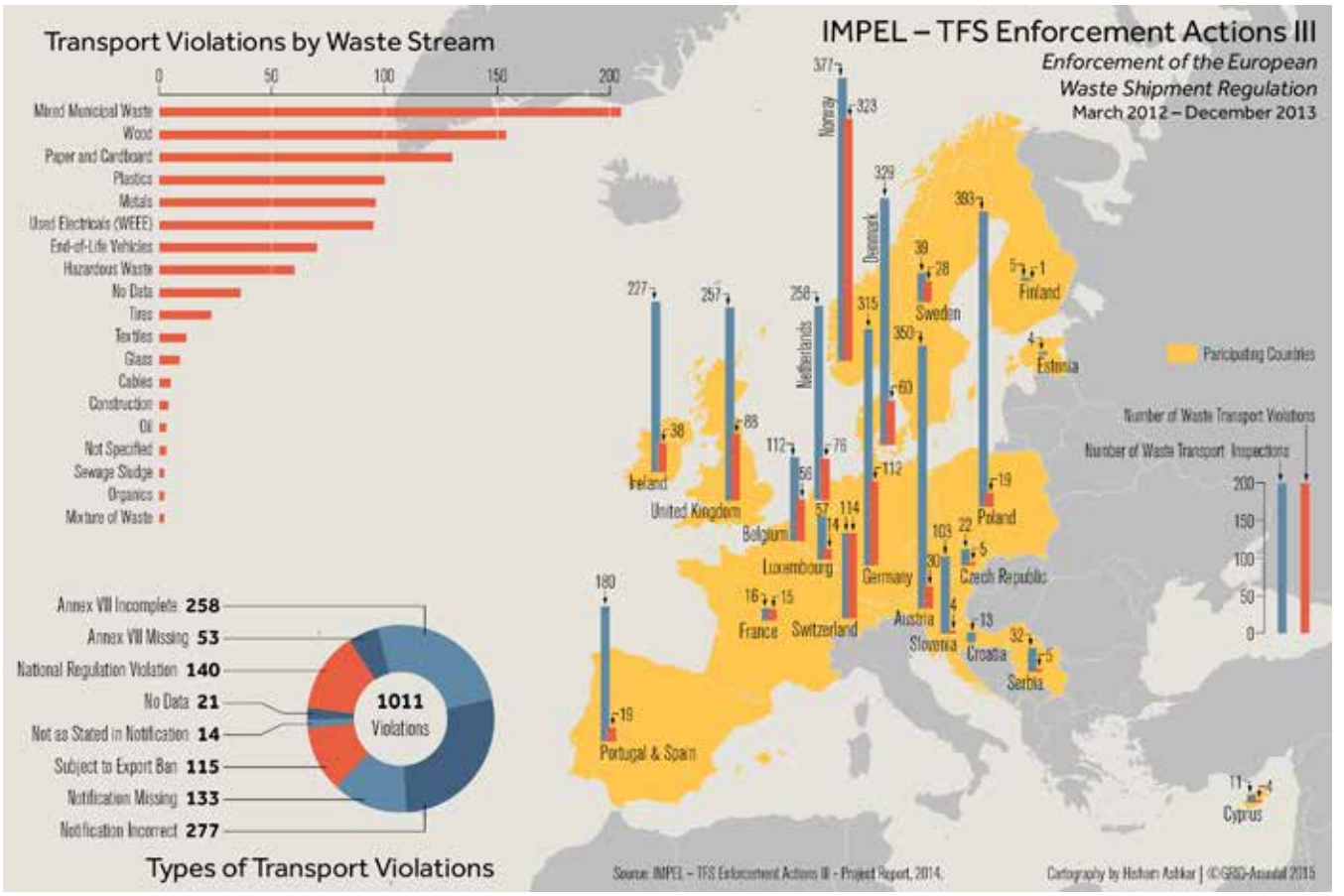
Countering illegal traffic: A snapshot of monitoring and enforcement

At the global and regional levels, several initiatives have been undertaken or are on-going to prevent and combat the illegal traffic of hazardous wastes and other wastes.

At the global level, Parties to the Basel Convention adopt decisions providing policy guidance to Parties on how to prevent and combat illegal traffic. For instance, Parties are encouraged to exchange information on their legislation or best practices and to transmit to the Secretariat forms for confirmed cases of illegal traffic. Parties also develop and adopt guidelines on how to prevent and combat illegal traffic. These guidelines can, among other things, harmonize their understanding of issues[2] at a global level. Finally, the Parties to the Basel Convention request that the Secretariat undertake a variety of tasks, such as assisting Parties, upon request, in identifying cases of illegal traffic, cooperating with regional or global enforcement organizations or networks, and delivering technical assistance activities.[3] At its 11th meeting, the

2. See the Guidance Elements for Detection, Prevention and Control of Illegal Traffic in Hazardous Waste; and the Instruction manual on the prosecution of illegal traffic of hazardous wastes or other wastes; available at: http://www.basel.int/Implementation/LegalMatters/IllegalTraffic/Guidance/tabid/3423/Default.aspx. See also the latest version of the draft guidance on the illegal traffic take back provision, available in document UNEP/CHW.12/9/Add.2 at: http://www.basel.int/TheConvention/ConferenceoftheParties/Meetings/COP12/tabid/4248/mctl/ViewDetails/EventModID/8051/EventID/542/xmid/13027/Default.aspx

3. For a list of meetings and workshops, see: http://www.basel.int/Implementation/LegalMatters/IllegalTraffic/Meetings/tabid/2757/Default.aspx. For training tools, see: http://synergies.pops.int/Implementation/TechnicalAssistance/ToolsandMethodologies/Eleaningmoduleforlawenforcement/tabid/3534/language/fr-CH/Default.aspx - Should these be footnotes in the text and not references?



Conference of the Parties also established the Environmental Network for Optimizing Regulatory Compliance on Illegal Traffic (ENFORCE). Its mission is, through a network of relevant experts, to promote the Parties' compliance with the provisions of the Basel Convention pertaining to preventing and combating illegal traffic in hazardous wastes and other wastes through the better implementation and enforcement of national law (Basel Convention 2011).

At the regional level, the European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL) has been running waste shipment inspection projects within the European region since 2003. The current project, Enforcement Actions, records inspections undertaken by competent authorities at ports, railhead, roads, and waste sites during three inspection periods each year, each lasting three days. The data collected provides a snapshot of inspection methods, the main waste streams involved in illegal waste shipments, and their intended destinations. The 2014 data from IMPEL shows that 70 per cent of illegal shipments detected in Europe were going to other European countries. Illegal shipments to Asia accounted for 20 per cent of the violations. China, including Hong Kong SAR, was the preferred destination for illegal shipments to non-OECD countries, accounting for almost 56 per cent of total violations detected for shipments to developing countries. The major waste streams involved in transport violations were mixed municipal waste (20 per cent), wood (15.2 per cent), paper and cardboard (12.9 per cent), plastics (9.9 per cent), metals (9.5 per cent), and waste electrical and electronic equipment (9.4 per cent). Further analysis of violations related to paper and plastics is needed to ascertain whether these violations are associated with the quality of the recyclates (IMPEL 2014). A follow up phase of the operation in July 2014 focused on building capacity to combat the trafficking of waste and other environmentally regulated substances in Asia.

In 2010, a global joint operation with ten participatory countries, including the United States and Hong Kong, targeted illegal shipments of waste under the INECE Seaport Environmental Security Network and found that the illegal waste streams most often encountered during the event were: electronic waste (e-waste) falsely declared as second-hand goods; waste batteries falsely declared as plastic or mixed metal scrap; cathode ray tubes from television and computer monitors wrongly described as metal scrap; and refrigerators containing chlorofluorocarbons (CFCs) (INECE 2010).

The joint operation called Demeter III (World Customs Organization 2014) was initiated by China Customs and organized by the World Customs Organization (WCO). It mainly targeted illicit maritime consignments of hazardous and other wastes transported from Europe and other waste-producing regions to the Asia Pacific region, which is increasingly becoming a dumping ground for this sort of unwanted waste. The operation netted more than 7 000 tonnes of illegal waste, including hazardous wastes, used vehicle parts and tires, textiles, and e-waste. During the five-week operation, which took place in October and November 2013, customs officers from 44 countries used risk assessment, profiling, and targeting techniques, together with available intelligence, to identify and control high-risk consignments. Almost all of the 48 interceptions took place in European countries, including Italy, the Netherlands, and Portugal, before the waste could be illegally shipped, although the largest seizure – 5 700 tonnes of textile waste – happened in China. The Demeter III operation has proven that a coordinated approach between concerned authorities at national level is required to tackle the illicit trade in waste.

The first INTERPOL operation targeting the illegal trade of electronic waste resulted in the seizure of more than 240 tonnes of electronic equipment and electrical goods and the launch of criminal investigations into some 40 companies involved in all aspects of the illicit trade (INTERPOL 2013). Conducted in November and December 2012, Operation Enigma saw the participation of police, customs, port authorities, and environmental and maritime law enforcement agencies in seven European and African countries. The operation aimed to identify and disrupt the illegal collection, recycling, export, import, and shipping of such discarded electronic products as computers, televisions, and other electronic devices – before they could be dumped in landfills or other sites where they can cause severe environmental harm. Checks were conducted at major ports in Belgium, Germany, the Netherlands, and the United Kingdom in Europe, which is a common source of electronic waste being shipped internationally. There were also checks in Ghana, Guinea, and Nigeria in Africa, a region considered to be a destination for this waste. Almost one-third of the checks resulted in the discovery of illegal electronic waste.

Examples of smuggling methods

False classification

The correct coding of waste streams is important not only for reporting purposes, but also to help the law enforcement community target and identify possible transboundary movements of illegal waste, based on profiles in the declaration systems.

To provide an overview of the shipments, waste streams are coded under different functions. One is based on the nature of the waste, regulated by the Basel Convention and regional and national authorities. The other, used for customs purposes, is regulated by the World Customs Organization (WCO). The Harmonized System (HS) is a multi-purpose international product nomenclature system developed and maintained by WCO. This system is used as the basis for customs tariffs and for the collection of international trade statistics. Not all waste streams are currently covered by dedicated HS codes. The assignment of HS codes to wastes not yet included in the WCO Harmonized Commodity Description and Coding System is an area of ongoing cooperation between the Basel Convention and WCO (Basel Convention 2011).

In order to conceal an illegal export of hazardous or other wastes, exporters might decide to misdeclare the nature of the waste or to use a customs code associated with goods falling outside the scope of the Basel Convention. They could, for example, choose to use a non-hazardous waste code for hazardous wastes or even use a product code for a hazardous waste. This appears to be a practice employed to get waste streams, such as e-waste or PCB containing transformers, declared as metal scrap or another non-hazardous waste. There are also cases of wastes being declared non-hazardous – as, for example, plastics, paper, and metals – when, in fact, they are contaminated with hazardous components. Another example is household wastes, which are sometimes coded as plastic.[4]

4. Example of a case: http://www.letsrecycle.com/news/latest-news/site-serv-ltd-fined-illegal-commingled-waste-export/

High-risk HS codes

In 2010 the Asian Network for Prevention of Illegal Transboundary Movements of Hazardous Wastes surveyed its members to collect information about take-back procedures for illegally shipped waste and risk profiling (Asian Network 2010). The information provided by two countries in the region revealed that the HS code 7204 was a high-risk code that was being used to disguise batteries and metal scrap mixed with hazardous components as metal scrap and that HS 3915 was commonly used to conceal movements of municipal or mixed plastics waste as non-hazardous, clean plastic scrap.

Cathode Ray Tubes misdeclared as "Plastic Scrap"

During an inspection operation under the International Network for Environmental Compliance and Enforcement (INECE), officials in China's Hong Kong SAR discovered a shipment from the United States, a non-Party to the Basel Convention, of glass from CRTs, which the shipper declared as non-hazardous "plastic scraps." The shipment was deemed to be illegal, since the import of used CRTs is illegal under Chinese law, and was returned to the US (INECE 2010).

Case study: Illegal export of waste chemicals under the pretext of a product

In 2001, the Dutch Environmental Authorities were informed by customs authorities, about two leaking containers in the port of Rotterdam. This triggered an investigation, which revealed that a US storage company was ordered by the US Environmental Protection Agency (EPA) to clean up chemicals it had been storing illegally for years. Some of the chemicals were loaded into 29 sea containers to be shipped via Rotterdam to Nigeria. The Dutch authorities found that the buyer in Nigeria did not exist and assumed the chemicals were meant for illegal dumping in Nigeria. The paperwork indicated that the shipments contained chemicals, not waste. Together with the US EPA, the Dutch investigators discovered that the 29 containers actually contained more than 300 tonnes of mixed expired hazardous chemicals that were classified as waste. The criminal investigation ultimately involved more than 40 witnesses in the United States and abroad and thousands of pages of documents. It also required close coordination among American, Dutch, and Nigerian agencies, including joint EPA-Dutch sampling of the chemicals in Rotterdam. After having been stored in the port terminal in Rotterdam during the investigations, the chemicals were incinerated in the Netherlands. A US federal judge ordered the defendants to pay more than USD 2 million in restitution and fines, with most of the money going to Dutch authorities to repay them for the storage and incineration of the chemicals dumped on them (EPA 2006).

Loading

To get wastes illegally moved across borders, a variety of tactics are used, particularly in loading containers. Waste can be hidden in goods legally exported or can be stored in a way that makes access to them difficult. Frequently, enforcement agents come across cases where the doors of cars or vans containing electrical and electronic equipment have been soldered shut, making it more difficult for law enforcers to determine whether the equipment is or is not waste. This practice makes physical inspections a resource-intensive activity. Another approach is to hide the waste in the back of a sea container, behind a layer of products or non-hazardous wastes. Discovering the waste that is illegally exported requires a thorough investigation. An X-ray scan of a sea container, for example, could reveal the hidden layers. Unpacking a shipment or a container is time-consuming and costly and might happen only when serious suspicions have arisen.

Problematic waste streams involved in environmental crime

Based on global, regional, and national inspections and on reports in the media and by NGOs, certain waste streams can be identified as more likely to be involved in waste crimes. Among those are e-waste, end-of-life vehicles, mixed blended waste streams, used or waste lead-acid batteries (ULABs), waste tires, equipment containing ozone depleting substances (ODS), ships destined for dismantling, and industrial waste.

E-waste

E-waste is an overarching name for waste related to electrical and electronic equipment, such as computers, mobile phones, television sets, and refrigerators. E-waste is largely categorized as hazardous waste due to the presence of toxic materials, such as mercury, lead, and brominated flame-retardants. E-waste may also contain precious metals, such as gold, copper, and nickel, and rare materials of strategic value, such as indium and palladium. These precious and heavy metals can be recovered, recycled, and used as valuable source of secondary raw materials. It has been documented that e-wastes are shipped to developing countries where they are often not managed in an environmentally sound manner, thus posing a serious threat to both human health and the environment (Basel Convention 2011). Identifying and classifying electronic and electrical equipment as waste may be challenging. One could argue that used or discarded equipment could still be of value to others and therefore should not be considered waste. However, the life span of second-hand goods is very short, and within a couple of years it becomes discarded waste. Technical guidelines on criteria to classify equipment as waste or non-waste are currently negotiated at the international level (Basel Convention 2010).

For the law enforcement community, e-waste is a problematic waste stream for several reasons. As noted above, the classification of equipment as a waste poses challenges. Secondly, the lack of designated customs codes for e-waste makes both data analysis and developing profiles to target shipments difficult. Thirdly, the actors involved in the e-waste chain are numerous. Getting a grip on the e-waste management and shipment chain is resource-intensive and requires an effective operational network at both national and international levels.

Co-mingled waste

The co-mingled waste stream is a mixture of the dry recyclables of household waste. Recycling or re-use of this mixture is only possible after extensive sorting. It is sometimes traded illegally under the guise of clean or sorted plastic or paper waste, which is considered a non-hazardous waste stream. Inspectors have discovered shipments declared as plastic or paper waste, but contaminated with other materials or composed of a mixture of waste streams mainly originating from households. Co-mingled waste is commonly exported[5] illegally as paper waste. The quality and composition of this waste, however, requires a prior notification procedure that is often not followed. The EU Waste Shipment Regulation specifically prohibits the export of household waste to non-OECD countries. Some non-OECD countries even ban the import of co-mingled waste because it is considered as other waste under the Basel Convention code Y46.

5. www.letsrecycle.com (2014). Waste Management: Site Serv Ltd fined over illegal 'commingled' waste export. [Online]. 12/11/2014. Available from: http://www.letsrecycle.com/news/latest-news/site-serv-ltd-fined-illegal-commingled-waste-export/

Mixing or blending waste streams

Mixing hazardous components with non-hazardous waste in order to avoid higher sorting or treatment costs can also be an attractive solution for unscrupulous waste handlers. In Threat Assessment 2013 on Environmental Crime in the EU, Europol describes the criminal practice of mixing low-quality petrol with toxic residues produced during illicit petrol processing. The report says that this type of crime is often investigated as fraud, rather than being pursued as environmental crime.

In Scotland, environmental authorities discovered a tax-dodging tactic used by Scottish gangs. It involves mixing low-tax waste, which costs USD 3.70 a tonne to dispose of, with high-tax waste costing USD 119 a tonne as a way to avoid high treatment costs (BBC 2014).

Used or Waste Lead-Acid Batteries

Used lead-acid batteries (ULABs, also referred to as Spent-Lead Acid Batteries) from cars and trucks are one of the world's most-recycled consumer products (Commission for Environmental Cooperation 2013). Waste lead-acid batteries are considered hazardous waste under the Basel Convention, which means that the Convention's provisions pertaining to the control of their export and import apply. However, the batteries are often disguised as non-hazardous metal waste or plastic waste and are illegally exported to countries with lower treatment standards. The treatment of the ULABs is a concern and so is the improper transport of the batteries, both of which can cause damage to human health and the environment.

The ULABs are valued for their lead content, which is recycled for new products. Because of its toxic nature, lead reprocessing requires strict control over possible environmental pollution and high health and safety standards to protect workers. The costs of environmentally sound management of the batteries can, therefore, be high. Seeking cheaper options for recycling leads, in some cases, to illegal exports.

The Commission for Environmental Cooperation (CEC) for North America, in its latest assessment of hazardous trade, concluded that the US has good control of ULABs exports to the main destination countries (Mexico, Canada, and South Korea). The US EPA, however, has no records for the other 47 destination countries receiving ULABs (Commission for Environmental Cooperation 2013).

An emerging and potentially growing source of hazardous waste: obsolete counterfeit pesticides

Although the scope of the problem at the global level has yet to be evaluated due to recent awareness of its existence, it is estimated that the trade in illegal pesticides in Europe alone represents more than 10 per cent of the total world market, and that more than 25 per cent of the pesticides in circulation in some EU member states are illicit or counterfeit (Europol 2011).

This illegal trade generates vast profits for its operators and huge losses for both legitimate business and tax collectors within national governments. But the cost is more than finan-

cial. Analysis of counterfeit products has revealed that the fake pesticides might contain unknown toxic impurities potentially dangerous to health and the environment (Karasali *et al.* 2014). These substances pose a threat to the food chain, to farmers, andultimately, to consumers when dangerous products reach the market (European Commission 2014). Some of the fake pesticides can cause long-term contamination of the soil and cause problems for future harvests, groundwater, surface water, and adjacent reservoirs (ECPA n.d.).

If authorities seize the counterfeit pesticides, they become waste at times, depending on their content, hazardous waste (Blakeney 2012). This means they have to be properly disposed of in line with national and international legal frameworks on waste management. The proper disposal of counterfeit pesticides can therefore be costly.

In many countries, there are no specialized facilities for the safe disposal of the dangerous, counterfeit pesticides (Blakeney 2012). This may mean that the pesticides must be transported to other countries for environmentally sound disposal in line with the Basel Convention. In addition, the waste management legislation in most countries places responsibility for waste disposal on the owner of the waste in question. The owner is supposed to cover the costs of storing the counterfeit at special storage facilities during investigation, as well as the costs of its eventual disposal. With this waste, however, the owners do everything possible to avoid responsibility for the waste disposal. As a result, the waste may accumulate in unguarded storage facilities, where the pesticides may be relabelled and brought back to the market. The return of previously confiscated counterfeit pesticides is a new trend that raises huge concerns (OSCE 2015).

In general, most developing countries do not have the facilities for safe hazardous waste disposal (Blakeney 2012). Stocks of hazardous pesticides often deteriorate and contaminate the environment and put people at risk. The worst affected are poor rural communities that may not even be aware of the toxic nature of the chemicals in their environment.

2006 CÔTE D'IVOIRE TOXIC WASTE DUMP

Name of the ship: Probo Koala

Jan 2006 • Trafigura starts to buy cargoes of coker gasoline from Mexico, to produce naphta through caustic washing.

Apr 2006 Tunisian authorities suspend the caustic washing operations at La Skhira.

Apr-Jun 2006 Caustic washing on board the Probo Koala in different locations in the Mediterranean.

Apr 2006 Unsuccessful attempts to dispose of the waste in several European countries.

2-5 Jul 2006 Waste partly offloaded in Amsterdam for processing, then reloaded.

9 Jul 2006 Probo Koala arrives in Paldiski to load gasoline.

4 Aug 2006 Probo Koala arrives in Lagos to unload gasoline.

10-16 Aug 2006 Several unsuccessful attempts to dispose of the waste in Nigeria.

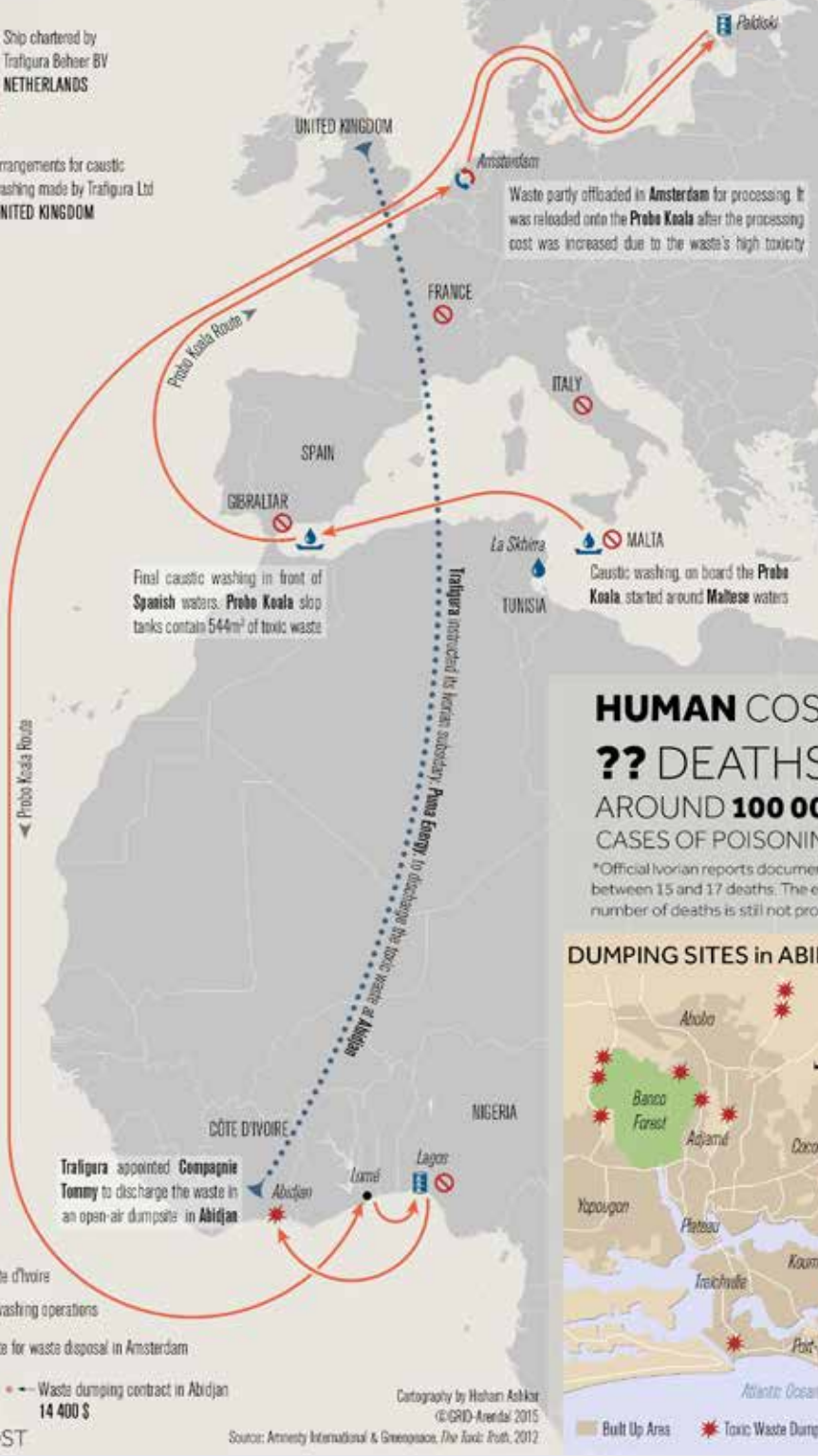
17 Aug 2006 Trafigura instructs its Ivorian subsidiary to discharge the waste in Abidjan. A newly formed local company was chosen for this task.

19 Aug 2006 The toxic waste is dumped in several open-air locations in Abidjan.

20 Aug 2006 • Thousands of poisoning cases are reported in Abidjan.

13 Feb 2007 • Trafigura pays $195 million compensation to Côte d'Ivoire

COMPARING THE COST



HUMAN COST

?? DEATHS*

AROUND 100 000 CASES OF POISONING

*Official Ivorian reports documented between 15 and 17 deaths. The exact number of deaths is still not proven.

DUMPING SITES in ABIDJAN

Cartography by Hisham Ashkar
©GRID-Arendal 2015

Source: Amnesty International & Greenpeace, *The Toxic Truth*, 2012

Case study: The Probo Koala Incident

The August 2006 case of illegal dumping of hazardous waste in Abidjan, Côte d'Ivoire, from the tanker Probo Koala brought to international attention the complex problems associated with transboundary movements of hazardous waste.

The company Trafigura chartered the Probo Koala in March 2006 to collect a cargo of full-range coker naphtha (heavy residual fuel oil) from the Texan port of Brownsville, having purchased the consignment at low cost in Mexico. Subsequently, on-board caustic washing took place, possibly off the coast of Libya or near Gibraltar. This involved "sweetening" the coker naphtha with a caustic solution to separate the sulphur and nitrogen contaminants and render the remaining product suitable for petrol blendstock. The residue or slops from the process was a mixture that included sulphurous mercaptans and phenols (Commission Internationale d'Enquête sur les Déchets Toxiques dans le District d'Abidjan 2007).

On the night of 2 July 2006, the Probo Koala berthed in Amsterdam, The Netherlands, having obtained agreement from the Amsterdam Port Service (APS) to treat the slops at a cost of about USD 30 per m^3, around USD 17 000 in total. Strong odours emanating from the waste prompted Amsterdam Port Services to take a sample, which revealed a significantly higher chemical oxygen demand than it was permitted and able to process on its premises, in addition to a high quantity of mercaptans, which was causing the foul stench (United Nations Human Rights Council 2009). Given that treatment would be more complex and costly and that it could only be done in Rotterdam, Amsterdam Port Services gave Trafigura a revised cost estimate accounting for the higher level of toxicity revealed by sample analysis (from USD 20 per m^3 to USD 900 per m^3). Trafigura rejected the quote and requested to reload the waste (Statecrime.org n.d.), after which the Probo Koala departed Amsterdam for Paldiski, Estonia, where it was due to collect a cargo. From there, the Probo Koala made its way to West Africa.

On 19 August 2006, the Probo Koala berthed in Abidjan. Through its subsidiary, Puma Energy Côte d'Ivoire, and with the assistance of its shipping agent in Abidjan, WAIBS, Trafigura had arranged unloading and treatment of its slop waste with a newly created company, Tommy Ltd. The company had made an offer of USD 30 per m^3 for waste falling under the MARPOL Convention and USD 35 per m3 for chemical slops, after which Trafigura instructed WAIBS to make arrangements for the discharge of the waste and to coordinate the operation with Tommy Ltd.

Tommy Ltd. rented 12 trucks, which dumped the waste at various sites in the district of Abidjan between the evening of 19 August and the morning of 20 August 2006. A report by the United Nations Disaster Assessment and Coordination team, deployed upon request by the United Nations Humanitarian Coordinator in Abidjan, indicates that on the night of 14 September, further dumping of the same hazardous waste may have taken place (2006).

According to the Ivorian Ministry of Health and Public Hygiene, there were 18 dumping points in 8 sites. Additional sites have also been reported. None of the dumping sites had proper facilities for the treatment of chemical waste. Suffocating odours originated from the dumping sites.

Dutch prosecutors accused Trafigura of illegally exporting hazardous waste to Côte d'Ivoire. The allegations against the company are that it breached Dutch export and environmental laws, as well as forging official documents. Trafigura rejected these charges. In July 2010, a Dutch court ruled that the company had concealed the dangerous nature of the waste aboard the Probo Koala and fined the company about USD 1 million. The Dutch court also convicted a Trafigura employee and the Ukrainian captain of the Probo Koala for their roles in the matter.

In November 2012, the Dutch Public Prosecutor's Office and Trafigura reached an out-of-court settlement (Openbaar Ministerie, The Netherlands 2012). Trafigura agreed to pay USD 325 000 compensation and paid a USD 72 000 fine in return for withdrawal of the case against Claude Dauphin, the co-founder and director of Trafigura (Openbaar Ministerie, The Netherlands 2012).

In 2007, Probo Emu, the sister ship of the Probo Koala, carried the same type of polluted, low quality coker petrol, to a company called Vest Tank, in Norway. Vest Tank desulphurised the petrol to make it ready for sale on the African market. During this process a tank containing waste products from the cleaning process exploded causing huge damages to the Vest Tank plant (Norwegian Broadcasting 2008). While no one got hurt by the explosion, it caused serious health problems for local residents as organic sulphuric compounds were scattered over a large area (Norwegian Environment Agency 2008, EUROSAI 2013). The investigation of the incident was concluded in 2013 with the managing director and one advisor in Vest Tank receiving prison sentences for breach of the Pollution Act and Working Environment Act (ØKOKRIM 2013).

Waste management landscape

The global waste market sector from collection to recycling is estimated at USD 410 billion a year (UNEP 2011), excluding a very large informal segment. As in any large economic sector, there are opportunities for illegal earnings at different stages of legal operations, with both monetary and ethical implications. The exploiters of these opportunities range from organized transnational crime to small groups or individuals (Europol 2015, 2013). Illegal and illicit trade of waste takes advantage of weak spots, such as the low overall possibility of controlling the trade, the price of waste treatment, and the complexity of waste-related legislation.

The waste sector, under different scenarios, could employ between 23 and 26 million people by 2050 (UNEP 2011) since the amount of waste is gradually growing. Many actors are involved in waste management, and the landscape is complex. The line of trade involves waste generators, waste collectors, waste management companies, transport and shipping companies, waste treatment operators, shipping agents, and waste brokers. The value chain of waste trade from producers to recycling, energy recovery, or other disposal operations, such as landfills, might be difficult to control. Recycling companies may not always have full knowledge of the final recipients of the waste. In some instances, they might have the impression that the waste is being handled legally, without having the incentive or capacity to investigate further. Waste traders, brokers, and recyclers are required to have legal documents, although investigations have showed that in several cases documents were falsified. Conducting responsible waste business may be challenging.

Waste crime is different from other criminal activities, such as trade in drugs, as it takes place in the context of a much broader chain of legal operations, with advantage being taken of loopholes in control regimes and control capacity. A link between the illegal waste trade and organized crime has been mentioned in many studies.[6] Several case analyses have revealed that legal players are involved in the illegal waste trade (EFFACE 2015). At times, fraudulent activities are hidden within prominent waste companies that promote green and sustainable management, have ISO certification, and have even won awards for their work. Small, informal groups of people, more opportunity-based, are also involved in the illegal trade of waste.

In the European Union, competent authorities are required by legislation to maintain an overview of waste traders and dealers. However, in some countries, establishing a waste business is almost effortless, while tracing its components is challenging. The international waste trade itself is a business activity that requires profound technical and legal knowledge. For example, operators need to know about their obligations to apply for permits and about recipient countries' regulations. These permits and regulations are important in ensuring the accountability of the industry. In some European countries, there is growing demand for illegal waste services, especially with regard to waste intended for export[7] (EUROJUST 2014, EFFACE 2015). There are differences among countries in inspection and enforcement related to the illegal waste business. In countries where authorities are primarily concerned with compliance with the regulatory framework, unscrupulous waste brokers can operate until the evidence of fraudulent activities appears. Even then, individuals and companies found guilty of offences tend to re-establish themselves quickly in the waste sector by using slightly altered names and titles or by moving to another country.

The collection and transportation of waste both require physical locations. However, with easy registration of companies in many countries and with access to the Internet, virtual trade through e-commerce and e-platform mechanisms is a new opportunity for waste businesses. Many companies trading in scrap metal or plastic are registered in so-called free zones in the Middle East. Companies registered in these free zones are neither public nor legally accessible (e.g., corporate structure, ownerships etc.). It is not a requirement that these companies have a physical presence, such as a registered postal address,

6. See for example: Bisschop, L. (2012). Is it all going to waste? Illegal transports of e-waste in a European trade hub. In Crime Law and Social Change (2012) 58:221–249. Available from: https://biblio.ugent.be/publication/2967255
EFFACE (2015). Illegal shipment of e-waste from the EU. Available from: http://www.ecologic.eu/sites/files/publication/2015/efface_illegal_shipment_of_e_waste_from_the_eu_0.pdf
Osservatorio Nazionale Ambiente e Legalità (Legambiente) (2014). Ecomafia 2014: le storie e i numeri della criminalità ambientale. Available from: http://www.legambiente.it/sites/default/files/docs/premessa_0.pdf
7. Swedish police interviewed on Sveriges Radio (Swedish Radio). Available from: http://sverigesradio.se/sida/artikel.aspx?programid=83&artikel=6047905 and http://sverigesradio.se/sida/artikel.aspx?programid=83&artikel=6065449

in the countries of operation. The opacity of this arrangement suggests that these companies might be trying to conceal trading partners in countries of destination in the Far East in order to hide illegal activities, such as the illegal transport and dumping of waste, and tax evasion.

Shipping agents, terminal operators, and shipping companies play a critical role in the transportation of waste by sea. Shipping agents provide logistical support and arrange the paperwork, providing all necessary shipment information. At times, important information such as the destination is concealed. Shipping lines may argue that they do not always have complete information about the cargo they ship. However, research indicates that shipping lines know their customers and have the capacity to be more selective in which customers have access to their services (Bisschop 2012).

Many illegal shipments end up in informal or small recycling factories in developing countries. For example, it was reported that 50 per cent of US plastic scraps were shipped to China, and much of that material was recycled in a primitive way (The Christian Science Monitor 2013). Laizhou, a county-level city in Yantai Prefecture, Shandong Province, had a lot of small family-owned workshops undertaking plastic scrap recycling. These small entrepreneurs wash, melt, extrude, and chop polyethylene into pellets that could be remelted and turned back into film. Safety equipment is unknown, and pollution controls are weak. The water and chemicals used to cleanse the plastic run directly into local rivers.[8]

Broadly, there is a lack of awareness and understanding of the seriousness of environmental crime, which is perceived as a victimless crime. Sentencing for waste crimes varies greatly among countries, and some EU member states have yet to pursue a waste-crime-related prosecution. Environmental crimes in European Union member states are supposed to be punished "by effective, proportionate and dissuasive criminal penalties" (EUROJUST 2014). Since 2004, the Environment Agency in England has brought at least 30 successful prosecutions against exporters, some of them with multiple defendants that include individuals, companies, and their directors. The cases involved different types of illegal waste exports, including household waste, electrical waste, and tires. Sentences ranged from conditional discharges or relatively small fines (USD 1 100 for individuals involved in low-level offences) to fines as large as USD 110 000 for companies exporting vast amounts of household waste. English courts recently imposed suspended prison sentences of 40 weeks for exporting hazardous electrical waste to Ghana and 18 months for similar exports to West Africa, as well as the first prison sentence of 16 months for a repeat offender convicted of exporting hazardous electrical waste to four countries in West Africa. In England, sentencing guidelines for environmental offences have been introduced recently. This is expected to be helpful in determining sentences related to illegal waste exports in the future. Another municipal waste smuggling case reported in China in 2013 suggests that a smuggler importing municipal waste was sentenced to jail for ten years and required to pay a fine of approximately USD 10 000 for smuggling 2 600 tonnes of waste.[9]

Electrical and electronic waste management

Over recent decades, recycling has been a success and a positive achievement for private and public partnership. There is substantial potential in the formal/legal recycling of electrical and electronic waste streams. The United Nations University has estimated that up to 41.8 million metric tonnes of e-waste was generated in 2014, with only part of that amount being legally recycled and recovered (Balde *et al.* 2015; UNODC 2013). For example, a survey in 2010 in Australia indicated that demand for e-waste recycling and reuse exceeded around 25 000 tonnes a year and only around 10 per cent of the discarded e-waste is recovered and processed; electronic components are largely exported for specialised metals recovery (WCS Pty Ltd and Rawtec Pty Ltd 2010). It has been estimated that between 0.5 and 1.3 million tonnes of used electrical and electronic equipment (EEE) and waste electrical and electronic equipment (WEEE) are shipped out of the European Union each year, representing between 16 and 38 per cent of the e-waste collected (Baird *et al.* 2014).

Illegal waste recycling poses a challenge to the legal waste business. After the European legislation on EEE came into effect, the recycling industry in the UK anticipated about 1.5 million tonnes of e-waste for annual processing. When these amounts did not appear, British authorities initiated an investigation and found that up to 1 million tonnes, or two-thirds of e-waste in the UK, do not reach designated recycling facilities but instead is shipped overseas (EIA 2011). According to estimates, the result is about USD 7.5 million loss in profit to domestic WEEE treatment (ESAET 2012).

The concept of Extended Producer Responsibility, where a producer is responsible for the post-consumer stage of a product's life cycle, is gaining in global popularity. In the UK, manufacturers and importers of electric and electronic goods are obliged to join one of 37 WEEE operations – called compliance schemes – operating around the country to oversee the recycling process. Producers and distributors pay an amount into the compliance schemes based on various formulas related to their share of the market. Stores are required to take back old WEEE equipment when consumers purchase new items. Consumers can also freely dispose of their WEEE goods at designated collection facilities. Producers of electronic goods

8. However, after China's Green Fence Operation, many such small factories do not exist any more due to the lack of imported plastic scrap from the US.

9. General Administration of Customs of the People's Republic of China. Available from: http://www3.customs.gov.cn/publish/portal0/tab49589/info434014.htm

Illegal Mercury Trade: A Case Study

A German company that provides economic and ecological solutions for difficult recycling tasks has been caught manipulating mercury-waste recycling and putting recovered metallic mercury back on the world market. Over many years, the company was trusted internationally for the disposal of mercury until 2014, when the annual tax investigation revealed fraud in the company's operations. From 2011 to 2014, the company had accepted mercury wastes from across the world with the promise of treating and permanently disposing of the material in a way that would protect human health and the environment. Yet up to 1 000 tonnes of metallic mercury were instead exported illegally, mostly to transit countries: Switzerland and, in smaller amounts, Greece and the Netherlands. The public prosecution office at Bochum in Germany is investigating the case.

Anthropogenic use of mercury, also called quicksilver, dates back millennia. International awareness of the dangers of mercury rose after mass intoxications and poisoning in various countries from the 1950s to the 1970s became public. Today, it still finds application in such products as thermostats and light bulbs. However, the largest uses of metallic mercury are in small-scale gold mining and the chlorine-alkali industry, where it is used in producing plastics and chlorine. There is now a global agreement on phasing out mercury, with the legal instrument of the Minamata Convention. In addition, since 2011 Europe has classified mercury, mostly from the chlorine-alkali industry, as waste to be disposed of and prohibits its export.[10] The aim is to remove mercury from the global supply chain to safeguard the biosphere.

In support of international efforts to phase out mercury, the German company developed a method to convert metallic mercury to a less harmful substance. In this process, sulphur reacts with metallic mercury under special conditions to form cinnabar (HgS), which can be permanently disposed of in Germany's salt mines, among other places. The method was internationally promoted and quickly elevated the company to a global leader in stabilization and final disposal of metallic mercury.

The company received a variety of mercury waste, but most was metallic mercury from the chlorine-alkali industry around the world.[11] The fee for treatment and final disposal was set at €2 150/tonne.[11] However, very little of the mercury shipped to Germany was ever converted to cinnabar. Market prices for mercury had risen following international efforts to restrict its circulation. As a result one tonne of metallic mercury could be sold for as much as USD 60 000 in 2012. Today, in the first half of 2015, metallic mercury prices in the EU have reached USD 60-70 000 per tonne (Asian Metal (2015). Due to these drastic changes in the market, the company saw new ways to profit from the large amount of metallic mercury it received. The company systematically deceived authorities, neglected to process the mercury as promised, and instead earned a double profit by reselling the same mercury back into markets.

Apart from deceiving its clients and systematically declaring falsified statistics to local authorities, the company's export activities occurred in a highly questionable grey area whose exploitation significantly undermines international efforts to reduce mercury use. According to European regulation,[12] the export of mercury waste from the EU, including Switzerland, is only permitted as long as the mercury content of the material is less than 95 per cent by weight. The regulation also states that "the mixing of metallic mercury with other substances for the sole purpose of export of metallic mercury" is prohibited.

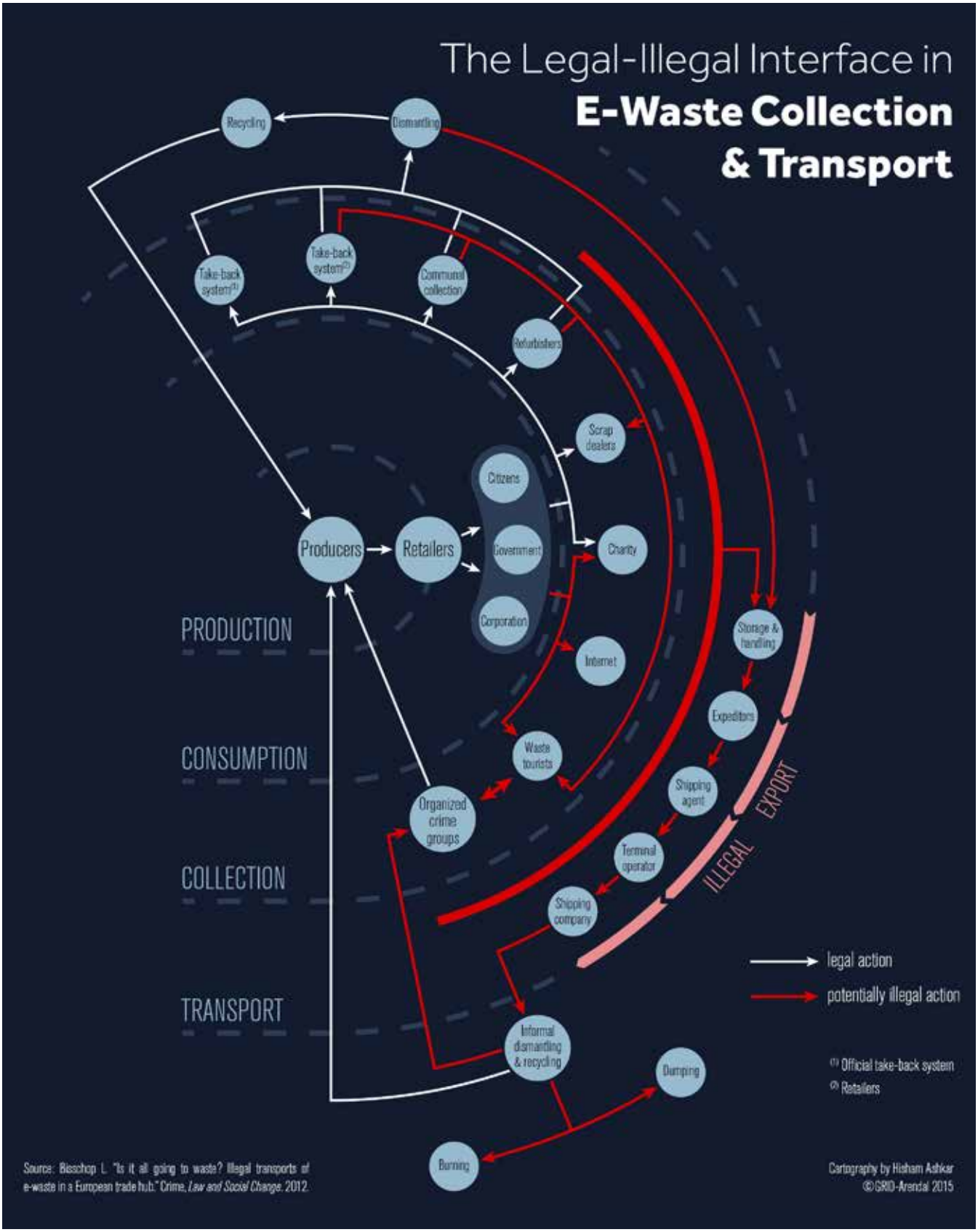
The company exported metallic mercury, wrongly declared as mercury waste, via trucks to Switzerland. To give the impression that mercury waste was being shipped, the company's workers were instructed to add a layer of soil on top of the liquid mercury. At the same time, the company sent storage bins filled with tennis sand to the underground salt mine operators in lieu of the stabilized mercury. Even though the contents of the company's deliveries were tested and verified in a mandatory acceptance control procedure at the salt mine, the cover-up was never reported to authorities.

In 2014, the company declared bankruptcy. A subsidiary of a large international recycling company has purchased the operations, intending to take up the mercury stabilization process. The question remains, what will be done to ensure that the same illicit activities do not happen again while mercury prices remain high? One reason why the company was able to get away with not delivering stabilized mercury for storage and disposal was because no monitoring mechanism is in place to track the mercury to its intended final destination in the salt mines. The stabilized form of mercury is neither classified as waste nor as hazardous waste in Germany. As a result, tracking responsibility ended with the company's receipt of the metallic mercury. One solution would be to include stabilized form of mercury in the list of hazardous wastes. This would extend reporting responsibilities to its final disposal in the salt mines.

10. Regulation (EC) No 1102/2008 of the European Parliament and of the Council on the banning of exports of metallic mercury and certain mercury compounds and mixtures and the safe storage of metallic mercury. Available from: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008R1102

11. Staatsanwaltschaft Bochum. Phone conversation, 9 December 2014

12. Regulation (EC) No 1102/2008 of the European Parliament and of the Council on the banning of exports of metallic mercury and certain mercury compounds and mixtures and the safe storage of metallic mercury. Article 1 paragraph 5. Available from: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008R1102


The Legal-Illegal Interface in
E-Waste Collection & Transport
Recycling
Dismantling
Take-back system(1)
Take-back system(2)
Communal collection
Refurbishers
Scrap dealers
Citizens
Producers
Retailers
Government
Charity
Corporation
Internet
Storage & handling
Expeditors
Waste tourists
Shipping agent
Organized crime groups
Terminal operator
Shipping company
PRODUCTION
CONSUMPTION
COLLECTION
TRANSPORT
ILLEGAL EXPORT
legal action
potentially illegal action
Informal dismantling & recycling
Dumping
Burning
(1) Official take-back system
(2) Retailers
Source: Bisschop L. "Is it all going to waste? Illegal transports of e-waste in a European trade hub." Crime, Law and Social Change. 2012.
Cartography by Hisham Ashkar
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have a Duty of Care to ensure that their e-waste is treated and recycled properly, and they can be prosecuted for not fulfilling their obligations. Critics of the system say the UK has too many compliance schemes, that there is too much competition in the market, and that some legitimate operators have been driven out of business, undercut by the activities of waste "cowboys."

The informal players in the e-waste business fall into several categories. Some are the so-called "waste tourists" who buy second-hand electronics and ship them to their relatives or business partners in developing countries. These waste tourists are often better organized than one might assume (Bisschop 2012). They get access to second-hand electronics by buying them in thrift stores, garage sales, flea markets, and the like. A few even go door-to-door in European cities to distribute flyers with contact information in case people have old electronics to discard.

Another sector that plays a role in collecting second-hand electronics is charities. They usually do not collect the electronics themselves, but ask people to support them by sending old mobile phones to specific companies that will then give the charity a certain amount of money – usually a couple of dollars – for each device. Both the charity and the recycling company advertise. Just a couple of years ago, not much information was provided to donors, but most charities that work with this system today provide information on the importance of responsible recycling. They stress the ecological importance of preventing electronics from being dumped or ending up in landfills, as well as of recycling the valuable secondary raw materials in mobile phone components. Some charities also address the importance of sending old mobile phones to trustworthy recyclers to guarantee a data wipe of possibly sensitive information. With increasingly sophisticated smart phones being discarded, data security is important to donors. In the past, messaging mainly focused on the money charities could make when phones were donated. Increasingly, the charities are providing information about where phones end up and with which recycler. Occasionally, however, the information link leads to a company whose website is no longer functional and which seems to have disappeared. This might mean the company has ceased to exist, was bought by another company, or changed its name. However, when there is no further information about where the electronics are being recycled or refurbished, it arouses suspicions that the transactions might be feeding into the trade in discarded electronics to developing countries.

A third, more informal, way to collect and trade in discarded electronics is via the Internet, which is becoming increasingly important in the e-waste sector (Bisschop 2012). A variety of websites offer cash for old devices. Many of them also offer to give the money to a charity of the consumer´s choice. Both companies and individuals offer second-hand electronics for sale and sometimes even for free. Scrap metal dealers (operating both physically and virtually) can act as intermediaries in the collection of e-waste. Websites that offer second-hand goods, including electronics, for sale (e.g., Craigslist, Marketplace, Kapaza, Alibaba, ScrapMetalForum, Ebay, etc.) are common and widespread. Large quantities of scrap electronic goods, such as old computers, circuit boards, printers, and phones, are offered via the Internet.

E-waste destination

The growing amount of e-waste encourages the establishment of small and artisan informal recycling businesses with very basic health, environmental, and safety standards in the countries of destination. At times, recycling can be carried out in domestic premises. Some governments are working towards more systematic and regulated methods of collecting obsolete

Home Appliance Old for New Rebate Program

In 2009, the Chinese government launched the "Home Appliance Old for New Rebate Program" (Old for New Program) in five large cities and four provinces. The program was a joint effort by several ministries and state agencies. The concept was quite simple: a consumer would get a ten per cent discount on a new home appliance when delivering an old appliance to an appointed collection company. The consumer would call the collection company, which would pick up the appliance at the consumer's house. The collector company would issue a ticket that the consumer could show when buying a new appliance. In addition, the collector company would pay the remaining value of the old appliance. The consumer benefitted in two ways: by handing the e-waste over to a certified collector who would pay for it, and by getting a ten per cent discount on a new home appliance.

The program was made possible through government subsidies. The retailers were reimbursed by the government for the discount provided to consumers, so they were able to offer discounts without financial loss. The collection companies had to sell the e-waste to an appointed recycling company at a certain price. In addition, the government reimbursed transportation costs, providing a double benefit for the collector. The Old for New Program was quite successful. Twenty months after the program was launched, a total of 49.9 million obsolete home appliances had been collected from consumers. The program also led to an increase in sales of new products. This was one of the goals, as China was in the midst of an economic downturn during this period. However, the program proved too expensive for the government and was ended in 2011. The volumes of e-waste collected by formal actors have decreased substantially since 2011, showing that, in the absence of government subsidies, consumers are likely to sell their old appliances to informal collectors who offer competitive prices and home pick-up.

Source: Wang et al (2013). E-waste in China: a country report

electronics and appliances, but organized and safe recycling remains at a very early stage.

Since 2000, the Chinese government has banned the import of e-waste and managed to agree on important pieces of national legislation[13] that stipulate collection through multiple channels and recycling of WEEE at licensed recycling enterprises.

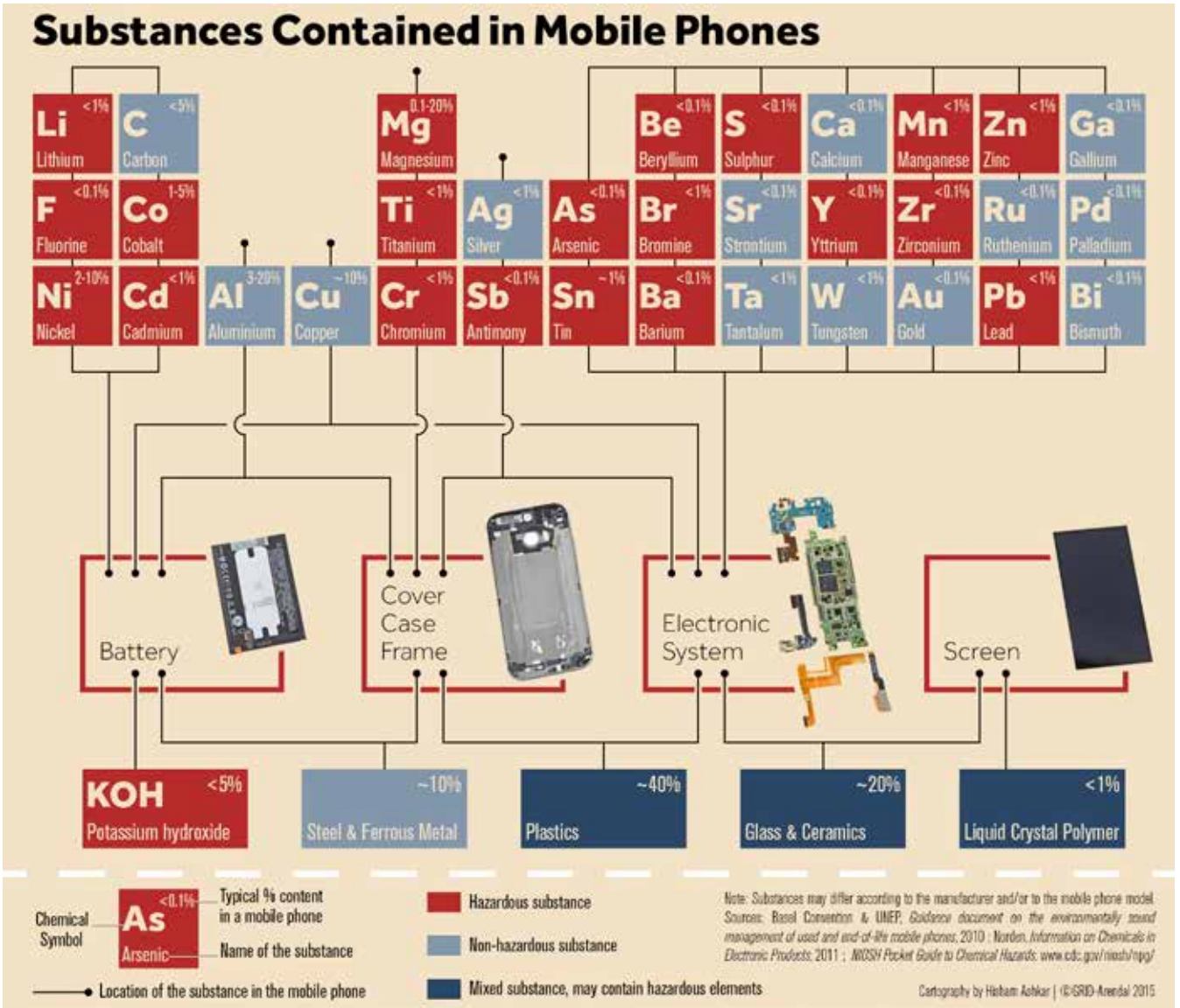
13. Regulations on Recovery Processing of Waste Electrical and Electronic Products. Unofficial English translation available from: http://www.chinarohs.com/chinaweee-decree551.pdf

China has enacted a nationwide recycling system for obsolete electronics supplied by domestic and illegally imported WEEE.

In China, there are about 130 registered enterprises recycling e-waste. However, not all of them have received all the necessary treatment licences, indicating that they have not met required technical and environmental standards (Wang *et al.* 2013). The collection and recycling of e-waste in China are partly carried out by informal actors. They are not registered with the state, so their numbers are difficult to estimate (Wang *et al.* 2013). However, it is clear that the sector has been

able to expand its trading networks incrementally through a variety of players, such as e-waste importers, informal collectors, dealers of secondary materials, and informal recyclers. Hong Kong is regarded as an important e-waste trading hub.

Informal recyclers tend to cluster around the key waterways and ports of entry, suggesting that the input materials for recycling are imported. The business has spread from Guangdong Province to other regions, such as Guangxi, Zhejiang, Shanghai, Tianjin, Hunan, Fujian, and Shandong (Wang *et al*. 2013). Recycling or disposal facilities in the developing world are often very basic. The town of Guiyu in Guangdong Province – often referred to as the WEEE capital of the world – is home to more than 300 companies and 3 000 individual workshops that employ people in informal recycling activities, such as extracting metals from computer circuit boards and burning the plastic off copper cables (Wang *et al*. 2013). Artisan recycling is very labour-intensive. Most of the workers in Guiyu are rural migrants coming from neighbouring agrarian regions and working for relatively low wages. Many of these workers are women and children (Wang *et al*. 2013).



Artisan recycling is based on the profit from materials of positive market value. These include plastics; precious metals, such as gold, silver, platinum, palladium, and copper; and strategic metals, such as rare earth metals and other non-ferrous metals. For example, 25 tonnes of mobile phones can yield 10 kg of gold. But electronic goods also contain a wide variety of hazardous substances. Printed circuit boards contain arsenic, cadmium, mercury, and bromides. Old cathode ray tube televisions (CRT) contain lead and phosphorus pentachloride; flat-screen televisions (LCDs) have mercury; fridges and other cooling equipment have quantities of chlorofluorocarbons (CFCs). Valuable materials recovered from the e-waste commodities are sold on to the manufacturing sector through a new brokers' network (UNODC 2013).

Even though the informal e-waste recycling system is deeply embedded in some provinces in China, it is possible to phase it

Commonly practiced crude recycling methods of informal recyclers in Asia (Chi *et al.* 2011)

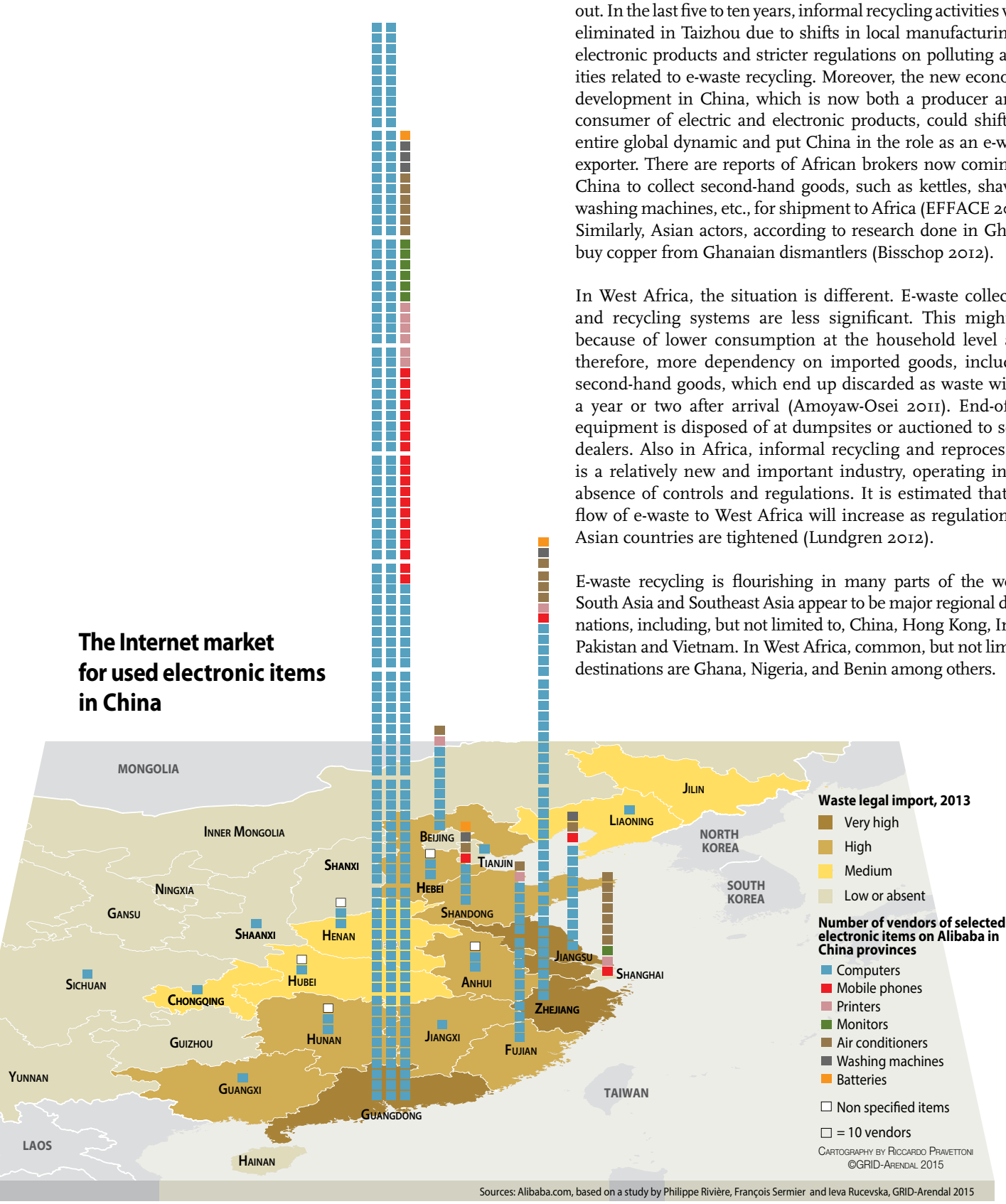
(1) Physical dismantling, using hammers, chisels, screwdrivers, and bare hands, to separate different materials
(2) Removing components from printed circuit boards by heating over coal-fired grills
(3) Stripping of metals in open-pit acid baths to recover gold and other metals
(4) Chipping and melting plastics without proper ventilation
(5) Burning cables to recover copper, and burning unwanted materials in open air
(6) Disposing of unsalvageable materials in fields and along riverbanks
(7) Refilling toner cartridges

out. In the last five to ten years, informal recycling activities were eliminated in Taizhou due to shifts in local manufacturing of electronic products and stricter regulations on polluting activities related to e-waste recycling. Moreover, the new economic development in China, which is now both a producer and a consumer of electric and electronic products, could shift the entire global dynamic and put China in the role as an e-waste exporter. There are reports of African brokers now coming to China to collect second-hand goods, such as kettles, shavers, washing machines, etc., for shipment to Africa (EFFACE 2015). Similarly, Asian actors, according to research done in Ghana, buy copper from Ghanaian dismantlers (Bisschop 2012).

In West Africa, the situation is different. E-waste collection and recycling systems are less significant. This might be because of lower consumption at the household level and, therefore, more dependency on imported goods, including second-hand goods, which end up discarded as waste within a year or two after arrival (Amoyaw-Osei 2011). End-of-life equipment is disposed of at dumpsites or auctioned to scrap dealers. Also in Africa, informal recycling and reprocessing is a relatively new and important industry, operating in the absence of controls and regulations. It is estimated that the flow of e-waste to West Africa will increase as regulations in Asian countries are tightened (Lundgren 2012).

E-waste recycling is flourishing in many parts of the world. South Asia and Southeast Asia appear to be major regional destinations, including, but not limited to, China, Hong Kong, India, Pakistan and Vietnam. In West Africa, common, but not limited destinations are Ghana, Nigeria, and Benin among others.

The Internet market for used electronic items in China



Sources: Alibaba.com, based on a study by Philippe Rivière, François Sermier and Ieva Rucevska, GRID-Arendal 2015

Costs

The treatment and disposal of waste, both non-hazardous and hazardous, may be subject to high environmental standards. On one hand, waste can have a positive value: for instance, it can be sold to recycling plants or incinerators. On the other hand, some waste only represents a negative economic value for its owner, who has to bear the costs of treatment (Albers 2014). As a consequence, illegal traffic of waste increases when circumventing regulations is financially more attractive than complying with them.

Illegal disposal of waste can offer savings of up to 200 to 300 per cent, compared to legal and safe disposal of the same waste (Baird *et al*. 2014). In terms of trade in regular commodities, a producer provides goods and, in return, receives a payment. In the trade of waste, the structure is different. In some streams, the waste generator provides both the product (the waste) and the payment. Before it is traded forward, waste can be turned from negative to positive value through receiving first-level treatment, such as sorting out, dismantling, washing, and pulping. Waste generators might be municipal waste services or corporations. They are followed by a complex structure of waste brokers, dealers, sellers, and recyclers who put the waste into a new market where there is a demand for it. This way the negative value of the waste is turned into a positive value, as it becomes a commodity in demand.

Drivers for the illegal trafficking of hazardous waste

Plastic waste is one of the main waste streams, involving a variety of different plastics that are recycled primarily in Asia. The movement of plastics across internal and external borders in the EU has increased considerably over the past years. According to research, it increased by a factor of five during the years 1999 to 2011 (Baird *et al*. 2014). This trend is partly driven by EU waste legislation, but also by the demand for the secondary materials. According to research done by IMPEL, 100 out of 1 011 detected illegal shipments in European countries participating in the 2012-2013 study were illegal shipments of plastic wastes. Asian traders are eager to acquire waste plastics from Europe for recycling and are offering about USD 150 per tonne.[14] This leads to waste of marginal quality being exported, as the product is priced by quantity rather than quality. European inspections indicate that plastic cargos often violate shipping regulations, either due to low-quality content, illegal country of destination, or incorrect documents.

E-waste is another clear example of waste that can be turned into a positive value. Electronic products contain precious metals, such as copper and gold, which can be re-used. The owner/producer of the waste can pay a waste broker to take the waste off his hands for further recycling. Waste brokers maximize their profit through getting paid first by the player disposing of the waste and second by the player who buys it as a reusable commodity. The producer of the waste often does not know whether the waste will be handled in accordance with regulations, since there is no clear mechanism for following this up (Baird *et al*. 2014).

Regulatory controls are often applied to organizations involved in physical production, storage, transport, treatment, and disposal of waste. However, waste brokers do not come into contact with the waste, and their role in illegal activities is particularly difficult to ascertain. Reported prosecutions point to few waste brokers being sanctioned for illegal waste activities. Analyses show that the opportunity structure is conducive to environmental crime in many ways. Most offences take little effort, chances of detection are low, rationalizations are easily found, and saving compliance costs is an attractive reward for non-compliance (Baird *et al*. 2014).

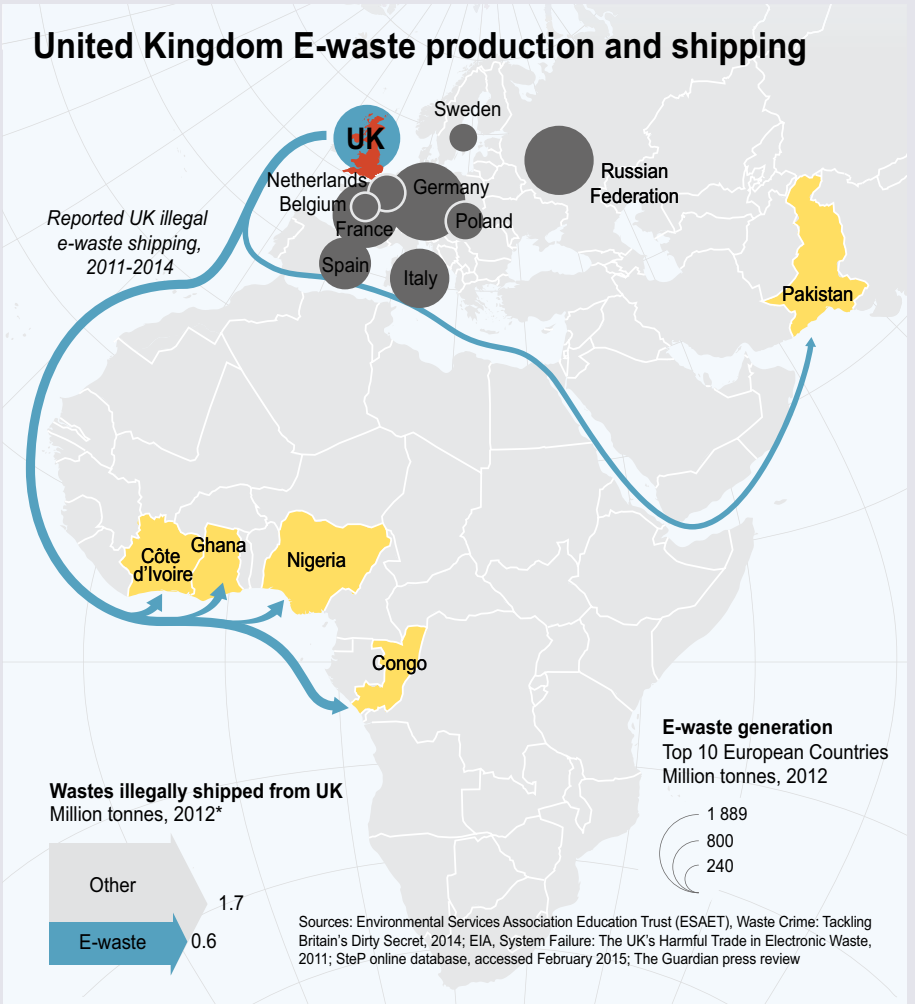
The main drivers of the trade in hazardous waste appear to be the high costs of proper treatment and the opportunities for illegal actors to operate in a market with relatively low risks and high financial benefit. In addition, low shipping costs and demand for certain types of used goods and constituents in some countries can be a driver for the illegal export of waste to developing countries (Bisschop 2012). A study commissioned by the US EPA found that it was ten times cheaper to export e-waste to Asia than to process it within the country (Lundgren 2012). According to the Italian NGO Legambiente, Italian companies have to pay about USD 64 000 to dispose of a container of 15 000 tonnes of hazardous waste legally (Ciafani 2012). The same amount of waste can be disposed of illegally for USD 5 000 through informal businesses shipping the waste to Asia. The number of illegal waste shipments to Asia is increasing (Lundgren 2012) in some countries, due to weak legislation with no specific criteria and regulations and to lack of enforcement capacity. As local governments in southern China strengthen environmental regulations, the problem simply relocates to northern parts of the country and

14. This price includes logistical costs such as transportation and freight.

UK case: export of illegal e-waste

In England, the first case where anyone was sentenced to jail for illegal export of e-waste was concluded in May 2014. A licensed waste processor was jailed for 16 months by a court in the UK for illegally exporting 46 tonnes of hazardous electrical waste to Nigeria, Ghana, and other destinations in Africa. Investigators found the defendant had been collecting e-waste from a number of council-run sites in the London area and taking it to his licensed waste premises. Instead of processing the e-waste properly, he sold and loaded four containers of items – including cathode ray TVs and fridge freezers with ozone depleting substances – to brokers and shipping firms who then exported the waste to West Africa. He loaded items at the front of the containers that appeared to have been tested properly for functionality and even put "testing labels" on them. On inspection these items were found not to work despite the labels suggesting otherwise. Further into the containers the "testing labels" disappeared and none of the items were protectively wrapped. Almost half the items tested from each container failed. The Environment Agency (EA) calculated that the defendant made a profit of about USD 12 000 on each container. The Agency said that such export trade is not a victimless crime. The containers contained a variety of hazardous materials and ozone depleting substances that can have serious detrimental impacts on health and the environments of the receiving countries if not recycled in an environmentally sound manner. The defendant was a repeat offender. In 2012, following a three-year investigation by the EA, the defendant and a number of other waste traders, processors, and shippers were convicted and fined a total of more than USD 30 000 for activities associated with illegal waste exports. The defendant was in the process of appealing his original fine when he was caught committing this second offence.

Source: https://www.gov.uk/government/news/waste-dealer-jailed-for-16-months-after-dangerous-shipments-stopped-at-port



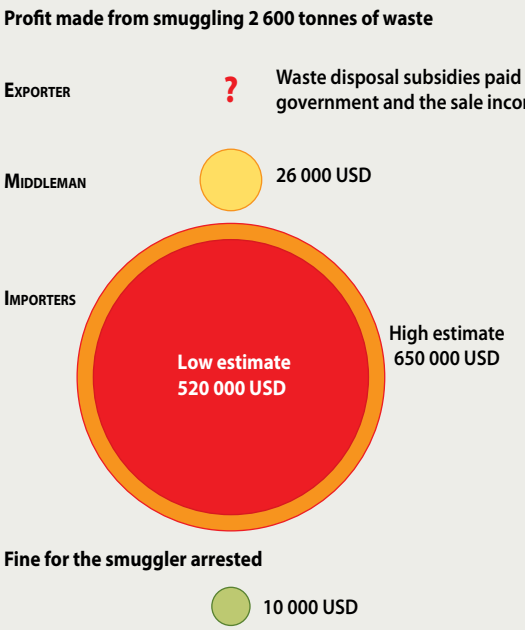
to other Asian countries. Hong Kong Special Administrative Region (SAR) functions as a gateway into China for waste shipments. From there, containers are shipped to smaller ports in China (Lundgren 2012). (See the following chapter)

The illegal treatment of hazardous waste has evolved over the past decades. Between 1970s and 1990s, toxic waste and nuclear waste in barrels were being dumped in the high seas or on land, typically in developing countries. Since the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter came into force in 1975, this trend appears to have slowed down. Later the Bamako Convention prohibited the dumping at sea of hazardous wastes. However, due to the shady nature of such dumping activities, it is difficult to know whether and to what extent this is still happening. There are indications that the waters around the Horn of Africa have been used as a dumping ground since the London Convention came into force (SomaliaReport 2011). Several reports refer to incidents of Italian shipments of toxic or nuclear waste to Somalia and other African countries in the 1990s (Greenpeace 2010). According to Greenpeace (2010) there were 94 attempted or actual cases of hazardous waste exports to Africa between 1994 and 1998 involving over 10 million tonnes of residues, including radioactive material. The Ecologist reported in 2009 that 35 million tonnes of waste have been exported to Somalia for USD 6.6 billion (The Ecologist 2009). According to a UN Security Council report there are claims from reputable sources of toxic waste in recent years being dumped in the waters off Somalia, although there are no official sources to back up these statements (2011). The security situation in Somalia hinders proper investigation of such claims. Nonetheless, UNEP has reported that, after the tsunami in 2004, dozens of containers containing hazardous waste were washed up on the shores of Somalia without any trace of where and when they had ended up in the sea. As a consequence, local people suffered serious health problems, such as acute respiratory infections, dry heavy coughing and mouth bleeding, abdominal haemorrhages, unusual skin conditions, and sudden deaths. In addition, fishers have complained about depletion of fish stocks, believed to be a consequence of toxic waste in the water (UNEP 2005).

The case of dumping hazardous waste in the waters around the Horn of Africa shows some of the serious long-term environmental effects on the local and global environment associated with the illegal handling of hazardous waste.

High profit, low risk

A case of importing municipal solid waste to China, 2013



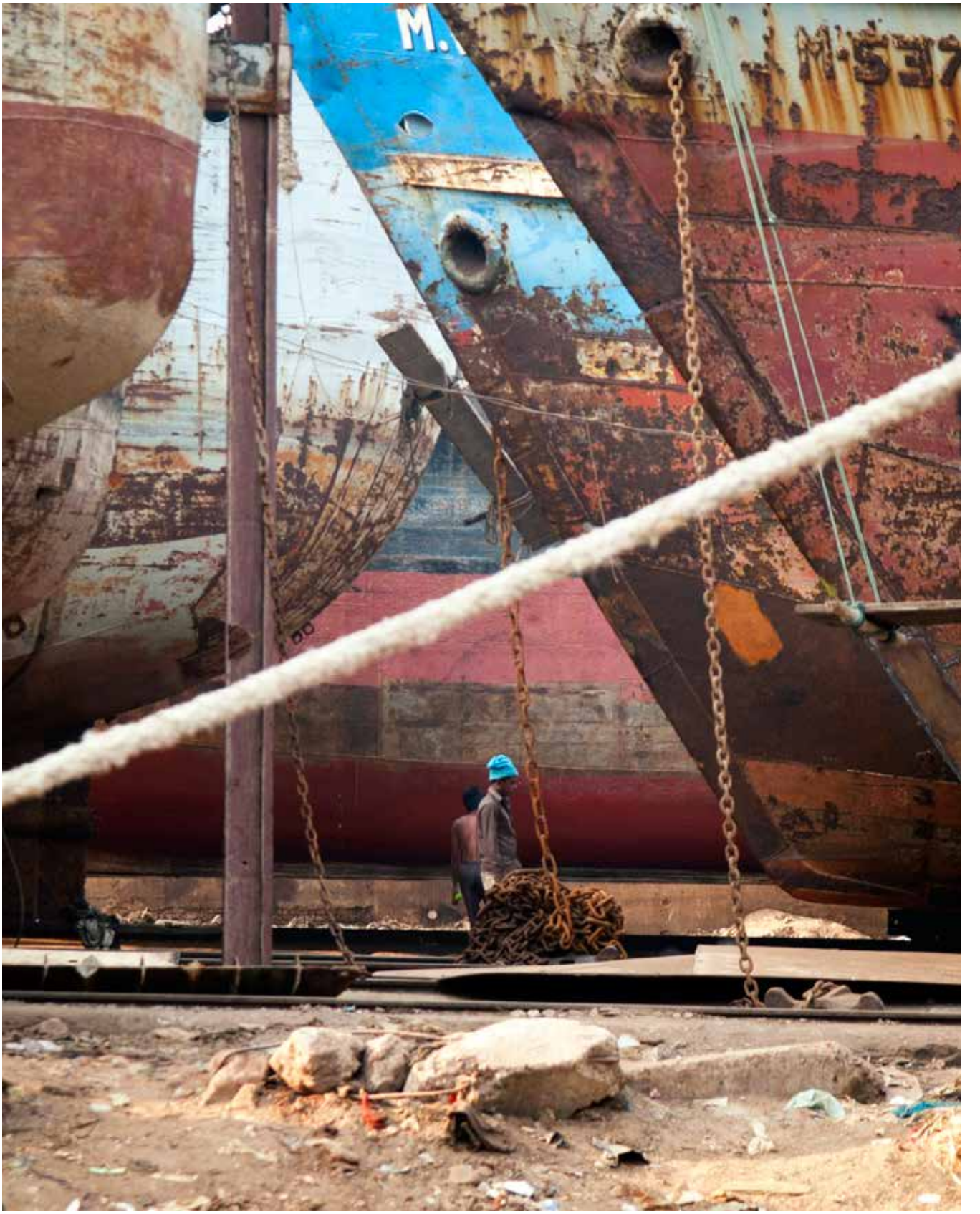
Source: Source: http://www3.customs.gov.cn/publish/portal0/tab49589/info434014.htm (in Chinese); http://www.hjysh.cn/_d276234610.htm

Different streams, different profits

Shipbreaking

Shipbreaking – the dismantling of end-of-life vessels for the recovery of steel and other materials – takes place mainly within five countries: India, Pakistan, Bangladesh, China, and Turkey. India and Bangladesh dismantle more than two-thirds of the global total of end-of-life vessels annually.[15] End-of-life vessels are considered hazardous waste under international environmental law when they contain toxic materials, such as asbestos, polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), organotins like tributyltin (TBT), and heavy metals. According to the provisions of the Basel Convention, these wastes must be managed in an environmentally sound manner. Used oils, slops, and sludges also require special consideration.

15. Shipbreaking Platform. [Online]. http://www.shipbreakingplatform.org/

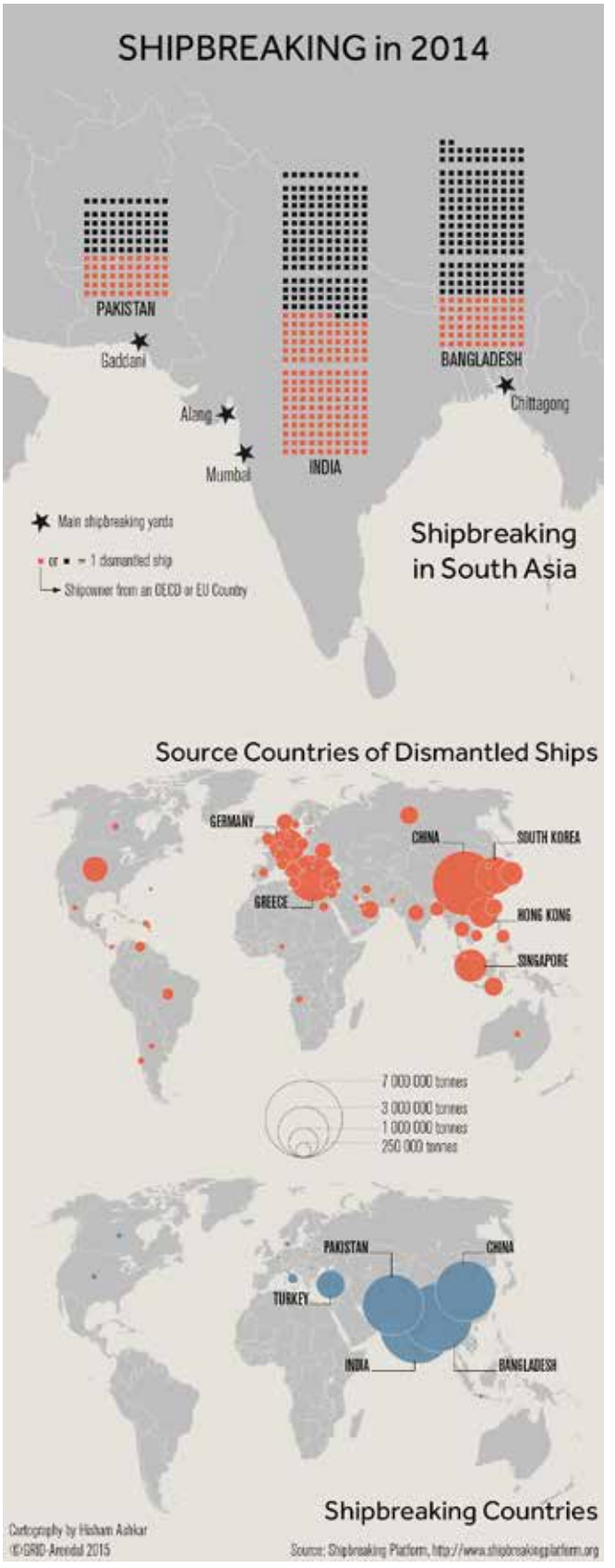


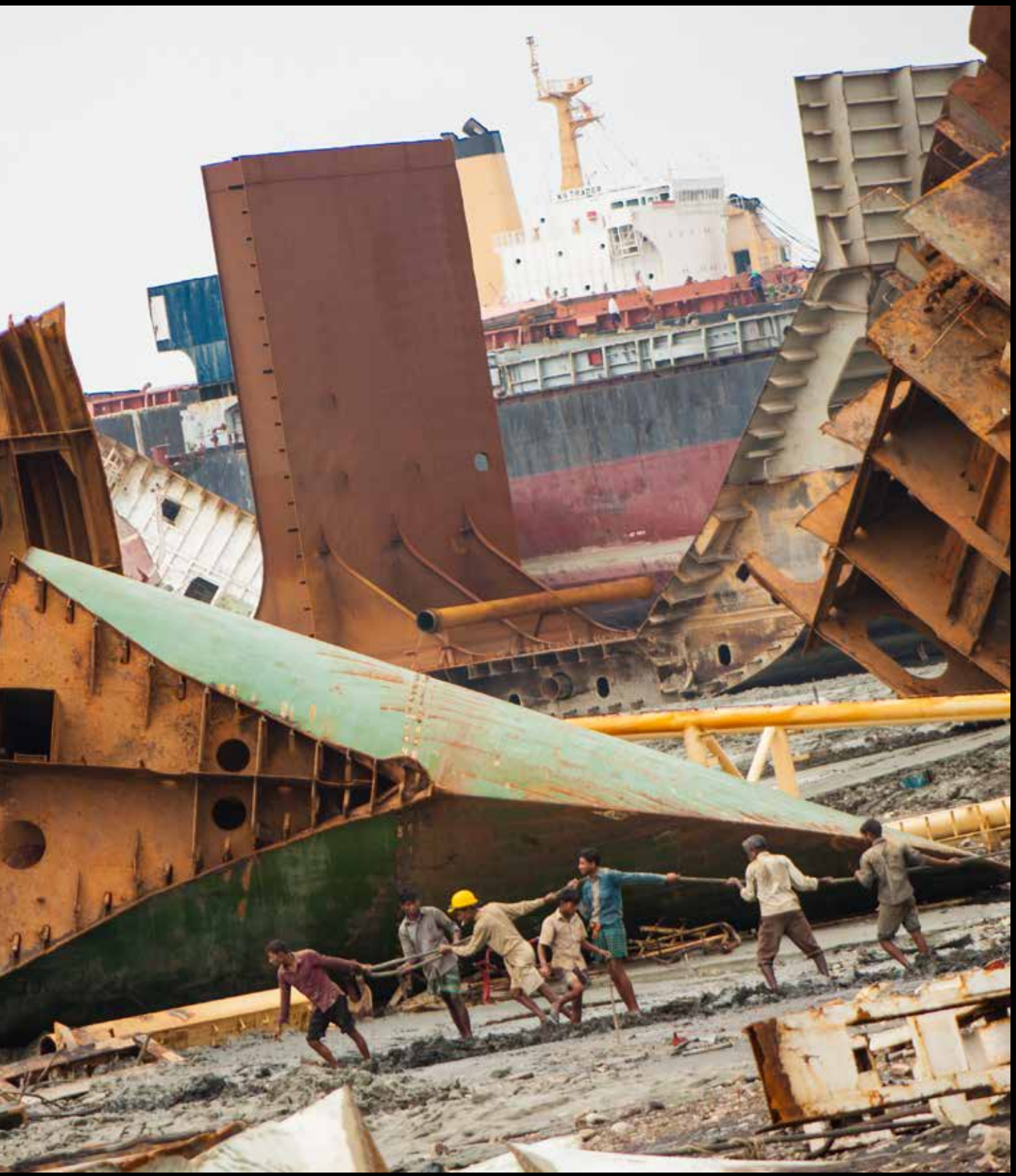
The shipbreaking business is driven by economic factors. One factor is the supply of end-of-life vessels, which has surged in recent years. This is due to higher environmental standards applied to the shipping industry, modernization of fleets to increase efficiency, and the recent phasing out of single-hull oil tankers, as well as a drop in freight rates since 2009 due to the economic downturn. For some ship owners it made more sense economically to send ships for dismantling rather than keeping them in service. Despite the increased supply of vessels for demolition, the price offered by ship recycling facilities has risen in some cases. Shipbreaking companies can offer approximately USD 400 per tonne (LDT) to ship owners for dismantling their ships, although this price varies between recycling locations. According to a report by Robin des Bois, an NGO monitoring the shipbreaking business, prices in China have dropped to USD 320 per tonne (LDT), while they are on the rise in southern Asia, with prices as high as USD 500 per tonne (LDT) being offered in Bangladesh and India (2014). The growth of the shipbreaking sector in South Asia is linked to the growing demand for steel. Depending on local and global steel prices, the scrap steel recovered in

Goodbye, Exxon Valdez

The famous former oil tanker, which in 1989 was responsible for leaking more than 41 million litres of crude oil into Alaska's Prince William Sound, is now history. After the accident, the Exxon Valdez was converted into an iron ore carrier, and it was most recently renamed the Oriental N. In the spring of 2012, Priya Blue, an Indian scrapping and salvage company, bought the freighter for USD 16 million solely for the purpose of scrapping it. The ship was grounded at high tide on the beach at Alang in India. There, at the world's largest graveyard for ships, more than 300 workers were paid a few rupees a day to dismantle the vessel.[16]

16. Der Spiegel Online (2013). Booming Scrap Business: Ship-Breaking Lessons from the Exxon Valdez. [Online]. 14/02/2013. Available from: http://www.spiegel.de/international/business/global-ship-breaking-business-booms-as-container-industry-suffers-a-883122.html





the shipbreaking yards is sold on domestic markets in India, Bangladesh, and Pakistan or exported to world markets, such as the European Union.[17] Recycled ships supply nine per cent of the demand for steel in India.[18] In Bangladesh, the demand for steel is 5 million tonnes annually, and recycled steel from shipbreaking accounts for the majority of this. The country does not have any iron ore resources or mines, which makes ship-scrapping an important source of raw materials.[19]

The illegally earned profits from shipbreaking have been estimated at more than USD 2 100 000 per ship in some cases, although this number varies depending on the characteristics of the ships. The calculation involves the price for the metal, as well as the profit saved from not scrapping ships in compliance with regulations. In 2014, for example, the Athens Trader, a 10 317 tonne container ship, was reported to have been bought by an Indian shipbreaking company for USD 495 per tonne, which amounts to USD 5 106 915 in total (Robin des Bois 2014).

Shipbreaking facilities in South Asia have a bad reputation in terms of adhering to environmental and occupational safety regulations. There are regulations for ship recyclers in India and Bangladesh, but implementation is weak. The Hong Kong International Convention for Safe and Environmentally Sound Recycling of Ships (2009) has not yet entered into force. It requires ship owners to prepare inventories of hazardous materials on board their ships and provides for matching the ship with a facility authorised to manage it. Some shipbreaking yards and ship owners are already abiding by the Hong Kong Convention, but the standards in many shipbreaking facilities are still not adequate. Beaching, a method used in several places in South Asia, consists of demolishing ships directly on the beach, often without proper structures to ensure full containment of pollutants, hazardous waste management, and protection of workers' health and safety. The shipbreaking industry is responsible for numerous preventable accidents, work-related illnesses, and loss of human lives, as well as the distribution of hazardous materials and pollution of the marine and coastal environment. Ship owners and the global maritime industry, mainly located in industrialized countries, effectively externalize the real costs of clean and safe recycling to South Asian countries, where laws assuring environmental protection and workers' health and safety may not be effectively enforced.[20]

17. NGO Shipbreaking Platform. [Online]. http://www.shipbreakingplatform.org/

18. Der Spiegel Online (2013). Booming Scrap Business: Ship-Breaking Lessons from the Exxon Valdez. [Online]. 14/02/2013. Available from: http://www.spiegel.de/international/business/global-ship-breaking-business-booms-as-container-industry-suffers-a-883122.html

19. Ship Breaking in Bangladesh (2012). Benefits from Ship breaking. [Online]. Available from: http://www.shipbreakingbd.info/Benefits.html

20. NGO Shipbreaking Platform. [Online]. http://www.shipbreakingplatform.org/

Waste electronic and electrical equipment (WEEE)

E-waste can be highly profitable. Individual shipments may potentially provide several sources of income. One is from waste collection on behalf of local authorities trying to achieve recycling targets or/and from companies obligated under the Producer Responsibility Regulations in the EU. A second income source can come from brokers abroad who buy the waste. Consumers deliver their old equipment for free to the municipality or to the retailer where they bought their new equipment. Local authorities and retailers bring their collected e-waste for free to the recycling facilities working for the producer responsibility scheme. Retailers and shops also sell the articles to traders for low prices. These traders make profits by re-selling or exporting the old stuff, mainly for re-use.

In the Netherlands, brokers can buy used televisions from shops for USD 4-5 each and sell them on in Africa for around USD 10 per unit. Assuming a container can take 700 televisions, the profit per container will total USD 3 500. Generally, e-waste can produce returns of around USD 500 per tonne. Unfortunately, limited work has been done to quantify the economics of illegal e-waste exports on a large scale (INTERPOL 2009).

The consumption of electronic products is high in developed countries. The European Union has produced 6.5 million tonnes of e-waste annually since 2008, and this figure is expected to reach 12 million tonnes in 2015. Moreover, emerging economies are increasingly consuming large numbers of electronic goods. In China, 73.9 million computers, 0.25 billion mobile phones, and 56.6 million televisions were sold in 2011. China generated an estimated 1.7 million tonnes of e-waste in 2006, a number expected to rise to 5.4 million tonnes in 2015. In addition to the rising level of domestically produced e-waste, e-waste is illegally exported to China from the EU, US, and neighbouring Asian countries (UNODC 2013, Wang *et al.* 2013), despite the fact that China has officially banned the import of e-waste.

The vast majority of illegal e-waste ends up in landfills, incinerators, and in ill-equipped recycling facilities. The waste is dumped in areas where local residents and workers disassemble the units and collect whatever is of value and can be re-used or resold. What is not reusable is simply dumped as waste, creating immense problems and leading to what has been described as a "toxic time bomb" (INTERPOL 2009).

Collecting from the waste stream, or scavenging materials from waste and recycling, is an important economic activity that provides income for more than 64 million people in the developing world. In 2001, it was a USD 5.7 billion industry that was projected to grow to USD 14.7 billion by 2014. In Africa, most of this activity is situated within the informal economy (Grant and Oteng-Ababio 2013). The informal recycling industry in Ghana is reportedly the largest in Africa. About 40 000 tonnes of e-waste is imported into Ghana

annually. Collectors are the most vulnerable group within this sector due to their low incomes, which range between USD 70 and 140 a month. Refurbishers make about USD 190 to 250 a month, while recyclers get USD 175 to 285 a month. However, the amount decreases if the supply of e-waste is hindered. Children, mostly boys, work on e-waste sites. The children are generally self-employed and earn, on average, less than USD 20 per month (Lundgren 2012).

In Nigeria, the monthly income of collectors and recyclers of e-waste ranges from 1 000 to 15 000 Naira (USD 6.70 to 100). Collectors who have enough financial resources to buy obsolete devices and components have a significantly higher income than collectors who are reliant on freely available waste. In the refurbishing sector, three major types of income groups can be identified: workshop owners, employees, and apprentices. While workshop owners often achieve a net income in a range of 30 000 to 100 000 Naira (USD 200 to 670) per month, employees usually receive a monthly salary ranging between 10 000 and 15 000 Naira (USD 67 to 100). Apprentices do not receive a monthly salary but are often granted some money to cover food and transport. In addition, apprentices usually receive some capital at the end of their two- to five-year learning period to assist them in starting their own businesses (Öko-Institut e.V./Basel Convention 2011).

Guiyu, one of the largest e-waste recycling centres in China, treats over 20 million tonnes of e-waste annually, and the recycling output reached about USD 127 million in 2004 (Chi *et al.* 2011). In Guiyu, the illegal processing of e-waste has led to growth in the local economy. Work in the informal e-waste treatment sector is favoured over factory employment as people have more freedom and control over their work (CNN 2013).

However, this short-term economic development is compromising the state of the local environment and the health of inhabitants in Guiyu. Studies by the Shantou University Medical College revealed that children in Guiyu had higher-than-average levels of lead in their blood. Lead can stunt development of the brain and central nervous system (CNN 2013). About 80 per cent of children in Guiyu suffer from respiratory diseases. There has been a surge in cases of leukaemia in children and a high incidence of skin damage, headaches, vertigo, nausea, chronic gastritis, and gastric and duodenal ulcers (Lundgren 2012).

Toxins in electronic equipment leak into the soil and water from landfills and into the air through the burning of waste. These toxins accumulate in the food chain, especially in animal tissue but also in plants growing in the area. Recent discoveries of high levels of cadmium in rice can be attributed to the dumping of toxic waste. Reports from Guiyu say that some local residents are afraid to drink the water and eat rice grown in the area (CNN 2013).

Ozone Depleting Substances

Ozone Depleting Substances (ODS) are banned under the Montreal Protocol. Since 2001, they have been gradually phased out of the production of refrigerators, air conditioners,

Case study

In July 2012, the Spanish state prosecution unit SERPONA conducted a raid on a Spanish company located in Las Palmas, Gran Canaria. The company was found to be in possession of more than 30 cylinders, 1 000-kg size, of HCFC-22. Smaller cylinders, including the banned 13.6-kg cylinders, and refilling equipment were also found. Photographic evidence also shows a suspected import of HCFC-22 in an ISO tank. The HCFC-22 had originally been imported into Spain using quotas given to companies that are allowed to sell HCFCs to fishing vessels. SERPONA's operation involved large-scale surveillance and telephone tapping, which revealed that the company involved had been decanting HCFC-22 into smaller cylinders. It appears that another company was also involved in helping to declare the HCFC-22 as recycled, so that it could be sold on the internal market. This black market trade was profit-driven, as the EU ban on the use of virgin HCFC-22 had driven the price of recycled HCFC-22 from USD 3-4 per kg to USD 25-40 per kg.

Source: EIA (2014).

and other equipment in the EU. Electrical equipment that previously used ODS can now use alternative chemicals that are far less damaging to the environment. However, the use of ODS in developing countries increased by 11 per cent in 2011-2012, and illegal use and smuggling of ODS seems to be increasing (EIA 2014). The lifespan of appliances, such as refrigerators and air conditioners, can be long, and second-hand appliances are exported to developing countries. These appliances can be retrofitted to use ODS substitutes, but this is costly at about USD 100-200 per unit.

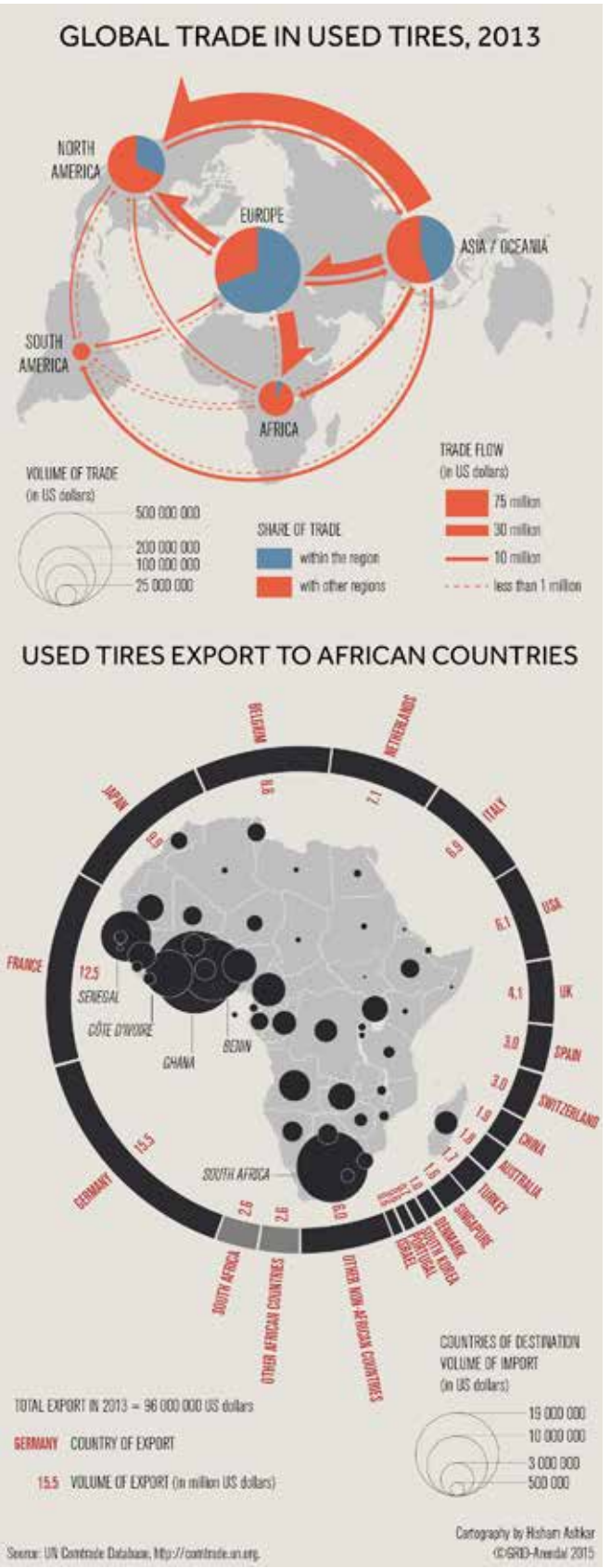
During the first phase of illegal trade of ODS in the mid-1990s, it was estimated that up to 38 000 tonnes of CFCs were traded illegally every year, equivalent to 20 per cent of the legal CFC commerce and worth up to USD 500 million. At that time, a single shipping container of CFCs smuggled into the United States could yield profits of USD 250 000 due to price differentials between the amount paid for CFCs in countries like China or Russia and the high market price in the United States, resulting from import taxes.

As the initial phase-out controls came into force in developing countries in 1999, incidences of illegal trade began emerging, especially in South Asia and East Asia. By 2005, contraband ODS had been seized in India, the Philippines, Indonesia, and Thailand, with China being the main source. By 2006, UNEP estimated that up to 14 000 tonnes of CFCs, worth up to USD 60 million, were being smuggled into developing countries each year.

By 2006, smuggling of ODS into Europe and the United States had declined, but it had increased in developing countries. The current magnitude of the flow of illicit ODS in East Asia and the Pacific can be estimated from the analysis of seizure data. The Sky-Hole Patching Operation in East Asia between 2006 and 2010 conducted 51 seizures of illegal ODS totalling approximately 730 tonnes – an average of 183 tonnes seized per year.

Based on an estimated five per cent seizure rate, this would translate into 3 660 tonnes of illegal ODS flowing from and within the East Asia region yearly. Based on a range of sources, the price of CFCs and hydrochlorofluorocarbons (HCFCs) in China is between USD 2.5 and USD 4.5 per kg. In Europe and the United States, the market price for CFCs and HCFCs from China varies from USD 9 to USD 31. An average would be USD 18.5 per kg. Based on the flow volume of 3 660 tonnes per year from East Asia and average gains of USD 18.5 per kg, the total value is around USD 67.7 million per year (UNODC 2013).

The global demand for hydrochlorofluorocarbon (HCFC) will be approximately three times greater than chlorofluorocarbon (CFC) production at its peak. It is predicted that the scale of illegal HCFC trade will likely be larger than that seen with CFCs (EIA 2014).



Tires

The global trade in used tires is quite extensive. Part of the flow is legal trade, and part of it is illegal. The IMPEL research uncovered 25 illegal shipments of tires from European ports in 2012-2013.

The UK has done some research on what happens to used tires and found that, in 2010, the main end uses for waste tires in the UK were: recycling (32 per cent); energy recovery (20 per cent); landfill engineering (16 per cent); re-treading (12 per cent); and other uses, such as silage clamps and dock fenders (20 per cent). Excluded from these end uses are exports and tires handled illegally, estimated at around 10 per cent of all used/waste tires. These tires are discarded through illegal baling, unregistered storage and abandonment, in illegal landfills, burning, and illegal export of used tires unfit for use in the UK (Environment Agency UK 2012). The tires end up in developing countries where there is a demand for cheap second-hand tires for use on vehicles. Such tires are often worn out and not in line with safety regulations in developed countries, and they quickly become useless and are dumped as waste. Moreover, driving with worn-out tires can be dangerous in traffic.

The market for second-hand tires results from the need to remove tires from tire retailers or end-of-life vehicle (ELV) dismantlers. A range of upstream operations are involved, including collection, sorting, and reprocessing. A study conducted by the Environment Agency suggested that, while tire crime can appear anywhere along the activity chain, it often begins with illegal collection (2012). Incentives include convenience, opportunism, market dynamics/demand, and low risks, but primarily financial gain. These motives are confirmed by wider EU-level intelligence (e.g., from Europol), which indicates that key factors are a perceived low level of risk, the simplicity with which profits can be made, lack of traceability of the tires themselves, and lack of visibility of enforcers (Environment Agency UK 2012). The EA study also noted that where limited treatment options are available and collection costs are higher, there is a greater risk of illegal collections taking place, as they offer businesses an opportunity to cut costs. Most importantly, illegal tire collections undermine legitimate operations by forcing them to reduce their prices in order to remain competitive Baird *et al.* 2012.

As is the case with other waste streams, the cost associated with proper treatment of used tires is high enough to stimulate the evolution of a black market. The cost of disposing of a car tire in the UK is in the region of USD 2 per tire. The Environment Agency has advised that tire fitters should stay clear of contractors offering a lower price for discarding tires as it is likely suspicious (BBC 2011). There are risks connected to tires ending up in landfills as well, since they can feed fires that are difficult to control. In tropical countries, the dumping of tires in landfills can lead to the spread of mosquito-borne diseases since water-filled tires are perfect for mosquito breeding. It is believed that the spread of Aedes albopictus, a mosquito native to subtropical climates but now found in many countries, is due to the global trade of tires.

New guidelines on used and retreaded tire trade in Brazil

Brazil banned the import of all used and retreaded tires in 2000. With this restriction in place, Brazil´s tire ban became a regional trade issue as it was against the Common Market of the Southern Cone (Mercosur) law that regulated the regional market in Argentina, Brazil, Paraguay, Venezuela and Uruguay. It has sparked a wide discussion among the neighbouring countries, and Brazil was accused of violating the regional trade agreement. However, Brazil argued that its measures were justified for environmental reasons, such as abandoned tires ending up in landfills and illegal dumps, causing threats to human health by increasing the risk of the spread of tropical diseases. In 2004, the ban was still valid, but a new federal measure[21] provided one broad exemption that allowed Mercosur countries to trade in used and retreaded tires among themselves (ICTSD 2010). The ban was now specifically restricted to trade with the European Union (The Star 20017), triggering a new wave of criticism from the World Trade Organization and the EU.

Environmental and public health arguments were used as the main defence of Brazil´s measures. It has led to a discussion with the Basel Convention Secretariat. As a result Brazil and the Basel Secretariat are working on guidelines for the environmentally sound management of used tires, which will help tropical countries in particular in regulating the used tire trade.

21. Ministério Do Desenvolvimento, Indústria e Comércio Exterior, Secretaria de Comércio Exterior (2014). Portaria SECEX 14/2004. Available from: http://www.mdic.gov.br/arquivo/legislacao/portarias/secex/2004/prtsecex14_2004.pdf

Cross border movement and routes

Smuggling, from small-scale to large, occurs all over the world, from waste tourists in northern Scandinavia to major smuggling hubs in South Asia. Shipping is the main route for overseas transportation, with millions of containers crossing borders. Control over the main ports in Europe, Africa, and Southeast Asia is limited. Thousands of containers arriving in Southeast Asia are not claimed, which suggests that they might contain hazardous waste. Over time, this could cause serious problems for the environment and human health.

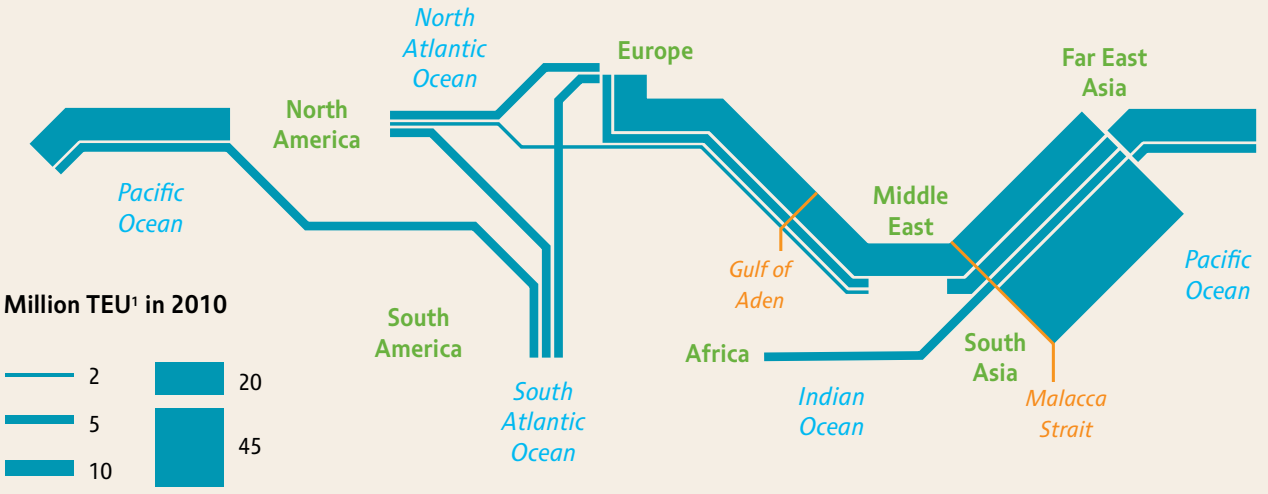
Waste shipment routes

Over the last few decades, cross-continent transport has increased markedly in volume with new intermodal haulage methods, such as containerization (the transport of containers using multiple transport modes, such as rail and truck). The standardization of container dimensions has made this possible. Containerization has been a major element in globalization by making it possible to link different parts of the globe. In 2009, approximately 90 per cent of non-bulk cargo shipments were moved by containers on board ships (Ebeling 2009). The rise of the shipping container has changed the trading fortunes of entire regions. The shipment of non-hazardous waste from developed to developing countries takes place largely via shipping containers. The scale of waste exports and the routes used closely track the major global shipping routes.

Ships transporting goods from Asia to Europe offer cheap freight rates on the return leg, as the demand for European products in Asia is low and ships want to avoid shipping empty containers. The disparity between Chinese domestic capacity and domestic supply of resources has resulted in an increase in commodity prices, which underpins the trade in non-hazardous wastes within and outside Europe. This change largely coincides with increasingly challenging recycling targets in Europe, leading to an increased supply of recyclable waste.

Broadly speaking, there is a hierarchical arrangement of ports within Europe, with large-scale load centres and secondary feeder-port facilities. The large ports also have an extensive network of land (rail and road) and inland-water feeder services. In northern Europe, larger ports – such as

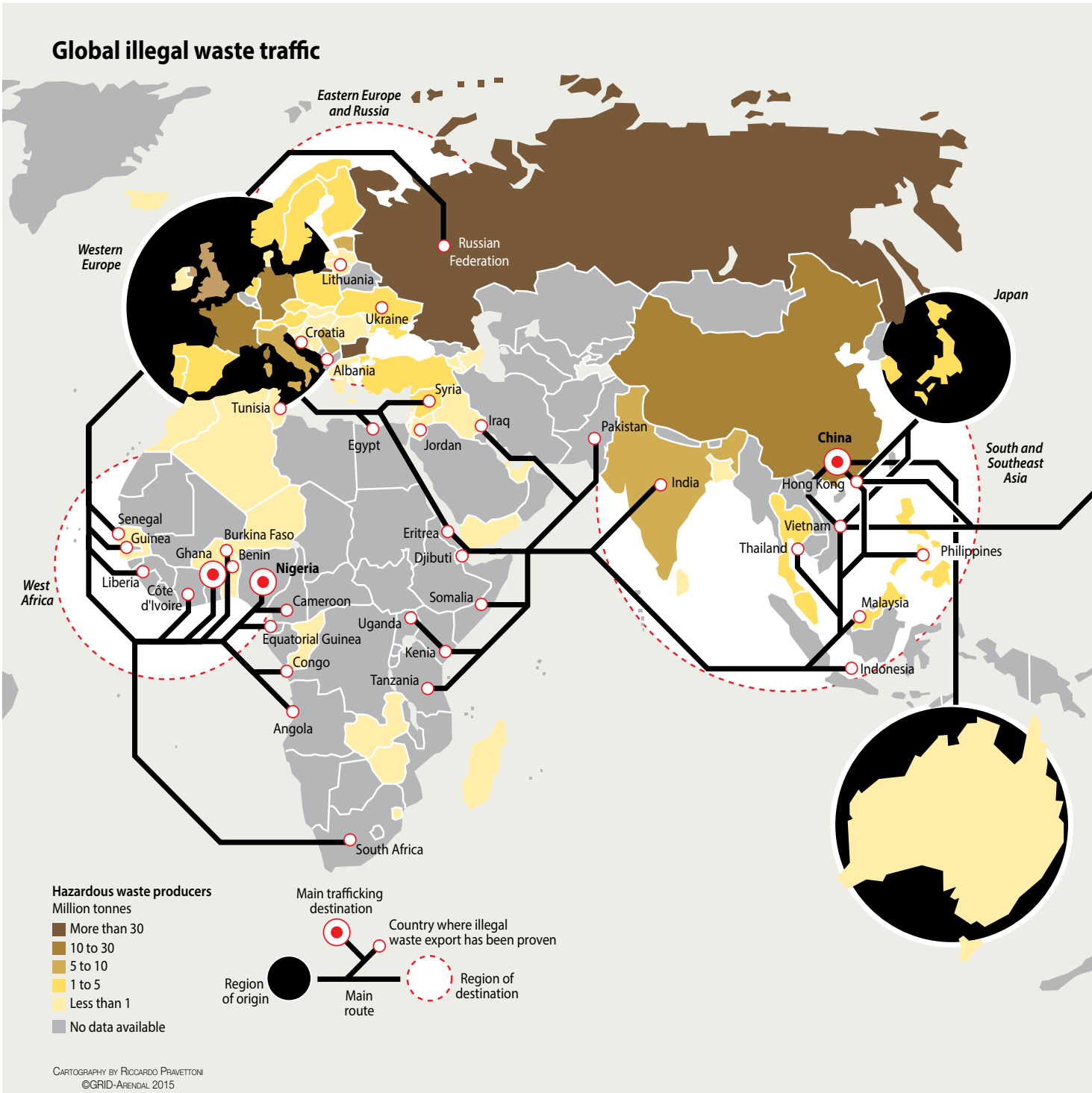
Main container shipping routes



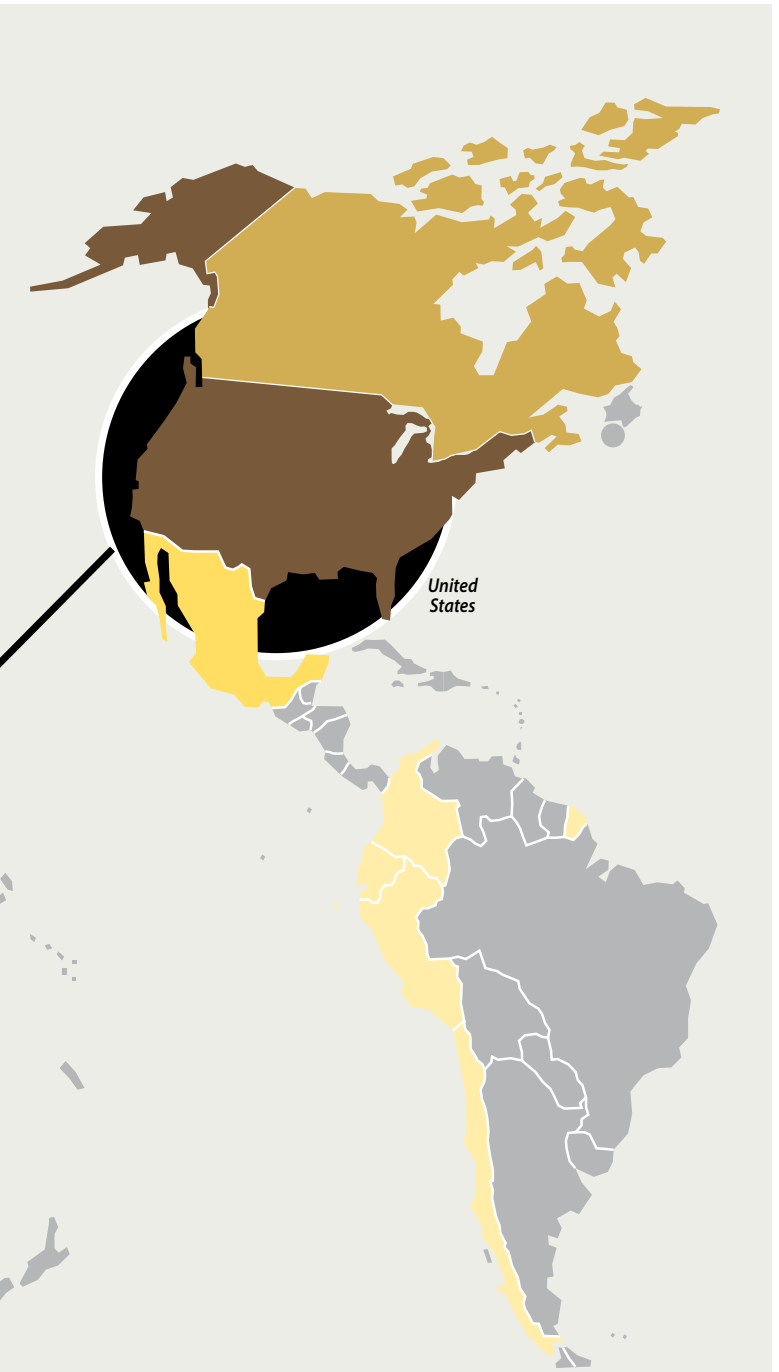
1. TEU (Twenty-foot Equivalent Unit). This unit is used to describe the capacity of container ships and container terminals, based on the volume of a 20 or 40 foot-long shipping container. The container circulation less than 1 million TEU is not represented on the map.

Sources: Lloyd's Register and Maritime Strategies International Ltd.

Map reproduced by courtesy of Philippe Rekacewicz - http://visionscarto.net



Rotterdam in the Netherlands, Antwerp in Belgium, Bremen and Hamburg in Germany – play a key role in transhipment operations for Western Europe, the Baltic States, and Scandinavia. Container ships call at a series of major European ports (e.g., Hamburg to Rotterdam to Antwerp to Le Havre), picking up containers with waste cargoes along the way before leaving Europe. In the Western Mediterranean region, the hub-feeder container ports and short sea shipping routes developed to cope with the increase in demand and to connect with other European ports. Ports, such as Valencia and Barcelona, grew due to their significant hinterlands, despite their distance from the main shipping routes.



Sources: United Nations Statistical Division, 2011; UNODC, Transnational Organized Crime in East Asia and the Pacific, 2013; Impel-TFS, 2006, Threat Assessment Project, and WorldCustoms Organization (2009) Operation Demeter final report, supplemented with data from the Dutch national audit, appeared in the Coordinated audit on the enforcement of the European Waste Shipment Regulation

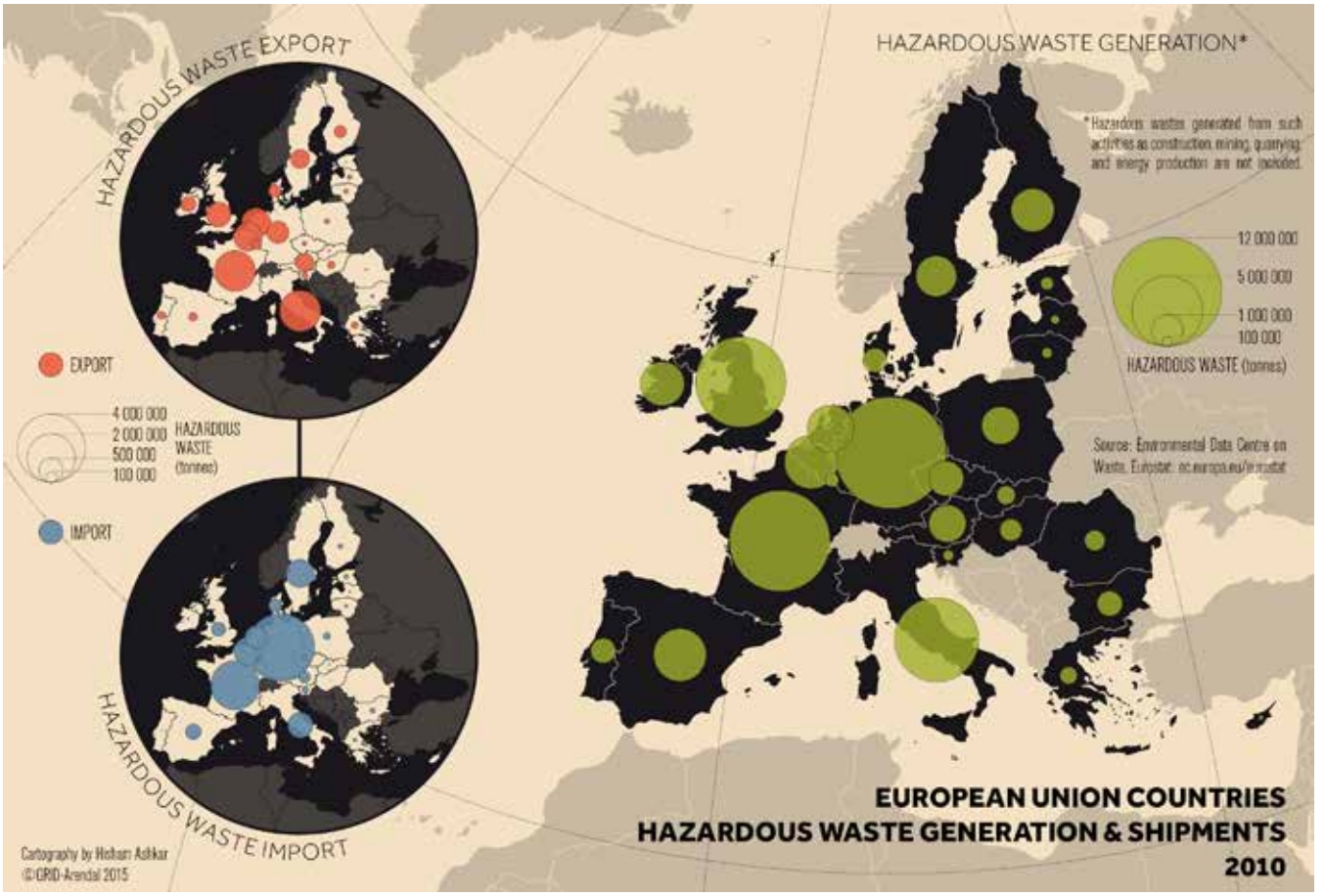
The volume of legal non-hazardous waste shipments across and out of Europe is difficult to track. EU member states are not required to record data on non-hazardous waste shipments, and, with the exception of a handful of countries, there is no requirement for exporters to inform environmental authorities of shipments prior to export. However, data suggest that total exports from the EU have increased considerably since 2000, with a small decline during 2008-2009 due to the economic downturn. Estimates suggest that almost half of all the plastic collected for recycling within the EU is exported, and that 87 per cent of this goes to China (Velis 2004). Figures from Scotland suggest that 73 per cent of shipments moving under "green list" controls are destined for China.[22] Seen from another perspective, the UK P&I Club's 2008 report (UK P&I Club 2008). estimated that a vessel loaded in the UK bound for China might have recyclable waste in up to 65 per cent of its containers. Although precious metal exports from the EU trebled between 1999 and 2011, most of this waste stream is traded within the EU. This is also the case for iron and steel scrap.

Illegal shipments of hazardous waste are increasing between northwest and northeast Europe, and waste is also shipped from south to southeast Europe and the Balkans (Romania, Hungary, and Albania). As revealed in European inspection data on intra-EU movements, such shipments include the export of tires, end-of-life vehicles and car parts, and e-waste by road and sea. Europe, North America, Japan, and Australia are the main points of origin of illegal waste shipments, with China, Hong Kong, Indonesia, India, Malaysia, Pakistan, Vietnam, Côte d'Ivoire, Ghana, Guinea, Nigeria, Sierra Leone, Tanzania, Togo, Benin, and Senegal being countries of destination.

The Suez route is the main trade route between Europe and Asia and has approximately 7.5 per cent of global trade passing through (Mærsk 2013). The route passes through such locations as the Strait of Malacca, Bab el-Mandab, and the Strait of Gibraltar. Cargo is picked up and unloaded at transhipment hubs, such as the Algeciras in Spain, Suez, and the Malacca Straits ports (such as Singapore and Tanjung Pelepas). These hubs are collecting points for regional cargoes and also connect to north/south routes. The seaports of the Yangtze Delta (e.g., Shanghai, Ningbo, etc.) act as gateways to the vast industries of their hinterlands, where processing of much of Europe's paper, cardboard, and plastic happens.

Hong Kong, the world´s fourth busiest container port, operates as a Special Administrative Region and serves as the transit port for waste shipments to China. Hong Kong requires permits from environmental authorities for the import, transhipment, and export of hazardous waste, contaminated waste, and any waste that is not intended for recycling. Shipping companies have become more cautious in screening suspicious shipments in order to avoid importing hazardous waste into Hong Kong. The number of cases of illegal importation of hazardous waste such as e-waste has dropped dramatically since 2008 due to enhanced control measures by the Hong Kong customs (Yu 2014). However, no permit is required for import and export of uncontaminated recyclable waste for recycling purposes, which means Hong

22. Scottish Environment Protection Agency (2014). Waste Shipment records.



Kong might still serve as a transit port for importing plastics, paper, metals, and hazardous waste.

According to the Ministry of Environmental Protection, China imported 54.85 million tonnes of waste in 2013. Three provinces, Guangdong, Zhejiang, and Jiangsu, are considered to be the top three destinations of large quantities of legally imported waste. All three provinces lie on the southeast coast of East China.

The amount of waste shipments from the US is also enormous. It was reported that 75 per cent of the aluminium scrap, 60 per cent of scrap paper, and 50 per cent of scrap plastic that US exports went to China (The Christian Science Monitor 2013).

In 2013, as a result of Operation Green Fence (see section on New Patterns below), China's authorities confiscated 976 500 tonnes of illegal waste material, and intercepted 221 instances of smuggling solid waste – including hazardous waste, used vehicle parts and tires, textiles, and e-waste – mainly from the US, Europe, and Japan.[23]

Smugglers collude with their overseas counterparts, who declare the items as "other articles" in order to get through customs checks and transport them to the Chinese mainland in large shipping containers. The items are sometimes hidden in other cargo and sent across porous border areas, such as those between China and Vietnam or the Beilun River and Beibu Bay in the Guangxi Zhuang autonomous region. In some cases, to avoid arrest, smugglers also traverse frontier areas in northeastern China instead of the more commonly used southeastern coastal areas.

The Indian subcontinent is also an important destination for European waste. Household recyclable streams, metals, textiles, and tires are exported to India and Pakistan. There is a significant trade in compressors to Pakistan. These should be depolluted prior to export, but waste operators seeking to avoid expense often omit this step.

Based on preliminary research on e-waste trafficking by UNEP in 2013, the EU, the US, Japan, and Korea were the main origins of e-waste shipments. China, India, Malaysia, Pakistan, and a few other countries were the main destinations.

23. China.org.cn (2014). Solid waste smuggling sees threefold rise. [Online]. 27/05/2014. Available from: http://www.china.org.cn/environment/2014-05/27/content_32499228.htm

To combat growing illegal waste imports, China launched Operation Green Fence in 2013 to strictly enforce its laws governing the import of waste. The main measures taken under Operation Green Fence include:

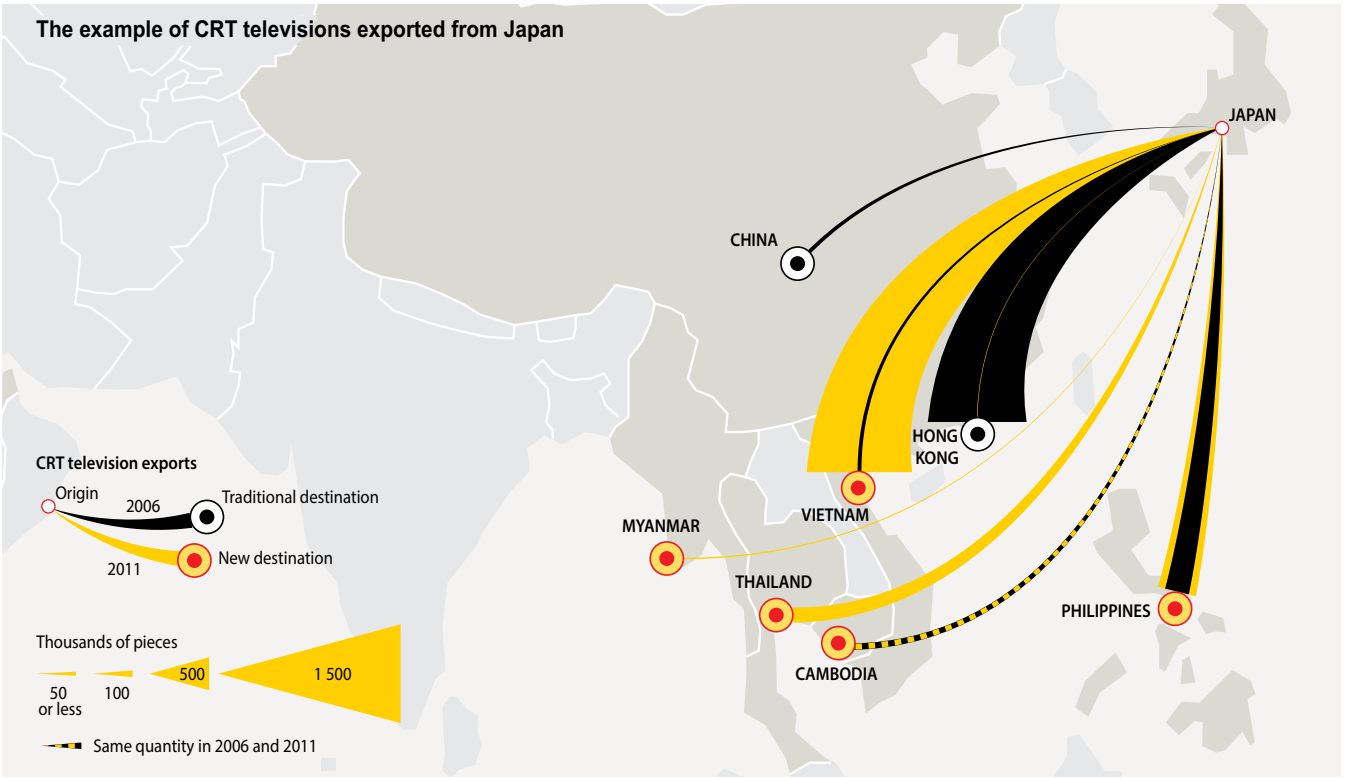
- Strengthened control of waste shipments on the exporting side
- Enhanced investigation and intelligence collection
- Improved multi-agency coordination and cooperation, including international cooperation with UNEP and the Basel Convention Regional and Coordinating Centres (BCRCs), and domestic coordination with Environmental Protection Agencies and The General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ).
- Organized training workshops
- Circulation of a technical document, Guidelines on Investigating Waste Cases

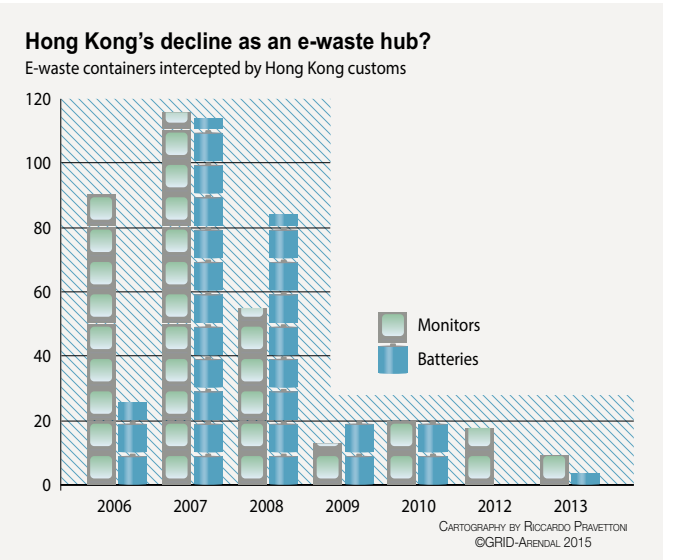
In 2014, seizures of illegal waste shipments in China decreased dramatically. China's customs authorities detected 68 cases, totalling approximately 213 thousand tonnes, in the first nine months of 2014. That was just one-quarter of the previous year's total. The decrease could be the effect of Operation Green Fence's strong enforcement campaign in 2013. It also means that the early routes of illegal waste shipments have changed.

The use of free ports is one of the key challenges in tackling the waste shipment chain. As a trade facilitation measure, many countries have free ports. Free ports, such as Hong Kong and Haiphong in Vietnam, do not levy customs tariffs on imports and exports other than liquors, tobacco, hydrocarbon oil, and methyl alcohol. Smugglers take advantage of free ports to traffic waste to mainland China or other countries, altering or forging trading documents, disguising transport routes, etc. Due to the loose control and relaxed policies applied in free ports, monitoring the shipments is difficult. As a result, large quantities of illegal waste shipments go through free ports, such as Hong Kong and Haiphong.

The ports of northwest Europe (for example, Tilbury and Felixstowe in England and Antwerp in Belgium) and of the Mediterranean are used to transport Europe's e-waste, shipped as second-hand electronics, and end-of-life vehicles to West Africa and Asia. E-waste is most often shipped in containers to ports in Nigeria (Lagos, Tincan Island), Ghana (Tema), and Benin (Cotonou). European environmental authorities are investigating the potential for e-waste shipments to Africa via roll-on roll-off ferries.

New e-waste trafficking routes in Southeast Asia





New patterns

Stringent enforcement in one country commonly leads to changes in traditional illegal shipment routes through neighbouring countries. Strong enforcement practices, such as China's Green Fence campaign, have been changing the traditional routes for illegal waste shipments. For example, Vietnam has been a transit country for movement of discarded CRT televisions and other household appliances to China. The illegal goods were transported to the Mong Cai border gate, where they were carried over the border river into Dongxing, China, close to China's biggest informal recy-

cling centre, Guangdong Province. In 2012 with a special anti-smuggling action between China and Vietnam and in 2013 the Green Fence campaign, the Chinese authorities worked hard to close down this illegal cross-border smuggling point, and the trade of WEEE has dropped considerably, even if some trade continues at night or has been displaced to the adjacent province.

In 2014, more complicated and convoluted routes of e-waste shipment were discovered by Chinese customs authorities. Early in 2014, members of three smuggling gangs that had imported 72 000 tonnes of e-waste, in total, into China over the previous year – the largest quantity ever found in the country – were arrested (Glombal Times 2014). What made the case interesting was the route the smugglers took. Unlike the traditional route of sea-land transportation, which uses Hong Kong as the main transit port, the smugglers shipped the e-waste from Hong Kong to another northeast Asian country and then smuggled the waste by small boats to Liaoning Province in northeast China. Finally, the e-waste was transported to Guangdong Province, commonly the final destination for illegal recycling but thousands of kilometres away from Liaoning.

Compared with the traditional route, the new route is much more complicated and costly. The reason behind its use was the 2013 Green Fence campaign.

Enforcement and cooperation between competent authorities

Cooperation between the competent authorities who enforce waste shipment rules around the world is inconsistent. In Europe, IMPEL has set up a network of front-line inspectors and administrators for the waste shipment regime called National Contact Points (NCPs). The IMPEL network includes a sub-group of prosecutors cooperating on illegal waste exports and involving the UK, the Netherlands, Belgium, Spain, Sweden, Ireland, and other member states. The sub-group also has close ties with legal advisors from the Basel Convention and its Party Members. The NCPs meet twice a year and communicate frequently via an online platform. The cooperation is positive and effective. However, the enforcement structure for waste shipment regulation is set up very differently across the European Economic Area. Processing notifications and inspections are often the responsibility of different bodies. Inspections may be carried out by multiple agencies or state administrations in some countries, such as Germany. Furthermore, collaboration among different regulators, such as environmental agencies, police, and customs, can vary considerably from country to country.

This fragmentation in regulatory practices can lead to difficulties in ensuring effective and consistent regulation of the waste shipment rules. Although the IMPEL network and police work to harmonize the quality and structure of inspections in the European network by producing training materials and field manuals, individual agencies have differing priorities. Where one agency might concentrate on the illegal shipment of e-waste, another might see the export of low-quality recyclate as a priority. Agencies also have different opinions on the classification of waste.

The main transit countries of Europe, understandably, experience the most disagreements when they intercept illegal shipments. A country of dispatch may not agree with an intercepting authority that a particular consignment is hazardous waste. A stalemate can result, leaving containers effectively trapped in limbo until a resolution is reached. The IMPEL network is currently amending its guidelines on the repatriation of waste with a view to ensuring that intercepted illegal shipments are dealt with in a timely manner.

Enforcement across the EU has been inconsistent for many years. The European Commission has recognized this, and in 2014, the Waste Shipment Regulation was amended, effective from 1st January 2016, to "reverse the burden of proof"[24] for exporters and require environmental authorities to plan and report on their inspections. Interventions are required right across the supply chain, from waste generator to final exporter, so that the policing burden does not fall on those countries with the largest transhipment ports. This change can be achieved only through coordinated action across Europe and with a thorough understanding of the various evidence-gathering procedures different authorities require in order to bring a prosecution.

An example of good cooperation is between the UK and the Netherlands, where joint enforcement and arrangements for intelligence-sharing are set out in a formal agreement. The authorities are working on extending this agreement to Ireland and Belgium.

Cooperation between European enforcement bodies and authorities outside the European Union also varies considerably. European regulators frequently ask for verification checks of sites in Asia. Authorities in Hong Kong and China respond to numerous requests on whether particular sites are permitted to accept waste. Collaboration between the IMPEL and Asian networks has increased over recent years. European inspectors undertook a lecture tour in China to outline their control regimes and to foster communication links. Unfortunately, responses from some countries can be difficult to obtain. Even when contact is established, it can be difficult to sustain, since officers move from post to post, and there is a lack of structured communication links.

24. EUR-Lex: Access to European Union Law (2014). Legislation. In Official Journal of the European Union. Volume 57. 27/06/2014. Available from: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L:2014:189:TOC

Port-hopping

Port-hopping is a trend that has become evident in recent years. This is a tactic used by illegal operators exporting waste from the European Union to developing countries. To prevent detection of their illegal cargo at ports, they move their cargo through ports with more lenient scrutiny regimes. Information gathered over recent years during inspections and criminal investigations shows that port-hopping is occurring in European ports.

Port-hopping is not easy to detect, as operators will give logistical reasons for switching ports, such as demurrage, handling, storage, lower transport costs, or that a particular shipping line sails only from the chosen port. It is only when a container is placed on a ship or removed from it for transhipment at a port that an environmental authority realistically has the opportunity to intercept it. The port of Rotterdam is the biggest European port, handling 50 per cent of all shipments leaving the European Union. The Human Environment and Transport Inspectorate of The Netherlands has therefore played a leading role in enforcing waste shipment rules.

There are weaknesses in the enforcement of regulatory measures to detect illegal waste exports. Examples include: lack of control and opportunities to sanction operators if the customs export declaration is registered in a country other than the actual country of export; lack of cooperation between regulatory agencies, such as customs and environmental authorities; and lack of information exchange between authorities about the actors involved and their modus operandi. These factors provide the opportunity that allows port-hopping to occur.

The level of cooperation between environmental and customs authorities is very important in fighting waste crimes. In some countries regulators have good cooperation based on official memoranda of understanding or other service-level agreements. This is not the case in other countries, and in certain cases there is no cooperation at all. As a result, environmental authorities have had to find other ways of working, such as using shipping line data to identify illegal shipments.

Individual countries have national customs databases that establish profiles for suspicious shipments. A particular shipment will be highlighted if it meets certain criteria: for example, country of destination, goods code, etc. That shipment can then be pulled for inspection. These customs profiles only apply within the individual country, meaning that an exporter in Country A can simply avoid a profile in his own country by exporting the waste illegally via Country B. The exporter can transport the goods easily from Country A to Country B because of the limited internal inspections and border controls within the European Union. It should also be noted that some landlocked countries necessarily have to export through other countries' ports. Given that the customs profile will only be running in the country where the exporter is located, and not Europe-wide, the exporter can still complete the customs declaration in Country B. This is not officially allowed under customs legislation, but such a breach is rarely penalized by customs or other agencies.

There is a general lack of structured exchange of information between the European states about illegal exports of wastes. This means that, despite good initiatives from such organizations as IMPEL-TFS and INTERPOL, the identities of players or even the detected modus operandi are not shared on a regular basis among states. Even though illegal waste shipments constitute environmental crime, national data protection laws make it difficult for authorities to share confidential information. However, some European countries, such as the Netherlands and Belgium, have excellent cooperation between environmental authorities and customs authorities. Part of this cooperation involves working together, using a risk-based approach to detect illegal waste shipments.

Lack of cooperation between authorities means that enforcing illegal shipments through ports other than those in the country of dispatch is almost impossible. Operators will switch their exports to tranship through ports with lower inspection levels. Evidence from various exporters supports the conclusion that ports with the most effective enforcement, such as Rotterdam, are avoided when shipping waste.

Abandoned cargo

Approximately 50 per cent of export containers are shipped without cargo. Shipping lines are therefore willing to take low-value, high-volume waste bookings to offset the costs of shipment. However shipping waste runs the risk that the containers will be abandoned in the country of destination. This can happen for a variety of reasons: the exporter cannot afford to or is not willing to pay the freight charges; the cargo is unwanted; the cargo is damaged; there is a dispute between shippers and consignees; or tightening regulation in the country of destination may mean that the cargo fails to meet local import standards.

From 2009 to 2011, Vietnam's environment police intercepted 37 waste cases, seizing 56 618 tonnes of waste batteries imported into Vietnam. Currently, 5 450 containers are still in various ports in Vietnam, especially Haiphong, with 2 796 containers of waste tires and 52 containers of suspicious illegal waste in Cailan and Quang Ninh (Vietnam Environment Administration 2014). In addition, there are thousands of waste containers stuck in ports in Indonesia, and it has been very difficult to repatriate them to the countries of origin.[25]

25. Information from an Indonesia official who attended the Technical Workshop of ASEAN Senior Officials Meeting on Transnational Crime (SOMTC) in April 2014.

Mixed household waste from UK to Brazil

Between September 2008 and May 2009, more than 1 500 tonnes of household waste described as plastics for recycling were exported in 89 containers from England to Brazil. The contents consisted of co-mingled plastics, tins, paper, cardboard, batteries, syringes, empty medical packaging, condoms, and soiled nappies. Reports prepared by the Brazilian authorities in July 2009 concluded that the containers violated Brazilian law and the Basel Convention. As a result, the Brazilian government lodged a formal complaint with the Basel Secretariat. Once the Environment Agency was informed, cooperation between the authorities involved was established, ensuring the repatriation of all 89 containers to England between August and October 2009. Brazilian authorities brought prosecutions against the shipping lines and companies involved in the import of the waste to Brazil.

The Environment Agency, the competent authority for regulating imports and exports of waste to and from England, investigated this case. It became the Agency's largest investigation into illegal exports, involving more than 70 officers and a two-year inquiry, and culminating in prosecution of three companies and five individuals in December 2011. The inspection and analysis of the containers alone took more than three months to complete. The Agency disposed of the material to a landfill due to health and environmental concerns about the contents of the waste.

The two companies responsible for exporting the containers were run by three Brazilian nationals based in the west of England. The companies went into liquidation before they could be prosecuted. They had sourced roughly half of the waste from household collections in their area and the rest from a company dealing with similar waste in Greater London. That company was looking for a buyer for a vast stockpile of waste, and the Brazilian nationals agreed to buy it at a reduced price. All three Brazilian nationals, the London company, its managing director, and its sales manager were prosecuted for exporting prohibited waste.

One of the Brazilian nationals remains at large, but the rest of the defendants pleaded guilty and were sentenced at the Central Criminal Court in London in 2013. The two Brazilian nationals and the sales manager were given conditional discharges of between 18 months and 2 years. That means that, should they commit similar offences within those periods, they will be brought back to court and dealt with not only for those offences but also this offence. The main reason for the conditional discharges was that they had no means to pay a significant fine. Both Brazilian nationals also had civil judgements against them in excess of USD 1 million (from the shipping lines involved in shipment of the containers to Brazil.

The managing director and his company were ordered to pay a total of USD 157 000 in fines and costs. This could have been significantly more, but they had already settled a civil claim for damages with the shipping lines in excess of USD 449 000.

In such situations, the owner of the waste may abandon the container and may even avoid paying the outstanding shipping charges. The risk of this happening with low-value waste exports such as low-grade paper is obviously greater than with high-value scrap metal. Costs start to rack up the longer a container is abandoned; demurrage costs and lost revenue for containers that remain out of circulation accumulate. When a container has not cleared customs at the destination port, the shipping line can try to sell the waste to another buyer within the same region, as the costs of returning a container to the load point can be high. In this way, the competent authority in the country of dispatch may never learn of an attempted illegal shipment. Although reports of abandoned containers are few, the number of containers involved can appear high, and it is likely that this is occurring on a larger scale than has been reported.

Recommendations

■ **Strengthen awareness, monitoring and information**

1. Acknowledge and raise further awareness of waste crime as an important threat to security, people and environment.

2. Strengthen mapping of scale, routes and state of hazardous waste and possible involvement of organized crime.
   a. Strengthen awareness and request countries to specifically address the risks associated with organized crime involvement in waste management.
   b. Strengthen awareness in the enforcement chain and of prosecutors of the risks for conducting fraud, tax fraud and money laundering through the waste sector.

3. Encourage non-governmental organizations and other stakeholders to expose waste crimes and build awareness of the massive health risks to waste end-users. If waste recycling activities are taken up there should be an adequate knowledge of sound recycling methods to prevent direct exposure to toxic substances.

■ **Strengthen national legislation and enforcement capacities**

4. Strengthen national legislation and control measures by:
   a. Improving national legislation frameworks as the primary basis for effectively and efficiently combating and monitoring of hazardous waste crimes. Establish the required competences and resources for the responsible law enforcement authorities to perform their duties, including inspections of transboundary movements within their mandates.
   b. Strengthen multi-agency cooperation at the national level between enforcement agencies – customs, police, environment authorities, and prosecutors.
   c. Build capacities of the entire enforcement chains, including customs, police, environmental enforcement officers, prosecutors and judges, to address waste crimes.
   d. Strengthen the capacity of customs authorities to enforce waste crimes mitigationthrough application of the UNODC-WCO Container Control Programme (CCP) or Green Customs Initiative (GCI) protocols.
   e. Promote identification of the tariff codes corresponding with the Codes of Basel Convention present in Annex I, in Annex VIII and Annex IX.

■ **Strengthen international treaties and compliance measures**

5. Strengthen effective monitoring and enforcement approaches at global, regional and sub-regional levels, including sharing of tools, best practices and intelligence for environmental inspectors, police and customs officers using existing networks such as the UNODC and INTERPOL. Environmental inspectors may also consider taking part in networks like IMPEL within the EU to share information with fellow government environmental agencies.

■ **Promote prevention measures and synergies**

6. Facilitate the proper return of illegal waste shipments at cost to shipper as a measure of prevention. Proceed with a technical assessment of quantities and qualities of abandoned containers particularly in Asia and of dumping of hazardous waste worldwide.

7. Take a comprehensive and integrated approach in combating environmental crime and exploring opportunities for building synergies with current efforts in combating wildlife and Ozone depleting substance (ODS) trafficking

8. Encourage waste producers and waste management companies to share experiences and lessons learned and obtain control of the downstream supply chain through a) the contract to document the value chain until the end disposal or recycling, and b) a legal obligation that only players with the necessary licenses all along the chain can handle the waste. This applies for both hazardous and non-hazardous waste. The waste management companies are encouraged to agree upon business standards that exempt so called “grey zones” in legislation to secure environmentally sounds waste management practices.

Acronyms

AQSIQ	The General Administration of Quality Supervision, Inspection and Quarantine
BCRC	Basel Convention Regional and Coordinating Centres
CEC	The Commission for Environmental Cooperation for North America
CFC	Chlorofluorocarbons
CRT	Cathode Ray Tubes
EC	European Commission/European Community/European Council
EA	United Kingdom Environment Agency
EEA	European Economic Area
EEC	European Economic Community
EEE	Electrical and Electronic Equipment
EFTA	European Free Trade Association
EIA	Environmental Investigation Agency
ENFORCE	The Environmental Network for Optimizing Regulatory Compliance on Illegal Traffic
EPA	United States Environmental Protection Agency
EU	European Union
E-waste	Electronic waste
Europol	European Police Office
HCFC	Hydrochlorofluorocarbons
HS	Harmonized System
IMPEL	The European Union Network for the Implementation and Enforcement of Environmental Law
IMPEL-TFS	Transfrontier Shipment of Waste
INTERPOL	International Criminal Police Organization
ISO	International Organization for Standardization
LCD	Liquid Crystal Display
LDT	Light Displacement Ton
NCP	National Contact Point
NGO	Non-Governmental Organization
ODS	Ozone Depleting Substances
OECD	Organisation for Economic Co-operation and Development
PAH	Polyaromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
(Hong Kong) SAR	Special Administrative Region
TBT	Tributyltin
TEU	20-foot Equivalent Unit
TV	Television
UK	United Kingdom
ULAB	Used Lead-Acid Batteries
USD	United States Dollar
WEEE	Waste Electrical and Electronic Equipment
WCO	World Customs Organization

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