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How e-Waste Challenges Environmental Governance

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Abstract

This article examines how e-waste – waste from electronic and electrical equipment – poses a challenge for environmental governance. The amount of e-waste generated globally has been estimated to reach about 72 billion tons annually by 2017. This article discusses how e-waste challenges the control of illegal trade as well as the prevention of environmental harms. By focusing on the role of state, corporate and civil society actors, insights are gained into the strengths and limitations of the governance framework. These suggest the need for reflection about both practical and theoretical implications that arise for environmental governance.

Keywords

Environmental governance; e-waste; environmental crime; environmental harm.

Introduction

E-waste – waste from electronic and electrical equipment² – is a rapidly growing market, with 72 billion tons estimated to be generated annually worldwide by 2017 (Duan et al. 2013). Obviously, the digital (r)evolution has resulted in a significant increase in the quantity of e-waste but the quality of the waste has also changed with the use of hazardous substances (Pellow 2007). E-waste is considered a hazardous waste because some of its components are harmful to the environment and/or to human health when they are not disposed of with care. Examples of such substances are heavy metals such as lead (for example, in CRT screens and batteries), cadmium (for example, in printer inks and toners) and compounds such as chlorofluorocarbon (CFC in cooling units).³ When inappropriately disposed of, e-waste pollutes the soil, air and water, thereby harming eco-systems, crops, and drinking water, thus causing harm to human health and the natural environment (Baker et al. 2004; Schluep et al. 2011). The precarious working circumstances in dismantling e-waste in West Africa and South East Asia have also been documented several times (Bisschop and Vande Walle 2013). Other types of harm relate to low material recovery rates, which is problematic in times when natural resources are scarce, and the unfair price settings which disadvantage treatment companies that do adhere to environmental regulations.

Waste is one of the most prominent environmental issues in contemporary society and at the same time one of the most normalized. The magnitude of the waste problem is significant and has increased with the pace of world population and consumption. As regulations on releasing waste into water, air and land have become more stringent, the price of waste management

services has increased (Vander Beken 2007). This has caused waste, including hazardous waste, to become an important article of trade. For instance, about 15 per cent of all trade within the European Union (EU) is trade in waste (IMPEL-TFS 2006). As for the cross-border or transnational dimension of the waste trade, most stays within the same region (for example, the EU) or takes place between countries that are members of the Organisation for Economic Cooperation and Development (OECD).

The reasons for the trade in (hazardous) waste are diverse. First, several countries do not have the necessary facilities to treat their hazardous waste or lack sufficient capacity to treat all of it. Also, certain types of waste can only be dealt with in a limited number of facilities. Examples of these are the Swan Hills facility in Alberta Canada which treats dioxins and furan contaminated materials and the nuclear fuel recycling plant in La Hague France. Additionally, West Africa currently lacks treatment facilities for hazardous waste. Second, sometimes a facility in another country is closer than one in the country of origin of the waste and hence transport across a border makes sense. Third, certain types of hazardous waste contain valuable secondary materials to be used in production processes in receiving countries. For e-waste, in particular, this issue of recycling and re-using secondary materials is prominent. Fourth, and perhaps most importantly, it is often less expensive to send waste to another country.⁴

Because of the above-mentioned harms resulting from inadequate recycling or disposal of waste, the trade in waste is regulated in multilateral environmental agreements.⁵ The trade flows that are most likely to result in inadequate recycling or disposal are those from developed countries (for example EU, USA, Australia) to less-developed ones (in Africa, South East Asia and South America) (Basel Action Network, 2005; Crem, 2008; Puckett and Smith, 2002). In fact, the illegal trade in and disposal of hazardous waste has been identified as a major form of environmental crime. Under European law, for instance, it is illegal to export toxic waste to non-EU countries with weaker standards for disposal. Although exact data do not exist, results of enforcement actions coordinated by the European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL) give some indication of the scale of the violations (IMPEL-TFS 2012). Of the total number of waste inspections carried out, 28.9 per cent were either an administrative violation, which refers to missing or incomplete forms (for example Annex VII), or an illegal shipment, which refers to a transport that is subject to an export ban.⁶ Waste from electronic and electrical equipment (WEEE) is one of the major waste streams among these transport violations. Overall, one in five containers exported from the EU contains waste and an estimated 20 per cent of those are in violation of export bans or administrative requirements for waste trading (Baird et al. 2014). The data available on the illegal trade in e-waste reflect, however, the control that takes place and are not necessarily an accurate representation of the scale of smuggling (Bisschop 2012).

Against this background, this article aims to shed light on how e-waste challenges environmental governance. Governance differs from government, because it is not limited to the engagement of state actors (Holley et al. 2012; Parker and Braithwaite 2003). Governance refers to different social and political units that govern social interactions such as corporations, international organisations and non-governmental organizations (NGOs). Governance in this article equates to those initiatives that aim to prevent the harm of sub-standard e-waste disposal and to control the illegal e-waste trade. This article draws on theories about environmental governance and responsive regulation (Holley et al. 2012; Parker and Braithwaite 2003) throughout.

The following section discusses the methodology of the study and sketches the characteristics of the research context. The article continues by discussing the challenges inherent to e-waste both as a commodity and as a sector and then explains the problems accompanying legal definitions and policy making. The focus then shifts to the complexities inherent in the

implementation of policy regarding e-waste and the difficulties that emerge in various interactions between governance actors in preventing harm and controlling crime related to e-waste. Attention is paid to the importance and difficulty of involving local governance actors, corporations and non-governmental organizations in governing e-waste. This article does not provide an exhaustive list of the governance challenges in dealing with e-waste but focuses on a number of core themes. This approach demonstrates, nevertheless, the rich complexity of the reality of governance.

Method and research context

This article draws on the findings of a case study describing the trade of e-waste passing through the port of Antwerp in Belgium (Bisschop 2013).⁷ The flows between Belgium and Ghana were the particular focus. The analysis is thus tailored to that specific empirical case. Antwerp, with a total annual freight volume of 185 million tons is among the top three ports in Europe alongside Rotterdam and Hamburg. Antwerp is a landlord port, owned by government and managed by a port authority which gives up its control over port operations by leasing the infrastructure to private terminal operators (Talley 2009). The Antwerp port, covering 130 km², 180km of quay, 400km of roads, 1000km of railway and with about 900 companies working in the port precinct, is a complex area for prevention and control. The territory of the port of Antwerp is governed by two jurisdictions (Dendermonde and Antwerp) and three municipalities (Antwerp, Beveren and Zwijndrecht), and falls under the responsibility of two provincial governments (East-Flanders and Antwerp). Given the sheer volume of trade, Antwerp employs a risk-analysis system to control transport. Less than 1 per cent of containers are scanned. About 80 per cent of the waste that is traded in the port is in transit, the other 20 per cent has its origin or destination within the territory of Belgium.

In Ghana, the port of Tema handles over half this country's trade and is also an important gateway for Burkina Faso, Mali and Niger. In 2012 it handled 11.5 million tons of freight, a 50 per cent increase compared to 2008. Imports account for about 80 per cent, exports 15 per cent, and transit freight 5 per cent (Eshun and Rasmussen 2013). All containers arriving in Tema are either scanned or physically inspected by unloading them.

This article makes no claims about being able to generalize from these findings to the cases of other regions and trade flows. By analysing the case within its broader contexts and paying attention to the global trade flows it does provide insights that help with understanding the challenges to the governance of illegal trade in, and sub-standard dismantling of, (e-)waste in other locations.

The findings are based on a multi-method approach of document analyses, interviews and field visits. Both the document analyses and the interviews triangulated government, corporate and civil society perspectives. The document analyses studied the existing international, European and national (Belgian and Ghanaian) regulation and litigation as well as available corporate and NGO documents. This study was further based on 56 semi-structured interviews with law enforcement agencies (customs, police, environmental inspectorates, port authority and judiciary), corporate actors (shipping lines and agents, e-waste collectors and recyclers) and civil society actors (informal e-waste workers, NGOs, local communities). The findings from the document analyses and the interviews were triangulated with data from the field visits in the port of Antwerp (Belgium), the city of Accra and the port of Tema (Ghana).

Challenged by waste as a product and a sector

There are a number of problems that relate to waste as a product. It has been linked to price fixing, racketeering and an illegal market in waste (Van Daele et al. 2007). It has an inverse incentive structure due to its negative value: when you own waste, you usually need to pay to

get rid of it. This inverse incentive structure does not straightforwardly apply to e-waste because there may often be some value in owning it as the (precious) metals it contains are worth retrieving for re-sale. Waste is also generally considered a product of low integrity since it can be easily mixed up or sold as second hand commodities (Gibbs et al. 2010; Van Daele and Vander Beken 2009). The transition from being 'legal' to 'illegal' when dealing with waste can occur at several stages. This can happen during national and cross-border transportation but also in collection or disposal. Waste can be more cheaply dealt with by illegal enterprises who disregard environmental regulations or by legal companies in Europe who treat waste they are not licensed to process (Ruggiero and South 2010).

As well as the product itself attracting illegal activity, the waste collecting and processing sector as a whole has characteristics that can be considered vulnerable to crime (Van Daele et al. 2007). Its rapid growth and international character have allowed a diverse range of actors to work in the waste industry, with brokers involved at different stages obscuring the paper trail. In collection, transport and treatment, multiple smaller companies try to compete with the few big ones. Many sub-streams of waste arise from the dismantling of various products and multiple actors are involved. Corporations that process e-waste legally and have environmentally sound management systems are few and their prices are high. The category of e-waste includes many devices that incur costs for treatment before disposal but some products hold enough valuable components to make recycling or treatment profitable (LNE and Haskoning 2010). For the former, exporting them as second-hand products saves the cost of treatment (Interpol 2009). The latter is a motivation for having the goods dismantled as cheaply as possible to be able to sell the raw materials (Sander and Schilling 2010). 'You can make money by "recycling" e-waste in poorer environmental and social conditions, since this provides you the precious metals with lower labour costs' (Corporate respondent 13).

The concern for the loss of secondary raw materials through e-waste exports is very important for the EU as it relies on the inflow of e-waste for the operation of its high-standard recycling facilities. Some recyclers see the setting of stringent legislation on waste exports as profitable for their business. Some refurbishers even set more stringent standards for their exports of used electronic and electrical equipment (WEEE) than the law requires. Evaluations and stakeholder consultations are continuing with the aim of developing a certification scheme or standard to demonstrate that waste exported from the EU to non-OECD countries can be treated in an environmentally sound manner. This usually involves firms that have made this their niche market. As long as all parties can benefit in a 'win-win' situation, investments seem to be made but there are also practical limitations (Gunningham et al. 2003). For example, producers were found to be cherry-picking in terms of their responsibility to take back WEEE from Ghana. Indeed, willingness and ability to commit to self-regulation and monitoring are investments largely limited to the 'big players' or niche corporations (Gunningham et al. 2003). This of course leaves a multitude of smaller corporations where self-regulation is much less clear (Haines 1997). Nonetheless, in the supply chain of electronics and e-waste and the due diligence that lies within, smaller actors can be motivated to set high standards for themselves. Some large corporations in collection and recycling choose which influx of WEEE/UEEE to accept, depending on whether they deem the source trustworthy. There is thus room to take this a step further and to truly integrate the environmental costs throughout the entire waste processing life cycle (van Erp and Huisman 2010). To address this, extended producer responsibility policies have emerged⁸ (Pellow 2007) but the implementation of these can still be improved. Both producers of electronics and the waste sector can take steps to prevent environmental harm in the supply chain of electronics and e-waste. Although both the product and the sector represent a challenge, corporations have the potential to play a role in environmental governance. Major corporations such as producers of electronics and (e-)waste processors have taken the initiative to self-regulate, albeit with varying degrees of success.

The governance of the illegal trade in e-waste is to a certain extent addressed through a form of 'regulated self-regulation'. This for instance happens in the risk-analysis system employed by European customs which bases its controls on the management systems of the corporations besides other risk indicators⁹ informed by legislation and past experience of customs, environmental inspectorates, police and administrations. Similarly, the inspectorates work through meta-regulation to control waste corporations. Self-regulation has the advantage of being more attuned to the underlying processes of the waste sector rather than having only the shallow effect that may follow when only the outcomes are controlled (de Bree 2011). Self-regulation might also be more flexible in addressing the dynamic reality of preventing illegal transport of e-waste (for example perceiving CRT television sets as WEEE). Self-regulation cannot address the entire market of waste collection and processing given the multitude of small scale actors (Bisschop 2012) which makes it difficult to install self-regulation sector-wide, for instance through certification schemes or extended responsibility (Gunningham et al. 1998; Holley et al. 2012). Setting this up through (regulated) self-regulation implies that all parties need to agree on the purpose and benefits (White 2011).

Challenged by legal definitions and policy-making

Many international organizations have developed policy mechanisms to manage waste generation and regulate the trade in waste (Iwama 2004).¹⁰ Because it is subject to international conventions, the trade in hazardous waste can be conceptualized in terms of legality and illegality. The most important conventions are the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and its 1995 Ban Amendment on Trade of Waste for Recovery between OECD and non-OECD countries; the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer; and the 2001 OECD Decision concerning the Control of Trans-Boundary Movement of Wastes destined for Recovery Operations. Basically, the more hazardous a waste shipment is, the more stringent its legal requirements such as providing information about the facility it is destined for, or obtaining prior consent – that is, before the transport takes place – from the receiving country. Waste crimes are considered an important type of environmental crime and make up a large share of the cases reported by environmental inspectorates. These can refer to both administrative (missing or incomplete paperwork) and criminal (going against actual trade ban) violations.

The policy framework itself is vulnerable to criminality in several ways. The Basel Convention and EU legal framework for waste are not always interpreted and implemented with the same commitment among all the parties. Not all countries have ratified the Basel Convention and its Ban Amendment. Moreover, the Basel Convention is primarily intended to regulate trade and not to control illegal trade. National differences in policy and particularly in implementation still exist, even within the EU. A particular difficulty is distinguishing the *illegal* exports of e-waste to non-OECD countries and the *legal* exports of second-hand electronics. The latter need to meet the following requirements: proof of functionality; contact details of shippers and destination; and appropriate packaging. Despite these guidelines, it can still be challenging to distinguish between the two. Overall, the EU waste legislation is very complex. As a consequence of this, customs, harbormaster office and police rely on environmental inspectorates to judge the suspicious shipments. Even prosecutors admit the legal framework for waste is difficult to apply. This confirms the finding that waste is a topic with many rules and regulations that are not always practical (Huisman 2001). This goes against one of the basic principles of good governance: that it needs to be understandable (Braithwaite 2008).

What complicates this further is the dynamic nature of precisely what can be defined as e-waste. There is a temporal dimension in the sense that every day more knowledge about harmful substances emerges but also another dynamic is at play in the sense that the discussion about what is a second-hand electronic product and what is e-waste depends on the cultural and

socio-economic context. Belgian definitions of e-waste are different from Ghanaian and therefore definitions of environmental crime and harm also differ. Similar to other issues of environmental harm, the definition of what constitutes illegality varies over time, place and perspective (White 2011). It is not easy for policy and legislation to incorporate this dynamism.

Challenges in implementation

Despite e-waste fraud being an issue of national and international importance, resources are limited, as is political will (Griffiths and Jenks 2012). Both in countries of origin and destination, there are a limited number of people involved in detection, despite the multitude of government agencies dealing with it. Environmental inspectorates play a crucial role and usually have the most technical expertise about waste matters. Environmental inspectorates are also those with most knowledge about waste collection, treatment or disposal facilities. This means that they can address companies on their license in cases of administrative violations and might be able to trace illegal waste trade back to its source. There is however a serious lack of capacity for administrative follow-up of illegal waste transports, since inspectorates have limited staff. Police officers focus on environmental issues and lead criminal investigations into waste fraud but, in much the same way, they are limited in staff and resources. One way to come across any illegal transport of e-waste is through the control of shipments in harbors. To a certain degree, this is like looking for a needle in a haystack. Customs play an important role in this through their risk analysis system for scanning and physically inspecting shipments. However, environmental issues are not a priority for customs, resulting in limited support from the hierarchy. Furthermore, the problem requires technical expertise that is not provided in training. Despite their knowledge and experience being crucial for the control of waste transports, enforcement agencies are constrained by their limited resources. 'The problem is not that we don't know where the illicit traffic is, know where to find it or know how to check it. The problem is that we don't have the means to guarantee the follow-up, that's the bottleneck'(G14). This refers to those environmental inspectors and police officers that are governing e-waste transports on a daily basis. These exceptions to the rule are passionate about their job but frustration does occur.

An additional challenge of EU waste policy is the different implementation in the EU member states. The case of the port of Antwerp illustrates this perfectly. Belgian inspectorates who control shipments in the port can only trace illegal waste shipments to their source when they originated in Belgium. As mentioned earlier, this is about one fifth of all waste transports through the port. For the other 80 per cent of waste – waste in transit from other EU countries – the exporting member states are responsible for ensuring that the goods accord with legislation. Similarly, the risk analysis system of Antwerp customs is applied to import and export, but the transit shipments rely on the risk analysis of the other EU countries. However, these member states do not necessarily interpret or implement the waste legislation in the same way. Not all member states use complementary interventions as well as the traditional environmental inspection and when controls become more severe in one country, illegal flows shift to another. There is no level playing field for controls on waste in the EU. Government, corporate and civil society respondents even notice a North-South and West-East schism in Europe concerning the matter of how seriously inspections and transport controls are taken. This led different respondents to refer to the need for further harmonization of EU policy implementation to avoid displacement although this is politically very sensitive. Imposing minimum requirements for inspections and controls is often interpreted as too much interference from Europe, especially if that would imply countries can call each other to order. Recently, the European Parliament confirmed an agreement to revise the EU rules on waste shipments.

The new law will ensure that member states are obliged to make comprehensive and meaningful inspection plans to check waste shipments, with a minimum

number of physical checks in line with the risk of illegal shipments. ... Enforcement will be stepped up, with more powers for authorities involved in inspections to check shipments. Cooperation between member states will be significantly strengthened. (MEP Bart Staes in The Greens/European Free Alliance in the European Parliament, 2014)

Taking this a step further, setting up a European environment agency with inspectorate authority might be beneficial to organize the controls at the EU level and create a more unified system, but this is a politically very sensitive topic.

Even if definitions and interpretations were equal, Europe – let alone global policy – is a long way from harmonization of implementation. Prosecution of environmental crime remains a national competence with significant differences between European countries in approach and number of convictions (IMPEL-TFS 2013). To avoid criminals taking advantage of this, IMPEL identified the establishment of a network of prosecutors which could exchange relevant case law, prosecution information such as the level of fines, working methods, prosecution approach, interpretation and practical experiences. Although the European waste legislation requires sanctions to be set, there are major differences in interpretation and implementation. There is prosecution of waste cases but fines that are imposed for illegal e-waste transports are perceived as too low to be effective and become part of shippers' business plans. One of the reasons for this is that, although it is often possible to prove one shipment is illegal, it may be hard to prove this has happened systemically. Fines differ by a factor of 100 across the EU. Even within countries there are considerable differences in decision-making (Sander and Schilling 2010). This is similar to findings about the implementation of other environmental policies in the EU, where member states demonstrate substantial margins in their interpretations and determinations of sanctions (Billiet and Meeus 2010). To counter this, judges could be guided about the seriousness of transnational environmental crime (White 2011), as suggested by respondents in this study.

Also on the receiving end of the trade flows, in countries of destination like Ghana, the implementation of legislation can prove challenging. Ghana has signed international conventions but national legislation on e-waste is not yet in place although a proposal for a bill on the control and management of hazardous waste in general, and on E-Waste in particular, drafted in 2012 had to be re-processed after the December 2013 elections. In the absence of a legal basis to act, the main concern of the Ghanaian Environmental Protection Agency (EPA) is raising awareness of government actors about the dangers of e-waste since many consider them as profitable second hand products. The enforcement focus is on licensing recycling facilities and analyzing where WEEE/UEEE might be sold and refurbished. However, these actors are numerous, very flexible and spread out across Ghana. The EPA also reaches out to informal actors and shows them how to improve working conditions. In theory, customs have governance potential in tackling the illegal e-waste transports since they inspect and unload containers of WEEE/UEEE. However, their priority is taxing the import of electronics rather than checking for e-waste. In case, when a law is passed, awareness raising and training of these enforcers will be crucial. Even then, the problem remains that seized goods will have to be recycled locally, often ending up in the same system. Additionally, increased attention to the trade in e-waste does not provide a solution to processing the large amounts of new and second-hand electronics being consumed in Ghana.

Challenges in involving local governance actors

Overall, the governance framework seems to be government dominated for e-waste, whereas corporate and civil society actors are more passive. When the authority over a port area is spread across different terminal operators, municipalities, provinces and jurisdictions, this

renders governance complex, but in recent years improvements have been made to step up the cooperation and information exchange among these actors in the port of Antwerp. In examining the governance reality of e-waste, the primary actors in the control and prevention of illegal transport remain the inspectorates. In theory, these environmental inspectors can trace transports in violation of either administrative or criminal regulation to its source, usually a particular corporation involved in waste transport, collection, treatment or disposal. As mentioned earlier, tracing the transit shipments to their sources remains the responsibility of governments in other member states. This approach of tracing the waste to its source does not easily apply to the multitude of small scale (often individual) shippers. Small scale collectors are not always known to the environmental inspectorates. To be more exact, it might be a shipment by one individual and not by a registered waste corporation that went through the licensing process for its facility. In preventing illegal waste shipments, it is important, however, to also get a grip on these smaller scale actors. Relying too much on the regulatory activities of inspectorates, transport controls by environmental police officers, and the controls in harbors by customs or harbormaster's offices, risks not getting a grip on waste smuggling at the local level. In identifying those smaller scale transports, it is important to involve local governments and local police organizations, because they might have a better view on waste collection activities – at whatever scale – that happen in their communities. This would allow the problem to be tackled by starting at the root, focusing on actors earlier in the supply chain of electronics and waste.

The local level of governance is therefore important for the success of governing environmental flows despite their transnational characteristics (Gille 2006; Braithwaite 2008). This is particularly relevant when the primary concern is shifted from controlling for crime to avoiding environmental harm. In developing countries, promising local initiatives are those of collecting and dismantling of e-waste (for example in Ghana), where scrap dealers are taught techniques to dismantle equipment while reducing health and environmental risks, ultimately resulting in better recovery rates for the raw materials. These initiatives are still very few and are usually set-up with the support of NGOs. Local Ghanaian NGOs also combine forces with international organizations to develop capacity building. Similarly, they cooperate with (European) corporations for the return of equipment (for example motherboards). Some companies are also looking to follow this example for other components but are assessing the economic feasibility. There are initiatives to turn the highly efficient informal economy of waste collection into a less harmful waste industry that provides extra income for the population and prevents further pollution (prevention of hazardous waste leaking into the soil or prevention of burning hazardous waste). Although many of these initiatives are still in their infancy, this shows that a broader network exists, beyond law enforcement alone, for dealing with e-waste. Setting up these initiatives takes time because local characteristics need to be taken into account. Insights are needed about how and why these governance initiatives work. Only then is it possible to evaluate whether they could apply elsewhere. This also implies the need to avoid imposing a Western frame of reference without considering local differences.

Challenges in interactions between governance actors

Given the above challenges presented by legal definitions and implementation of waste legislation, it seems fitting not to rely solely on the criminal justice system to prevent environmental harm from inadequate disposal of e-waste and control illegal transports of e-waste. Complex problems such as environmental issues are not easily governed by a single actor and a networked governance model might fare better (Holley et al. 2012). In interaction, however, it is not always easy to work towards the same goals, even amongst government agencies – as the e-waste case demonstrates. The governance of e-waste cuts through different layers of authority. Each of the government actors that were examined in this study were aware that their work was only one part of a broader system. Depending on the features of the case,

one or another actor took a leading role, either for practical reasons due to available expertise or out of concern for an integrated approach. The judiciary clearly takes a leading role in the approach to waste fraud in the port of Antwerp. Customs take a leading role in the risk analysis system. Inspectorates and administrations have expertise on environmental issues. Although these actors are all part of the network or the chain that responds to these issues, their methods and responsibilities are different. One of the criticisms of corporations is that the implementation of the law seems to be valued higher than the matter of environmental importance. Corporations experience an extra burden in terms of administration because of the fragmentation of agencies and perceive this as an inefficient use by government of already limited environmental enforcement resources. This efficiency of the network will become increasingly important, given the continued expansion of the Antwerp harbor and its trade flow. This fragmentation of responsibility is also being addressed in Belgian institutional reforms.

Waste is a topic, just like other environmental issues, that can be dealt with by administrative as well as criminal proceedings and neither necessarily have the same objectives in mind. Transparency and clear delineation of tasks and objectives is crucial to avoid government actors fighting each other instead of fighting crime (Sluis et al. 2012). The question is then whether these actors work with the same intentions in mind and the same realities at hand. Environmental inspectorates focus on illegal transports of e-waste but also take into account the broader concern of avoiding environmental harm. Administration systems are similarly oriented to environmental issues, but focus on initiatives earlier in the chain (licenses) as well as on policy. The focus of customs and harbormaster's office on illegal trade in e-waste is rather recent and struggles with balancing concerns for security and the economy. Customs specializes in responsibilities that are at the front line in import and export of waste; it has the technical means to control (scanning of containers and risk analysis) and has many 'eyes and ears'. Note, however, that their risk analysis system which relies on a large basis of trust in corporations (potentially) does not match the approaches of other government actors. Questions remain whether this system of trust in economic operators by customs and even the system of trust in compliance by the environmental administrations can be united with the strategies of judicial actors that proceed in their work based on distrust. The police and the judiciary are both concerned with illegal transport of e-waste because they are environmental crimes and have a potential link to 'organized crime'. This only concerns the serious and extensive cases.

Besides the various initiatives for international networking, the responsible authorities cooperate bilaterally with their neighboring countries as well as with countries of destination such as Ghana, but with limited staff and resources this can be difficult. Different international guidelines and soft measures exist and are stimulated by organizations such as the European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL), International Network for Environmental Compliance and Enforcement (INECE), Secretariat of the Basel Convention, the World Customs Organization (WCO) and the Solving the E-waste Problem (StEP) initiative. These initiatives organize training sessions in countries of destination, function as advisors and fund capacity-building projects. One challenge to these international networking initiatives is their voluntary character. Unambiguous measures (for example inspections and controls) are more difficult to agree on though this should not be surprising given the known problems of global environmental governance (Iwama 2004): an ad hoc or fragmented approach; a missing link between policy making and implementation; conflicting or overlapping responsibilities between different agencies; a lack of a powerful competent authority; and NGOs and corporate actors not being reflected in multilateral environmental initiatives. Despite significant improvements in policy making and – more recently – implementation, many of the above problems apply to the governance of e-waste.

From a governance perspective, non-government actors have a valuable role to play, although this is currently not exploited to its full potential in the case of e-waste. Both corporations and

civil society stakeholders come to mind. When taking the supply chain of electronics into account, producers, recyclers, transport actors and consumers become part of the governance framework. Not all producers and recyclers as well as transport actors are currently proactive in self-regulating their sector, despite the governance potential they may have. For instance, transport actors could be encouraged to be more diligent and transparent. A first important step is raising awareness about this. Many company brochures and websites already mention sustainability and related issues, but there is a need for further translation of awareness into practice in both Belgium and Ghana. As witnessed during the field visits and interviews, many port actors do not know what e-waste is and are unaware of the potential harms.

This information campaign should contain practical advice directed not only at the managers of these companies but also at the actual goods handlers. This might not stop crafty criminals from shipping e-waste illegally but might address 'low hanging fruit'. (Civil society respondent 20)

This will likely require a few major shipping lines to take the lead as is happening today, but it might be more difficult to involve smaller actors like shipping agents, 'because these often have neither the resources nor the management structure to seriously deal with this' (Corporate respondent 5). A second step might be to increase information exchange about the flows – both legal and illegal – providing better grounds on which to address illegal trade. As a testimony to the governance potential of shipping lines, they are already partners of the waste enforcement agencies in England and Wales, in this way helping to keep their businesses clean and trace waste back to its origin. It is however not possible to simply replicate this in Antwerp where the share of transit in the waste trade is much bigger (80 per cent in Antwerp versus 10 per cent in England and Wales). A similar development is occurring in countries of destination where shipping lines are increasingly providing the authorities with information to facilitate controls or even providing warnings in cases where suspicions about the nature of the shipment arise.

By phasing out hazardous components, producers can ensure that the recycling of e-waste is less harmful. Through eco-design, they can increase the life cycles of products. Economic and environmental interests, however, do not always coincide. Consequently, the involvement of producers and recyclers is largely determined by the potential gains from being environmentally responsible, either financially or in terms of their corporate image. An important governance potential, however, lies in linking the illegal transports of e-waste to the EU's lack of raw materials. This is an important incentive for European industry, especially since it is often more energy-efficient to extract precious metals from e-waste than from mines. Protecting the secondary raw materials and keeping these within Europe is increasingly going hand-in-hand with the objective of avoiding further environmental degradation in countries of destination of e-waste transports. Despite these self-regulatory efforts, corporate actors could play a more significant role: for instance through regulated self-regulation in the governance of illegal e-waste trade. This will, of course, require carefully designed incentives, both positive and negative (Gunningham et al. 1998; Holley et al. 2012).

Apart from the role for corporations, the civil society representatives like NGOs play a role in governance. This happens by raising consumer awareness and by keeping governments and corporations on their toes about environmental topics. During the field visits, it also became clear that NGOs play an important role in engaging local actors in Ghana. By setting up capacity-building projects, they are reaching out to actors who are currently not always involved in governance. Many of these initiatives are small-scale and ad hoc but have the potential to address the structural causes of the illegal trade in e-waste. They can, for instance, aim to reduce the demand for WEEE/UEEE by highlighting the fact that dismantling e-waste and second-hand electronics in search of precious metals is the sole source of a secure livelihood for many people in countries of destination. More importantly, they can avoid the immediate harm

by teaching informal workers about more environmentally and health-friendly dismantling techniques. This would address both the illegal trade in e-waste and the domestic consumption of electronics.

Conclusion

This article set out to shed light on how e-waste is a challenge for environmental governance. Challenges inherent in legal definitions and policy making remain, only outnumbered by the challenges inherent in the implementation of waste policy. The analysis of the reality of governance illustrates how the control of illegal e-waste flows is primarily taken up by government actors, which is not surprising given its criminalisation. An important challenge, however, is the underfunding of these government actors, with consequences for training, resources and effective follow-up throughout the flows (See also Brack et al. 2002). Despite the good intentions of many and the improvements made in the last decade, both the administrative and the criminal approaches in dealing with illegal transports of e-waste could be improved. Even in a region like the EU that can be considered an environmental forerunner (Vig and Faure 2004), environmental law enforcement is perceived to be too slow and too weak in responding to environmental crime. An important characteristic of responsive regulation is the escalation towards more punitive measures in cases of (continued) non-compliance (Braithwaite 2008; Nielsen and Parker 2009). As has been illustrated here, this escalation is not at all certain for the illegal trade in e-waste in the countries of origin and even less so in the countries of destination. For environmental governance to work, it is crucial to gain insights into the objectives and realities of each separate governance actor, so as to understand basic assumptions that might be influencing their cooperation. This might require trying to overcome differences and working towards the same end, despite different objectives and means. This also requires clarity about whether avoiding environmental harm or preventing environmental crime is the primary concern. Through a networked governance approaches, different interests can be taken into account and negotiation can proceed based on each actor's capacity. This means taking into account not only what is strictly defined as illegal but also the broader dimensions, thus allowing a more complete account of social phenomena. The diversity of actors and reasons for getting involved in illegal e-waste transport or sub-standard treatment of e-waste, inevitably means taking many actors into account in countries of origin, transit and destination and on local, national and international levels. This of course renders the arrangement of networked governance very complex, going against the idea that networked governance for the environment is easiest in a small scale setting with limited complexity (Holley et al. 2012).

A more comprehensive governance picture emerges when the gaze is broadened from controlling for illegal transports of e-waste to preventing environmental harm through sub-standard recycling practices. This makes it possible to look for governance frameworks that involve actors throughout the supply chain of electronics and not merely those that contribute to or control for (illegal) trade in e-waste. The emergence of new actors, outside the state, on local levels and in new cooperative arrangements fits a view on 'world politics that are no longer confined to nation states but are characterized by increasing participation of actors that have so far been largely active at the subnational level' (Biermann and Pattberg 2008: 280). Insight regarding the potential and challenges of these new environmental governance arrangements is needed. In the interaction between governments and corporate and civil society on the topic of e-waste, the need for clarity about objectives and for working towards similar ends despite differences remains a challenge. Also, the different perspectives of the developed and developing countries will require environmental governance mechanisms to assess challenges and strengths within particular local contexts. At the same time, the inherently global dynamics of the trade in electronics as well as of environment harm require governance mechanisms that cut across national and institutional boundaries. A locally

grounded and globally informed governance network has the potential to prevent further environmental harms caused by the supply chain of electronics.

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² E-waste refers to all types of electrical and electronic equipment (EEE) that is discarded, such as television sets, computers, mobile phones, tablets, refrigerators, washing machines, dryers, home entertainment and stereo systems and toys.

³ For more information, please consult http://ewasteguide.info/hazardous_substances (accessed 29 May 2014).

⁴ For more information, please consult http://www.cec.org/hazwaste/Page.asp?PageID=5001&ContentID=341&SiteNodeID=204&BL_ExpandID=60 (accessed 29 May 2014).

⁵ The discovery of and media attention for dump sites of toxic waste in developing countries during the 1980s and 1990s led to the adoption of international and European legislative frameworks that regulate waste transports. Examples of these are the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal; Montreal Protocol on Ozone-Depleting Substances; and OECD Decision on Control of Cross-Border Movements of Waste Destined for Recovery Operations; European Waste Shipment Regulation; Directive on Waste Electrical and Electronic Equipment; Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa.

⁶ Over the several phases of IMPEL-TFS measurements (2006, 2012), the number of administrative violations decreased from 52 to 37 per cent, but the number of illegal shipments, subject to an export ban increased from 33 to 38 per cent.

⁷ More detailed information about this study and its findings can be found in the following book: Bisschop L (forthcoming) *Governance of the Illegal Trade in e-Waste and Tropical Timber: Case studies on Transnational Environmental Crime*. Ashgate Green Criminology Series.

⁸ For instance the European WEEE Directive (on waste of electronic and electrical equipment) or the Directive on the Restriction of hazardous substances.

⁹ These risk indicators can refer to particular destinations (risk countries, suspicious streets), descriptions of the goods, value added tax (VAT) numbers and the value of the goods.

¹⁰ For instance: UNDP (solid waste management); WTO (sustainable/recycling waste trade); World Bank (solid waste management); OECD (waste management, sustainable use of materials); WCO (combating environmental crime – MEAs); Interpol (illegal waste trade).

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