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MENACE OF E-WASTES IN DEVELOPING COUNTRIES: AN AGENDA FOR LEGAL AND POLICY RESPONSES

Dejo Olowu

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* LLM (Ife); LLM Human Rights & Democratisation in Africa (Pretoria); PG Diploma International Human Rights (Åbo Akademi); JSD *cum laude* (Notre Dame); Barrister & Solicitor (Nigeria); Research Professor of Law, North-West University, Mafikeng, South Africa. E-mail: djelowu1@yahoo.co.uk. This essay is dedicated to the cause of alleviating the human suffering associated with toxic and hazardous electronic wastes in developing countries.

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1

INTRODUCTION

The control of pollution and management of wastes are twin challenges confronted by virtually all countries of the modern world. Although empirical researchers concede that reliable data with respect to the amount of waste being generated worldwide is costly and time-consuming to obtain, it is estimated that 20 to 50 million metric tonnes of electronic waste are generated worldwide every year, with the United States alone discarding some fourteen to 20 million personal computers every year, while Asia discards an estimated twelve million tonnes of electronic waste each year.¹ With the increase in population, urbanisation, capacity, economic growth, and lifestyle orientations, it is anticipated that developing countries will triple their electronic waste production over the next few years.²

Linked to the global concerns about waste management is the broader question of tackling poverty and disease. When left untreated, accumulated waste poses grave environmental risk and threat to human health, the juncture at which

scholars and commentators have drawn the nexus between environmental pollution via hazardous electronic wastes and human rights.³

Empirical findings have shown that over the course of time, poorer and weaker countries in the developing world habitually bear the negative consequences of waste generation in developed countries.⁴ Whether it is about toxic waste dumping in Ivory Coast, the mismanaged delivery of mercury-contaminated industrial waste in Cambodia, the disposal of chemical wastes in the Pacific Ocean, the offloading of toxic ash in Haiti, or the ceaseless delivery of unserviceable electronic equipment to Nigeria, human beings have been exposed to the gory effects of transboundary movements of hazardous wastes in developing countries.

Hazardous wastes can be in form of materials contaminated with dioxins and heavy metals, such as mercury, cadmium, or lead, or organic wastes from industrial activities. These wastes come in many forms ranging from barrels of fluid waste to sludge, old computer parts, used batteries, or incinerator ash. The scope of toxic and hazardous wastes is thus wide and far-reaching.

While the human rights and environmental concerns emanating from the transboundary movements of toxic wastes and hazardous products have attracted considerable attention from scholars, activists, governments, and multilateral organisations such as

1 See United Nations Environment Programme (UNEP), *Recycling – From E-Waste to Resources* (Nairobi: UNEP, 2009). See also Electronic Take Back Coalition, *Facts and Figures on E Waste and Recycling*, available at http://www.electronicstakeback.com/wp-content/uploads/Facts_and_Figures; Climate Neutral Network, *Waste*, available at <http://www.unep.org/climateneutral/Topics/Waste/tabid/156/Default.aspx>.

2 See United Nations Environment Programme (UNEP), *Waste and Climate Change: Global Trends and Strategy Framework* 14 (Osaka: UNEP, 2010); Swiss Federal Institute of Aquatic Science and Technology, *Global Waste Challenge: Situation in Developing Countries*, April 2008, available at http://www.eawag.ch/forschung/sandec/publikationen/swm/dl/global_waste_challenge.pdf; Greenpeace International, *The E-Waste Problem*, available at <http://www.greenpeace.org/international/en/campaigns/toxics/electronics/the-e-waste-problem/>; Developing countries face surge in e-waste, *People & Planet*, 24 February 2010, available at <http://www.peopleandplanet.net/?lid=29256&topic=23§ion=37>.

3 See e.g., Edna C. Eguh, 'The Bamako Convention and the First Meeting of the Parties: A Glance at Implementation Strategies' 7 (3) *Review of European Community & International Environmental Law* 256 (1998); UNEP, 'Hazardous Waste', available at <http://www.unep.org/ourplanet/imgversn/104/content.html>; Cyril Uchenna Gwam, 'Adverse Effects of the Illicit Movement and Dumping of Hazardous, Toxic, and Dangerous Wastes and Products on the Enjoyment of Human Rights', 14 *Florida Journal of International Law* 427 (2002).

4 See M. Sharpe, 'Climbing the E-Waste Mountain', 7/10 *Journal of Environmental Monitoring* 933-936 (2005); Greenpeace International, 'Where Does E-Waste End Up?', 24 February 2009, available at <http://www.greenpeace.org/international/en/campaigns/toxics/electronics/the-e-waste-problem/where-does-e-waste-end-up/>.

the United Nations,⁵ the relatively newer dimension to this problem relates to electronic wastes otherwise referred to as 'e-wastes' in trendy parlance, which has received paltry scholarly attention thus far.

Apart from urging a reconceptualisation of the electronic waste dimension to the global waste challenge in regulatory and trade terms, the underpinning thrust of this essay is that developing countries should find pragmatic ways of handling electronic waste because of their often toxic and hazardous substances that pollute the environment, expose people to diseases, and invariably violate a whole range of human rights.

2 ELECTRONIC WASTES: A RISING GLOBAL PHENOMENON

In the 1990s, governments in the European Union (EU), Japan, the United States (US) and some other industrialised countries began to tighten the regulatory framework against electronic wastes and simultaneously commenced the setting up of electronic waste retrieval and recycling systems. However, not all industrialised countries had the capacity to deal with the steep quantity of the electronic and electrical wastes they generated.⁶

5 See generally Mariana T. Acevedo, 'The Intersection of Human Rights and Environmental Protection in the European Court of Human Rights', 8 *N.Y.U. Environmental Law Journal* 437 (2000); Sumudu Atapattu, 'The Public Health Impact of Global Environmental Problems and the Role of International Law', 30 *American Journal of Law & Medicine* 283 (2004); Donna Craig and Michael I. Jeffery, 'Global Environmental Governance and the United Nations in the 21st Century', paper presented to the European Union Forum Strengthening International Environmental Governance, Sydney, 24 November 2006; Rebecca M. Bratspies, 'The Intersection of International Human Rights and Domestic Environmental Regulation', 38 *Georgia Journal of International & Comparative Law* 1 (2010).

6 See Jonathan Krueger, 'What's to Become of Trade in Hazardous Waste?', 41(9) *Environment* 10-21 (1999); Rob White, 'Toxic Cities: Globalizing the Problem of Waste', 35(3) *Social Justice* 107-119 (2008-09).

Consequently, therefore, such industrialised countries began exporting their predicament to developing countries where laws to protect workers and the environment are non-existent, inadequate or unenforced. It was also cheaper to 'recycle' waste in developing countries, as for instance, the cost of breaking down or recycling of electronics in the US is 26 times more than the cost in Nigeria. In this most populous African country, labour costs are much lower while safety and environmental regulations are ignored or corruptly negotiated. Krueger described the general scenario this way: 'in the late 1980s the average disposal cost for one tonne of hazardous waste in Africa was between \$US2.50 and \$US50, while in the OECD it ranged from \$US100 to \$US2000.'⁷

Electronic waste (or 'e-waste') is the term used to cover all types of electrical and electronic equipment that has or could enter the waste stream. Although electronic waste is a general term, it has assumed technical usage as a term covering any household or business item with circuitry or electrical components with power or battery supply.⁸ These may consist of electrical and electronic equipment and accessories that are non-operational or whose life cycles are extinguished. Obsolete electrical and electronic equipment include computers, televisions, audio-visual recorders, mobile phones, printers and other electronic goods such as air conditioners, electronic toys, washing machines, sewing machines, lawn mowers, elevators, kitchen equipment, therapeutic equipment, surveillance equipment, mobile radio transmitters, refrigerators, and their accessories. Although China and India used to be the 'dumping grounds' for such discarded global electronic wastes, several studies have exposed illegal exporting of electronic wastes from developed countries to African countries, and several Asian and Pacific

7 Jonathan Krueger, 'The Basel Convention and the International Trade in Hazardous Wastes', in Olav Schram Stokke and Øystein B. Thommessen (eds), *Yearbook of International Co-operation on Environment and Development 2001/2002* 44 (London: Earthscan, 2001).

8 See Sustainable Electronic Wastes Project (StEP), 'What is e-Waste?', available at <http://www.step-initiative.org/initiative/what-is-e-waste.php>.

countries, over the past few decades.⁹ Further levels of internally generated electronic wastes are rising across the developing world as well, a result of increased electronic goods consumption stemming, *inter alia*, from upward indices of material wealth in the so-called Third World countries.

Understandably, while the age of information superhighway has brought about many benefits, rising consumption of electrical and electronic equipment coupled with increasingly rapid obsolescence due to unrelenting technological advances, and diminishing product lifetimes has led to significant increases in global electronic wastes levels.

Although exact data are difficult to come by because of the often clandestine nature of the transboundary movements of toxic wastes and hazardous products, researchers estimate that some 50 million tonnes of electronic waste is produced annually around the world, of which only ten percent is recycled.¹⁰ The UNEP study of 2009 warns that by 2020, electronic waste in South Africa and China will have soared by 200-400 percent from 2007 levels, and by 500 percent in India.¹¹ Statistics also suggest that the United Kingdom alone is responsible for producing some 1 million tonnes per year of electronic wastes while the United States dumps between 300 and 400 million electronic items per year, and yet, less than twenty percent of those electronic wastes are properly recycled.¹²

This mounting crisis is compounded by low recycling rates, and illegal transboundary movement from developed to developing countries.¹³ At the same time, there is a significant increase in demand for electrical and electronic equipment from within developing countries, thus further contributing to future potential increases in electronic wastes.¹⁴

Individual demand for electrical and electronic equipment is rising at a considerable pace across developing countries, driven primarily by growing disposable incomes and the quest for the monetary values of components retrieved from obsolete electrical and electronic equipment.¹⁵ Empirical studies show that because discarded electronics contain precious materials such as copper, gold and silver, many informal recycling yards have sprung up in developing countries where workers are paid low wages to extract these valuable metals from these waste products.¹⁶ Demand in the poorer countries of Africa and Asia for electronic waste has steadily grown as informal scrap yards found they could extract valuable substances such as copper, iron, silicon, nickel and gold, during the recycling process. A mobile phone, for example, is 19 percent copper and eight percent iron.¹⁷

9 See K.N. Probst and T.C. Beierle, 'Hazardous Waste Management: Lessons from Eight Countries', 41(9) *Environment* 10-21 (1999); P.S. Goodman, 'Where Old Computers Go: China', *Washington Post, National Weekly Edition*, 3-9 March 2003; Maquita K. Hill, *Understanding Environmental Pollution* 298 (Cambridge: Cambridge University Press, 2007).

10 'Curbing the E-waste Problem', 25 May 2011, available at <http://planetgreen.discovery.com/tech-transport/curbing-the-electronic-wastes-problem.html>; Waste Management World, 'Undercover Investigations into E-waste Smuggling', 16 May 2011, available at http://renewable-energy-database.com/index/display/article-display/1498817050/articles/waste-management-world/markets-policy-finance/2011/05/Undercover_Investigations_into_Electronic_wastes_Smuggling.html.

11 See UNEP, note 1 above at 49. See also 'UN Conference to Tackle Growing Problem of 'e-waste'', *Deutsche Welle*, 22 February 2010, available at <http://www.dw-world.de/dw/article/0,,5274947,00.html>.

12 See Waste Management World, note 10 above.

13 *Id.* See also White, note 6 above at 114.

14 See UNEP, note 11 above.

15 Sustainable Electronic Wastes Project (StEP), *Annual Report 2010* 5 (Bonn: StEP, 2010). See also Kurian Joseph, 'Electronic Waste Management in India-Issues and Strategies', Proceedings of the Eleventh International Waste Management and Landfill Symposium, Cagliari, Italy, 1-5 October 2007, available at <http://www.swlf.ait.ac.th/UpdData/International/NRIs/Electronic%20waste%20management%20in%20India.pdf>.

16 See F. Berkhout and J. Hertin, 'De-materialising and Re-materialising: Digital Technologies and the Environment', 36(8) *Futures* 903-920 (2004). See also 'Curbing the E-wastes Problem', note 10 above; Axel Bojanowski, 'Recycling Precious Metals: Treasure Trove in World's E-Waste', 24 February 2010, available at <http://www.spiegel.de/international/world/0,1518,679871,00.html>.

17 See Junaidah Ahmad Kalana, 'Electrical and Electronic Waste Management Practice by Households in Shah Alam, Selangor, Malaysia', 1(2) *International Journal of Environmental Sciences* 132-144 (2010); I.C. Nnorom and O. Osibanjo, 'Overview of Electronic Waste (E-waste) Management Practices and Legislations, and Their Applications in Developing Countries', 52 *Resources, Conservation & Recycling* 843-848 (2008).

Despite this growing demand for, and saturation rates of, electronic and electrical equipment across the African continent, many people are unable to afford new electronic devices. The resultant quest for cheaper second-hand electrical and electronic equipment, coupled with low labour costs for reparation and refurbishment, has thus led to a strong electronic re-use market in developing countries, and is clearly strong across much of the developing world.¹⁸ Taking Nigeria as case study, for instance, the Standards Organisation of Nigeria (SON) declared that within the first quarter of 2010 alone, it destroyed over 30 container shipments estimated at three hundred million Naira (approximately two million US dollars).¹⁹ Ghana is reported to have imported 31,400 metric tonnes of used electrical appliances in 2010 alone, 75 percent more than what was imported in 2009, with the United Kingdom accounting for more than half the quantum of imports into that country.²⁰ In Tanzania, the World Bank asserts that over the last decade, personal computer penetration rates has risen ten-fold, while the number of people who own mobile phones has increased by over a hundred percent.²¹ Furthermore, reports commissioned by the Sustainable Electronic Wastes Project (StEP), a UN initiative that facilitates multimodal responses to the electronic wastes problem, indicate that electronic and electrical equipment markets remain unsaturated, particularly for ICT products, across the majority of the countries surveyed, indicating further future growths in electronic and electrical

equipment penetration across the developing world. This scenario is assuredly going to result in higher levels of domestic electronic wastes generation annually, due to the reduced lifespan of second-hand electrical and electronic equipment.²²

As would be expected, a substantial portion of the demand for second-hand electrical and electronic equipment in the developing world is met by discarded equipment from government agencies and companies. In Kenya, for example, this source stream of electrical and electronic equipment was found to contribute up to twenty percent of the stock of second-hand ICT equipment in the country as of 2009.²³ Much of the remaining demand for second-hand electrical and electronic equipment in developing countries is met by imports from developed countries. However, estimates from Greenpeace International, an independent international non-governmental organisation that acts to transform attitudes and actions in order to protect and conserve the environment and to promote peace, indicate that between 25 and 75 percent of second-hand electrical and electronic equipment imported into Africa arrived in an unusable condition, beyond repair.²⁴

In summing up this segment, it becomes discernible that the electronic waste problem is a global concern because of the nature of the generation, distribution and dumping of wastes in the globalised world economy.²⁵

18 UNEP, note 1 above at 51; Sarah Marriott, 'E-wastes: A Growing Environmental Problem for Africa', SANGONET Pulse, 7 September 2011, available at <http://www.ngopulse.org/article/e-waste-growing-environmental-problem-africa>.

19 'We Raided Lagos Computer Village to Remove Killer-Products - SON', *Vanguard Online Edition*, 9 October 2011, available at <http://odili.net/news/source/2011/oct/9/318.html>.

20 Kofi Adu Domfeh, 'Ghana's Political will to Curb Dumping of Electronic Wastes Questioned', *Modern Ghana*, 19 July 2011, available at <http://www.modernghana.com/news/340721/1/ghanas-political-will-to-curb-dumping-of-electronic-wastes-q.html>. See also Yaw Amoyaw-Osei et al., 'Ghana e-Waste Country Assessment: SBC e-Waste Africa Project', March 2011, available at http://ewasteguide.info/files/Amoyaw-Osei_2011_GreenAd-Empa.pdf.

21 See Marriott, note 18 above.

22 See A. Sepúlveda et al, 'A Review of the Environmental Fate and Effects of Hazardous Substances Released from Electrical and Electronic Equipments during Recycling: Examples from China and India', 30 *Environmental Impact Assessment Review* 29-41 (2010).

23 James Ratemo, 'E-waste Menace in Kenya Refuses to go Away', 31 July 2009, available at <http://kenyatech.wordpress.com/2009/07/31/e-waste-menace-in-kenya-refuses-to-go-away/>.

24 See Marriott, note 18 above.

25 There have been scholarly indications that globalisation is, after all, not a new phenomenon. See T. Larsson, *The Race to the Top: The Real Story of Globalization* 9 (Washington, DC: Cato Institute, 2001); M.J. Rippon, 'History of Globalization', available at <http://www.aeworldconnected.org/article.php/611.html>. See also The World Bank, *Globalization, Growth, and Poverty* 23-24 (Washington, DC: The World Bank, 2002) - identifying the 'new wave' of globalization of the post-1980s as the third wave of globalisation.

While it is hard to calculate overall amounts of electronic wastes, it is beyond question that hefty quantities end up at locations where dispensation takes place at very rudimentary levels. This engenders concerns in relation to capacity building, resource efficiency and also the shorter and longer term apprehensions about the perils to human beings and the environment. Certainly, there is a lengthy and often complex sequence of processes in the electronic waste menace, starting from an idea that an info-tech expert has conceived for making a new invention, then the fabrication of that product, leading to its commercialisation, procurement and, ultimately, its dumping by the consumer after the product's life span or usefulness. These are the issues that throw up the questions around waste management beyond its confinement as a legal issue *simpliciter*.

3 TRANSBOUNDARY MOVEMENT OF ELECTRONIC WASTES: THE SOCIO- LEGAL QUANDARY

The demand for used electrical and electronic equipment within developing countries runs in tandem with the demand for non-serviceable or near end-of-life products. Although the exportation of second-hand electrical and electronic equipment is legal in many developing countries, the exportation of electronic wastes is generally prohibited under international and regional treaty as well as under the statutes of several countries.²⁶ Nevertheless, transboundary shipments of electronic wastes occur due to costly environmental and social standards for electronic wastes recycling in, for example, European Union (EU) countries, the US and Japan.²⁷ Against

the backdrop of the 'Not-In-My-Back-Yard (NIMBY)' syndrome, for instance, waste disposal facilities are shrinking in most industrialised countries as a result of stricter environmental regulation, yet, such wastes are ending up as illegal shipments which are effectively liberating developed countries of the electronic wastes problem, at the expense of the human residents in the recipient developing world.²⁸

When the problem of this so called electronic wastes 'dumping' began to gain attention, it was China and India who were the main receivers. In recent times, however, studies are finding that such shipments were being exported beyond Asia to some African countries, with high volumes received by Ghana and Nigeria in particular.²⁹ The scale of these illegal transboundary shipments of electronic wastes is growing; estimates from 2010 indicate that 40 percent of electronic wastes from Europe alone are being exported to Asia and Africa.³⁰ In Nigeria, for example, estimates of the number of computer imports found to be non-functioning range from 75 to 95 per cent of each shipment.³¹

Not a few commentators have identified the growing phenomenon of hazardous and electronic wastes

26 See Elli Louka, *International Environmental Law* 424-426 (Cambridge: Cambridge University Press, 2006). For a comparative survey of legislative and policy responses to e-wastes in the EU, US, China, South Korea, Norway and Switzerland, see Paul Goodman, 'Current and Future Hazardous Substance Legislation Affecting Electrical and Electronic Equipment', 17(3) *RECIEL* 261, 264-267 (2008).

27 See White, note 6 above at 115.

28 For general scholarly discussions on the NIMBY syndrome and the push-and-pull factors around transboundary movement of electronic wastes, see Jason Lloyd, 'Toxic Trade: International Knowledge Networks and the Development of the Basel Convention', 3 *International Public Policy Review* 17-27 (2008) and Nnorom and Osibanjo, note 17 above.

29 Jinglei Yu et al, 'Forecasting Global Generation of Obsolete Personal Computers', 44(9) *Environmental Science & Technology* 3232 (2010).

30 O. Tysdenova and M. Bengtsson, 'Chemical Hazards Associated with Treatment of Waste Electrical and Electronic Equipment', 31 *Waste Management* 56 (2011).

31 See I.C. Nnorom and O. Osibanjo, 'The Challenge of Electronic Waste (E-waste) Management in Developing Countries', 25 *Waste Management & Research* 489-501 (2007); N.I. Onwughara, 'Disposal Methods and Heavy Metals Released from Certain Electrical and Electronic Equipment Wastes in Nigeria: Adoption of Environmental Sound Recycling System', 1(4) *International Journal of Environmental Science and Development* 290 (2010); The Africa Society, Addressing Environmental Problems in Africa, March 2008, available at <http://www.africasummit.org/publications/Environment.pdf>.

dumping in developing countries from the industrialised world as a direct consequence of economic globalisation.³² While globalisation has indeed been identified as transforming trade, finance, labour, migration, technology, communication, and governance, there can be no shying away from the reality that one of its negative collateral effects since the 1990s has been the reduction in the power of national governments in the face of global free market and technological advancements that have taken their regulation out of the reach of many governments.

What more? While international economic and financial integration is rapidly occurring as a result of increased trade and capital, technology and information flows, the production and sale of consumer goods *vis-à-vis* up-to-date technology is heavily and disproportionately weighed against developing countries.³³ And even though technological diffusion and advances in communications are occurring quite rapidly, very vast portions of the developing world are left out. This is the sort of atmosphere that leaves the developing world in the dire strait of incapacity to outrightly and effectively uproot the menace of dumping of wastes within their respective jurisdictions.³⁴

Although celebrated as the offshoot of the free market system that has characterised economic and trade liberalisation since the 1990s, the commodification of waste, whether legal or illegal, cannot be 'free trade' in the fullest sense, but smacks of some form of oppression – predation, exploitation, or coercion – unquestionably translating the so-called economic liberation theory of free market and globalisation into nightmarish

experiences for environmental and human rights protection in developing countries.³⁵

Environmental justice theorists have extended the philosophical issues here by contending that treating others fairly also involves recognising their membership in the moral and political community, promoting the capabilities needed for their functioning and flourishing, and ensuring their inclusion in political decision-making.³⁶ Moreover, they maintain that distribution, recognition, capabilities, and participation are interrelated and interdependent – one can therefore not pursue one dimension of justice in isolation.³⁷ Other writers have posited that within the context of toxic waste dumping, those who end up living closest to dumping sites and thus bearing the greatest adversities of toxic wastes are the poor, the homeless, street children and other vulnerable people at the lowest rungs of society. This reality manifests the deeper social problem of the environmental injustices that serve as catalysts for the human rights violations associated with the dumping of wastes.³⁸

32 See e.g., Paul Streeten, 'Globalization: Threat or Salvation?', in A.S. Bhalla (ed), *Globalization, Growth and Marginalization* 13-46 (New York: St. Martin's Press, 1998); C. Schmidt, 'Environmental Crimes: Profiting at the Earth's Expense', 112(2) *Environmental Health Perspectives* A96-A103 (2004) and Nnorom & Osibanjo, note 31 above.

33 *Ibid.*

34 See Alan Andrews, 'Beyond the Ban – Can the Basel Convention Adequately Safeguard the Interests of the World's Poor in the International Trade of Hazardous Waste?', 5(2) *Law, Environment & Development Journal* 167 (2009).

35 Padideh Ala'i, 'A Human Rights Critique of the WTO: Some Preliminary Observations', 33 *George Washington International Law Review* 533, 539 (2001); Frank J. Garcia, 'Is Free Trade "Free"? Is It Even "Trade"? Oppression and Consent in Hemispheric Trade Agreements', 5 *Seattle Journal for Social Justice* 505, 506 (2007).

36 See, e.g., Gwynne Wiatrowski Guzzeau, 'Indoor Air Pollution: Energy Problems in China's Residential Sector', 11 *Georgia International Environmental Law Review* 439, 455 (1999); G.F. Maggio, 'Inter/Intra-Generational Equity: Current Applications under International Law for Promoting the Sustainable Development of Natural Resources', 4 *Buffalo Environmental Law Journal* 161, 221 (1997); Randon H. Draper, 'Resuscitating the Victims of Ship Pollution: The Right of Coastal Inhabitants to a Healthy Environment', 15 *Colorado Journal of International Environmental Law & Policy* 181, 205 (2004); Philippe Sands, *Principles of International Environmental Law* 268 (Cambridge: Cambridge University Press, 2nd edn., 2003).

37 See David Schlosberg, *Defining Environmental Justice: Theories, Movements, and Nature* (New York: Oxford University Press, 2007); Lisa Widawsky, 'In My Backyard: How Enabling Hazardous Waste Trade to Developing Nations Can Improve the Basel Convention's Ability to Achieve Environmental Justice', 38(2) *Environmental Law* 577 (2008).

38 D. Simon, 'Corporate Environmental Crimes and Social Inequality: New Directions for Environmental Justice Research', 43(4) *American Behavioral Scientist* 633-645; D. Pellow, 'The Politics of Illegal Dumping: An Environmental Justice Framework', 27(4) *Qualitative Sociology* 511-525 (2004).

4

ELECTRONIC WASTES: THE ENVIRONMENTAL AND HUMAN RIGHTS DIMENSIONS

Several scholars across geo-cultural divides have argued that linking human rights with environmental issues creates a rights-based platform to environmental protection that places the people harmed by environmental degradation or pollution at its centre.³⁹ The articulation of the rights of human beings thus creates the opportunity to secure those rights through juridical bodies at the international and domestic fora. This has particular implications for those human groups that are most vulnerable to environmental harm and least able to access political remedies within their own meagre means. The connectivity between human rights and the environment reveals that human rights abuses often lead to environmental harm, just as environmental degradation or pollution often causes egregious human rights violations.⁴⁰

With more than one hundred national constitutions recognising and protecting the right to a safe, clean and healthy environment, and virtually all international and regional human rights treaty monitoring bodies also recognising the direct linkage between environmental harm and human rights norms, it is safe to posit that interjecting the electronic waste discourse from a rights-based perspective at this

juncture is neither out of place nor abstract. In her seminal work produced on behalf of the World Health Organisation in 2002, Shelton had proffered sweeping validation for the inclusion of a rights-based approach to every discourse on environmental health in the following words:

First, the emphasis on rights of information, participation, and access to justice encourages an integration of democratic values and promotion of the rule of law in broad-based structures of governance. Experience shows better environmental decision-making and implementation when those affected are informed and participate in the process: the legitimacy of the decisions exercises a pull towards compliance with the measures adopted. Another benefit of a rights-based approach is the existence of international petition procedures that allow those harmed to bring international pressure to bear when governments lack the will to prevent or halt severe pollution that threaten human health and well-being. In many instances, petitioners have been afforded redress and governments have taken measures to remedy the violation. In other instances, however, the problem appears to be the result of a combination of governmental lack of capacity and lack of political will. The pollution may be caused by powerful enterprises whose business and investment are important to the state or the state may have inadequate monitoring systems to ensure air or water quality. Even in these instances, however, petition procedures can help to identify problems and encourage a dialogue to resolve them, including by the provision of technical assistance.⁴¹

The non-functioning computers that arrive into most developing countries are sold as scrap, smashed up and discarded, a common practice within electronic wastes receiving countries that often lack capacity in the handling and recycling of the hazardous materials within the electronic wastes. Instead, manual dismantling, open burning to recover materials, and open dumping of residual

³⁹ See Dinah L. Shelton, *Human Rights, Health and Environmental Protection: Linkages in Law and Practice* 23 (A Background Paper for the World Health Organisation, 2002); Sumudu Atapattu, 'The Right to a Healthy Life or the Right to Die Polluted?: The Emergence of a Human Right to a Healthy Environment Under International Law', 16 *Tulane Environmental Law Journal* 65-126 (2002); Kaniye S.A. Ebeku, 'The Right to a Satisfactory Environment and the African Commission', 3 *African Human Rights Law Journal* 149-166 (2003).

⁴⁰ D. Olowu, 'The United Nations Special Rapporteur on the Adverse Effects of the Illicit Movement and Dumping of Toxic and Dangerous Wastes on the Enjoyment of Human Rights: A Critical Evaluation of the First Ten Years', 8(3) *Environmental Law Review* 199 (2006). See also Gwam, note 3 above at 433.

⁴¹ See Shelton, note 39 above at 24.

fractions occurs.⁴² In both China and India, this is predominantly carried out by a large organised informal electronic wastes recycling sector, whereas in African countries, with the exception of South Africa, where a formal electronic wastes recycling industry has evolved, these actions are carried out by individuals.⁴³ While in China, India and Malaysia, plastics, cathode ray tubes, and precious metals contained within the electronic wastes are retrieved, re-sold, or re-exported, in Nigeria and Ghana, it was found that only copper, aluminium and steel were recovered from electronic wastes.⁴⁴ Consequently, relatively more hazardous material is introduced into informal electronic wastes burning and dumping grounds across many developing countries, with higher implications for the environment and human health.

Electronic wastes present severe environmental and health challenges for the countries saddled with the task of processing them, by reason of both the quantity and inherent dangers of toxicity. Electronic wastes can contain more than a thousand assorted substances, many of which are lethal. These may be in form of heavy metals or chemicals such as mercury, lead, cadmium, chromium, magnetic properties and antimony (flame retardants), including polybrominated biphenyls, polyvinyl chloride, polychlorinated biphenyls, and polybrominated diphenyl ethers.⁴⁵ Perhaps the most

hazardous components of electronic wastes are the mercury-containing components, batteries, printed circuit boards, CRTs, and the plastics which contain the brominated flame retardants. Accidental leakages and evaporation of these substances occur at the electronic wastes dumping sites, and results in the contamination of surrounding natural resources including, soil, crops, water, livestock and fish.⁴⁶ Empirical studies at the Alaba Computer Village in Lagos, Nigeria, revealed lead, mercury, cadmium, arsenic, antimony trioxide, polybrominated flame retardants, selenium, chromium, and cobalt contents in soil samples at rates far higher than average.⁴⁷ Of course, when the electronic wastes are burnt, further toxic substances can be inadvertently generated.

Beyond the environmental degradation concerns, the hazardous materials found in electronic wastes pose a significant risk to human health. After all, empirical research has established that people who break electronic wastes open often suffer radiation, nausea, headaches, respiratory failure among other health problems.⁴⁸ However, it is not only the people working directly with electronic wastes who are susceptible to their harmful effects but also people living in the ambience of the waste dumps, and those indirectly affected through resulting contamination of the food chain, soils and rivers. These people are exposed to the hazardous substances through dermal exposure, dietary intake, dust inhalation or particle intake, with the latter two sources found to be particularly significant.⁴⁹

Other expert studies assert that exposure to chemicals from e-waste – including lead, cadmium, mercury, chromium and polybrominated biphenyls - could injure the human brain and nervous system, distress the kidneys and liver, and lead to birth defects.⁵⁰ The

42 See M. Streicher-Porte et al, 'One Laptop Per Child, Local Refurbishment or Overseas Donations?: Sustainability Assessment of Computer Supply Scenarios for Schools in Colombia', 90(11) *Journal of Environmental Management* 3498-3511 (2009) and Sustainable Electronic Wastes Project, note 15 above.

43 See Marriott, note 18 above. See also Palesa Siphuma, The National Environmental Management: Waste Act (Southern African Catholic Bishops Conference, Parliamentary Liaison Office, Briefing Paper, August 2011).

44 See W. Scharnhorst, L.M. Hilty and O. Jolliet, 'Life Cycle Assessment of Second Generation (2G) and Third Generation (3G) Mobile Phone Networks', 32(5) *Environment International* 656-675 (2006); Kalana, note 17 above; Joseph, note 15 above and Amoyaw-Osei, et al., note 18 above.

45 Lorenz M. Hilty, 'Electronic Waste – An Emerging Risk?', 25 *Environmental Impact Assessment Review* 431– 435 (2005); UNEP, note 1 above at 8; Andreas R. Köhler, Lorenz M. Hilty and Conny Bakker, 'Prospective Impacts of Electronic Textiles on Recycling and Disposal', 15(4) *Journal of Industrial Ecology* 496-511 (2011).

46 See Joseph, note 15 above.

47 See Marriott, note 18 above. See also Olagbaju Abioye, 'Electronic Waste Management in Nigeria: A Great Challenge', 3 *University of Ibadan Law Review* 84 (2003).

48 See Joseph, note 15 above and Marriott, note 18 above.

49 See 'Mountains' of E-waste Threaten Developing World', BBC News, 22 February 2010, available at <http://news.bbc.co.uk/2/hi/8528066.stm>.

50 See Krueger, note 7 above at 43; 'UN Conference to Tackle Growing Problem of 'E-Waste'', at *Deutsche Welle*, 22 February 2010, available at <http://www.dw-world.de/dw/article/0,,5274947,00.html>.

Minamata disease in Japan between 1954 and 1965; the Love Canal incident, near Niagara Falls in the US; the Koko incident of 1988 in Nigeria; the Thor Chemicals diseases of the early 1990s in South Africa; the disastrous Trafigura dumping of hazardous wastes incident in Ivory Coast, in 2006, are among the numerous pointers to the grave consequences that unscrupulous waste dumping could have on human beings, jeopardising their livelihood, liberty and very existence.

The essence of the above is to demonstrate that the totality of human rights guarantees and particularly the right to life, the right to development, and the entire gamut of economic, social and cultural rights cannot be realised in the absence of the right to a healthy environment.⁵¹

5

REGULATORY RESPONSES TO THE ELECTRONIC WASTE PHENOMENON

With the increase in the use of computers, mobile telephones, televisions and other types of electronic and electrical equipment, and the litany of environmental and health risks and challenges arising out of discarded products, diverse initiatives are being undertaken to address this emerging environmental concern; nevertheless, these initiatives are varied in design with varying degrees of success in addressing the challenges that e-waste brings. Against this backdrop, manufacturers of electrical and electronic equipments are continually being subjected to expanding limitations on the substances that they can use to build their products because many are hazardous substances that could potentially harm human beings and/or the environment. Consequently, legislative and policy regulations are being imposed with the European

Union (EU) in the vanguard, with other countries following with comparable restrictions.⁵²

In the EU, there are several pieces of legislation that restrict substances in electrical equipment. The two most important are RoHS Directive 2002/95/EC of 27 January 2003 on the restriction of the use of certain hazardous substances restricts six substances in eight categories of electrical equipment and Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the registration, authorisation and restriction of chemicals (REACH). Today, within the EU, restricted substances now include lead and its compounds; cadmium and its compounds; mercury and its compounds; hexavalent chromium (but not chromium metal or chromium in other oxidation states); polybrominated biphenyls (flame retardants); and polybrominated diphenyl ether (a family of flame retardants), although debates continue on the dichotomy between 'products' and 'wastes'.⁵³

Although the US is a signatory to the *Basel Convention on the Control of Transboundary Movement of hazardous Wastes and Their Disposal* ('the Basel Convention'), 1989, it has not ratified the treaty till date. Dreher and Pulver assert that this refusal may be connected to the 'blanket ban' proposed by the Basel Convention as well as the way 'waste' is defined.⁵⁴

Although the US Senate is currently reviewing bill S. 1397 – the Electronic Device Recycling Research and Development Act, individual States have commenced legislative responses to fill the lacuna in federal law, particularly on issues of collection and take-back of discarded devices.⁵⁵ As complementary measure, non-state actors have taken

51 See Shelton, note 39 above at 23-24; Olowu, note 40 above at 204; Ashish Kothari and Anuprita Patel, *Environment and Human Rights: An Introductory Essay and Essential Readings* (New Delhi: National Human Rights Commission, 2006).

52 See Goodman, note 26 above.

53 Karola Maxianova, 'Shipments of Electronic Waste: Providing the Right Incentives through Regulation and Enforcement', 17(3) *RECIEL* 270, 274-276 (2008).

54 *Id.* at 273-274. See also Kelly Dreher and Simone Pulver, 'Environment as 'High Politics'? Explaining Divergence in US and EU Hazardous Waste Export Policies', 17(3) *RECIEL* 308, 314-315 (2008).

55 Oladele A. Ogunseitan et al, 'The Electronics Revolution: From E-Wonderland to E-Wasteland', 326(5953) *Science* 670-671.

up governance roles in various national multi-stakeholder partnerships of state and non-state actors, at the federal level. The initiatives of the identified non-state actors have centred around (a) disposal in landfills and incineration; (b) take-back and recycling; and (c) exports, which are critical areas of concern implicated by the lack of federal legislative framework.⁵⁶

Contemporary patterns in the US and EU's management of e-wastes have their origins in the two entities' past hazardous waste management practices. The EU and the US have followed divergent trajectories in regulating the export of hazardous waste. Whereas the EU has been a leading advocate for banning the North-South trade in hazardous waste since 1989, the US has opposed such a ban and argued in favour of continued trade. This divergence is explained by differences both in the two entities' domestic institutions and in their valuations of international environmental leadership. First, differences in waste trade regulatory capacities, in international treaty ratification processes, and in the access of industry and non-governmental organisations to the environmental policy process have contributed to US-EU divergence on hazardous waste trade policy. Second, the US and EU have differed in the extent to which they seek international political leadership through environmental leadership.

The above analysis of the sharp divergence in the approaches of the EU and the US to e-wastes not only provides an explanation as to why the US and EU have regulated the North-South hazardous waste trade in dissimilar ways, but also lend significant insight into current waste trade issues, most notably the management of electronic waste, and more importantly, the lack of global leadership on e-wastes as an environmental problem deserving urgent attention.⁵⁷

Beyond the initiatives discussed above, there have been concerted efforts at developing global and region-specific treaties on the menace of hazardous wastes in general and e-wastes in particular. It will

⁵⁶ Stefan Renckens, 'Yes, We Will! Voluntarism in US E-Waste Governance', 17(3) *RECIEL* 286 (2008).

⁵⁷ See Dreher and Pulver, note 54 above at 318-319.

assist a holistic analysis to examine some of the most pertinent frameworks at this juncture.

5.1 The Basel Convention

The *Basel Convention* is the universal normative framework on the transboundary movement of wastes. This treaty attempts to regulate waste movements by imposing restrictions to reduce transnational movement of wastes and to provide incentives for effective waste management. The treaty prescribes that each country must become self-sufficient in managing its own wastes and wastes are to be disposed of as close as possible to the locus of origination.⁵⁸ The provision of Article 4(2)(b) also prescribes that shipments of waste must be reduced to the barest minimum, consistent with environmentally efficient standards of management.

It is remarkable to note that while Articles 4(1) and 6 of the treaty provides that prior notification and informed consent must be established between an exporting state and an importing state prior to waste exportation, these provisions are often more honoured in breach than in observance as states often circumvent the bureaucratic requirements of the treaty. This is so mainly because the treaty failed to specify what constitutes 'sound waste management' and the treaty also omits to prescribe explicit liability for non-compliance with its provisions.⁵⁹

The EU officially became a party to the Basel Convention, with the adoption of Council Decision 93/98/EEC, which ratified the Convention, and Council Regulation 259/93/EEC, which translated

⁵⁸ Article 4(2)(b). For background reading on the origins, contents, challenges and promise of the Basel Convention, see Katharina Kummer, 'The Basel Convention: Ten years On', 7 *Review of European Community & International Environmental Law* 3 (1998); T. Waugh, 'Where Do We Go from Here? Legal Controls and Future Strategies for Addressing the Transportation of Hazardous Wastes Across International Borders', 11 *Fordham Environmental Law Journal* 477, 502 (2001); Cyril Uchenna Gwam, 'Travaux Préparatoires of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal', 18 *Journal of Natural Resources & Environmental Law* 1 (2004) and Krueger, note 7 above.

⁵⁹ See Krueger, note 7 above at 43 and Lloyd, note 26 above at 18.

the Convention's principles into EU law. Both were adopted in February 1993. As already discussed, the US is a mere signatory to the Basel Convention.⁶⁰

5.2 The Bamako Convention

The Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa ('the Bamako Convention'), 1991, was adopted by the member-states of the defunct Organisation of Africa Unity (OAU), now African Union (AU), as a protest against the persisting dumping of hazardous and nuclear wastes in the territorial borders of African countries which the Basel Convention was perceived not to have effectively addressed.⁶¹ By reason of its history, therefore, the Bamako Convention included in its definition of 'hazardous waste' hazardous substances 'banned, cancelled or refused...in the country of manufacture.'⁶²

Ostensibly providing a regional framework to respond to Africa's peculiar challenges in the area of hazardous products and toxic wastes dumping, the Bamako Convention prescribes more stringent restrictions on transboundary movement of wastes. The treaty bans all waste importation into African territories, and criminalises such acts in express terms.⁶³ Regrettably, however, the Bamako Convention failed to prescribe enforcement and monitoring mechanisms but simply provided that states parties must adopt domestic legislation imposing strict, unlimited, joint and individual liability on generators of waste.⁶⁴ It is also

remarkable to note that the Secretariat of the Bamako Convention was not granted any authority in monitoring the treaty beyond what existed under the Basel Convention.⁶⁵

In its overall outlook, the Bamako Convention seeks to promote intra-African movement of wastes, urging African countries to collaborate with themselves in solving their mutual waste management problems.⁶⁶ Although the Bamako Convention was adopted in Bamako, Mali, on 30 January 1991, and entered into force on 22 April 1998 after securing ratification by ten countries, twenty years after its adoption, there are only 30 signatories while 23 states are parties to the treaty.

5.3 The Waigani Convention

Another notable regional treaty on the theme of this essay is the *Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement and Management of Hazardous Wastes within the South Pacific Region* ('the Waigani Convention'). This treaty opened for signature in Waigani, Papua New Guinea, in 1995, and entered into force in 2001. Apart from committing states parties not to import or export radioactive waste, to cooperate in preventing illegal import of such waste, to reaffirm existing commitments not to dump radioactive wastes at sea, and to 'give active consideration to the implementation of the IAEA Code of Practice on the International Transboundary Movement of Radioactive Wastes' and to 'participating in the development of a Convention on the Safe Management of Nuclear Waste',⁶⁷ the treaty made no effort to introduce any landmark regulatory framework against the menace of hazardous waste.⁶⁸

Without doubt, the Waigani Convention emerged as a radically weaker treaty in its prescriptions on hazardous waste than the 1991 Bamako Convention covering Africa. While the Bamako Convention

60 See Dreher and Pulver, note 54 above.

61 See Andrew Webster-Main, 'Keeping Africa out of the Global Backyard: A Comparative Study of the Basel & Bamako Conventions', 26 *Environmental Law & Policy Journal* 65 (2002).

62 Article 2(1)(d). For background reading on the origins, contents, challenges and promise of the Bamako Convention, see C. Russell and H. Shearer, 'Comparative Analysis of the Basel and Bamako Conventions on Hazardous Waste', 23 *Environmental Law* 141 (1993); Andrews, note 34 above and Webster-Main, note 61 above.

63 Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, Bamako, 29 January 1991, in force 22 April 1998, 30 *Int'l Leg. Mat.* 775 (1991), Article 4(1).

64 *Id.* Article 4(3)(b).

65 *Id.* Article 16.

66 *Id.* Articles 4(3) and 6(6).

67 *Id.* Article 4.

68 Michael, Hamel-Green, 'Waigani Convention - A Leaky Treaty', available at <http://www.klimaatkeuze.nl/wise/nl/node/4611>.

explicitly includes radioactive and hazardous wastes in its definition of wastes to be covered by the convention, the Waigani Convention specifically omitted radioactive and hazardous waste from most of the provisions of the Convention other than Articles 4(1)-(3) and 4(5).

In a region that had witnessed Japanese shipments of high-level radioactive waste and plutonium through South Pacific exclusive economic zones, and in the feared anticipation of a recurrence of radioactive waste shipments between Australia and either the Asian or North American mainlands,⁶⁹ one would have expected a sterner outlook from the Waigani Convention.

Flowing from the foregoing analysis, global and regional policy and regulatory responses have predominantly focused on banning transboundary shipments of wastes. Even at that, the potential for the optimal enforcement of these regulatory responses is inherently weakened by a combination of factors. It is regrettable that decades after these treaties were adopted; there are still recalcitrant states that have declined to become parties to them. The US, for one, has refused to accede to the Basel Convention, while only about half of the member states of the AU are parties to the Bamako Convention. The Waigani Convention has also not fared much better as otherwise eligible countries like France, Marshall Islands, United Kingdom and the United States have refused to join the Convention and Palau signed the treaty in 1995 without ratifying it.

Again, where these treaties were ratified, many states parties have not domesticated them as part of their municipal laws. The fall out is that these treaties are largely inadequately enforced, and have been mainly ineffective in both the sending and receiving countries. The stark reality of the ineffectiveness of treaties manifests when one remembers that international environmental law thrives on the

mutual consent of states evidenced by multilateral treaties. In the absence of the ratifications by major exporting states, these treaties are bound to suffer.

It therefore becomes inevitable, that if developing countries are to stem the tide of the menace of electronic wastes, alternative strategies must be developed. It is acknowledged that alternative solutions may include but are not limited to recycling technology transfer and increased manufacturer responsibility, although neither has been extensively effective in developing countries up till now.

Beyond the non-ratification and non-domestication of relevant treaties lies another challenge: the tendency among some developing countries to enter into agreements to serve as recipient domains for wastes generated in the industrialised world, contrary to international prohibitory regimes.⁷⁰

6

ELECTRONIC WASTES: QUEST FOR ALTERNATIVE STRATEGIES AND APPROACHES

The electronic industry has revolutionised the world over last decades as electrical and electronic products increasingly have become an essential part of everyday human life worldwide. While no one can categorically quantify how much electronic wastes are presently being circulated globally or how much of this waste is hazardous, what is definite is that, if not properly managed, electronic wastes have the potential of threatening human health and the environment. Waste experts, as well as industrialists,

⁶⁹ See Duncan E.J. Currie, *The International Law of Shipments of Ultra-hazardous Radioactive Materials: Strategies and Options to Protect the Marine Environment* (Paper presented at the South Pacific Regional Workshop on Criminal Law and its Administration in International Environmental Conventions, Apia, Western Samoa, 22-26 June 1998).

⁷⁰ See, e.g., the Agreement of Cooperation Between the United States of America and the United Mexican States Regarding the Transboundary Shipments of Hazardous Wastes and Hazardous Substances, 12 November 1986; the Waste Shipment Agreement between Germany and Zimbabwe, 31 May 1994; and the Agreement between Australia and the Democratic Republic of East Timor on Transboundary Movements of Hazardous Wastes, 31 October 2002.

environmentalists, and governments, increasingly agree that the response is to generate as little waste as possible in the first place, through the related concepts of cleaner production and eco-efficiency.⁷¹ Cleaner production generates less waste, and reuses and recycles more of what it is produced. Eco-efficiency uses fewer raw materials and there is an upward consensus that industrial societies could cut consumption of them by 90 per cent, while still greatly improving living standards.⁷²

Although a wide range of environmentally-effective technologies are now available to mitigate emissions and provide public health, environmental protection and sustainable development benefits, and commentators readily subscribe to the sweeping measures and standards adopted against the problem of electronic waste in Europe and the US as the pathway to solve the problem in developing countries,⁷³ the capacity of most developing countries to procure such technologies or the skills to operate and maintain them are limited.⁷⁴ It is therefore plausible to suggest that solving the e-waste problem in the developing world must necessarily entail a multi-pronged approach.

While many governments in developing countries are increasingly becoming conscious of the crisis of electronic wastes and aiming to tackle it, others have not domesticated the respectively applicable Basel, Bamako, or Waigani treaties as part of their municipal laws. However, for African countries, it would appear that the 2006 Nairobi Declaration on Environmentally Sound Management of Electronic and Electrical Waste, followed by the 2008 Durban Declaration on E-waste Management in Africa, and

more recently by the Bamako Declaration on the Environment for Sustainable Development, 2010, would seem to suggest that the challenges confronting the continent is more than what could be sacrificed on the altar of political expediency. The latter instrument, for the first time, sought a multidimensional approach to the problem by appealing to the involvement of 'young people, civil society, the Pan-African Parliament and national assemblies, government institutions and other stakeholders constructively in supporting measures aimed at environmental management.'⁷⁵

Today, several African countries are drawing up policies regarding electrical and electronic equipment; some are focusing on the age of imported electrical and electronic equipment, for example Ghana is considering a ban on electrical and electronic equipment that is older than five years, while Uganda has banned second-hand electrical and electronic equipment from entering the country,⁷⁶ while Nigeria is developing its own guidelines to ensure environmentally sound management of e-waste, and is in discussions with a UK-based waste from electrical and electronic equipment recycler to establish a facility in Lagos.⁷⁷ Nevertheless, global, regional and national policies focussing on banning or regulating imports, or practices such as open burning have so far been weakly enforced, and have not enabled effective and significant management of electronic wastes treatment.

Furthermore, transnational export/import tariffs do not make a distinction between second-hand or unserviceable electrical and electronic equipment and brand new electrical and electronic equipment, which complicates the system of restraining or curbing the illegal import of electronic wastes.⁷⁸ Perhaps instead of bans on imports and on informal

71 See UNEP, note 1 above; C. Hagelüken, Improving Metal Returns and Eco-Efficiency in Electronics Recycling 218-223 (Proceedings of the 2006 IEEE International Symposium on Electronics and the Environment, 2006).

72 See UNEP, note 1 above; Nickolas J. Themelis, 'An Overview of the Global Waste-To-Energy Industry', *Waste Management World* 40-47 (2003-2004).

73 See, e.g., N.I. Onwughara et al, note 31 above at 296-297; Joseph, note 15 above and Marriott, note 18 above.

74 M.J. Realf et al, 'E-Waste: An Opportunity', 7(1) *Materials Today* 40-45 (2004); R. Widmer et al, 'Global Perspectives on E-Waste', 25(5) *Environmental Impact Assessment Review* 436-458 (2005) and UNEP, note 1 above at 24.

75 See Paragraph 70, Bamako Declaration on the Environment for Sustainable Development, Thirteenth Session of the African Ministerial Conference on the Environment, Bamako, Mali, 23-25 June 2010, available at http://www.unep.org/roa/amcen/amcen_events/13th_Session/Docs/AMCEN-13-CRP-2_ENG.pdf.

76 See Marriott, note 18 above.

77 See Onwughara et al, note 31 above at 295.

78 See Ikechukwu Chime, 'Trade Related Environmental Measures: A Threat to Developing Countries', *Oil, Gas & Energy Law* 1 (2003).

electronic wastes recycling practices, it is being suggested that both should be more efficiently controlled, and that it is especially vital to include the informal sector within decisions and resulting actions.⁷⁹

The risks to the environment and human health connected with informal electronic wastes practices within developing countries could potentially be reduced significantly through the use of better dismantling methods. With particular regard to electronic wastes, for example, modern recycling plants can recover or re-use equipment material, leaving only a tiny portion as waste. The envisaged future is one in which societies have reduced to a sustainable level the e-waste-related burden on the ecosystem that results from the design, production, use and disposal of electrical and electronic equipment.

One further way forward will be to transfer the global problem of e-wastes to the individual scale in order to increase individual involvement. Actions, targeting the different social classes, should be taken to raise awareness levels through the available means. After all, as experiences from Jordan, Thailand, and China show, separating waste at generation sources has proven to be much easier and more cost effective than at later stages.⁸⁰

In terms of regulations, since achieving a complete universal approach to the problem of e-waste is proving to be thorny, each developing state should develop its own legal and policy framework on transboundary movements and management of e-wastes similar to the Administrative Measures on Control of Pollution Caused by Electronic Information Products (known

as 'China RoHS') of 2006 and the Ordinance on the Administration of the Recovery and Disposal of Waste Electronic and Electrical Products (known as 'China WEEE') of 2009.

In policy terms, one path less taken by developing countries is subscription to the Poverty-Environment Initiative (PEI) of the United Nations Development Programme (UNDP) and the UNEP. The PEI supports country-led efforts to mainstream poverty-environment linkages into national development planning and provides financial and technical assistance to government partners to set up institutional and capacity strengthening programmes and carry out activities to address the particular poverty-environment context. Regrettably, less than 50 developing countries are current partakers of this initiative.⁸¹

The above makes it critical that approaches and responses to the phenomenon of hazardous electronic wastes begin to integrate proper conceptualisation along with the poverty question in many developing countries. Warnings are emerging that global warming, climate change, and depletion of the ozone layer are all indications of the limit of the Earth's capacity to assimilate wastes. These wastes, in whichever form they come, have direct linkages to the desperate quest for survival and livelihood in several countries, developed and developing alike.⁸²

While legal frameworks and policy initiatives are indeed veritable components of appropriate responses to the menace of electronic wastes in developing countries, there is no gainsaying the fact that strategic responses must bring all actors to the table. The bottom-line of the contention here is that all the actors along the product-disposal chain share responsibility for the environmental impacts of the

⁷⁹ For indications to this effect, see Lagos State Environmental Protection Agency, EKO Declaration on E-Waste 2011: Communiqué, The 1st Eko Summit on E-waste, Lagos, Nigeria, 24-25 February 2011, available at <http://www.lasepa.org/COMMUNIQUE.pdf>.

⁸⁰ See Panate Manomaivibool and Sujitra Vassanadumrongdee, 'Extended Producer Responsibility in Thailand: Prospects for Policies on Waste Electrical and Electronic Equipment', 15(2) *Journal of Industrial Ecology* 185 (2011); Feras Y. Fraige, et al, 'Waste Electric and Electronic Equipment in Jordan: Willingness and Generation Rates', 55(2) *Journal of Environmental Planning and Management* 161 (2012).

⁸¹ See UNDP-UNEP, 'What is the Poverty-Environment Initiative?', available at <http://www.unpei.org/#>.

⁸² See generally Peter M. Vitousek et al, 'Human Appropriation of the Products of Photosynthesis', 36(6) *Bioscience* 368-373 (1986); Environmental Research Foundation, 'Poverty is an Environmental Issue-Confronting Real Limits to Growth', *Rachel's Hazardous Waste News* No. 256, 23 October 1991, available at <http://www.ejnet.org/rachel/rhwn256.htm>; UNEP, note 2 above n. 2 and Andrews, note 34 above at 172, 184.

whole product system. The greater the ability of each stratum of actor(s) to influence the environmental impacts of the product system, therefore, the greater the share of responsibility for addressing those impacts should be. The actors contemplated within the framework of this discussion are the product manufacturers, the suppliers, and the consumers. Manufacturers should reduce the life-cycle environmental impacts of their products through their influence on product design, material choices, manufacturing processes, product delivery, product system support, and product disposal mechanisms. Suppliers should have a significant influence by providing manufacturers with environmentally friendly materials and components. Consumers should affect the environmental impacts of products in a number of ways, namely, by way of purchase choices (i.e. choosing environmentally friendly products), adopting good maintenance culture and environmentally-conscious operation of electronic products, and careful end-of-life disposal special care in disposing of household electronics containing toxic substances and returning them to proper facilities where possible.

7 CONCLUSION

The core of the discussion here has been the impact of the transboundary movement of hazardous electronic wastes to the weaker developing countries of the world. Although electronic waste is just one among many other hazardous wastes, the genre considered in this essay is one which can assume very latent but lethal dimensions on human lives and livelihood. The central objective is to accentuate the need for urgent action in reducing this menace.

It has been argued that current environmental issues require new approaches. The linking of the phenomenal increase in waste generation and dumping in developing countries with human rights and environmental protection in this essay is thus an acknowledgement that prohibitions of transboundary movement of hazardous waste alone

will not be successful without effective multimodal approaches. A range of diverse actions are therefore required at national, regional and international levels, anchored on rights-based strategies as the foundation for action. Such an understanding for new approaches requires a new focus on governance and accountability in and among developing countries. The civil society needs to be strengthened within and across borders, enabling national and local organisations to play their part in all matters connected with environmental governance and to influence the use and allocation of resources more effectively.

The overarching premise of this essay is that the links between poverty, development and environmental pollution and degradation are strong. These links need to be openly addressed to provide a common foundation under international and regional law for all future action on sustainable development in developing countries.

Far from being an *ex cathedra* pronouncement on all the dynamics that should inform the strategic, legal and policy responses of developing countries to the phenomenon of the dumping of hazardous electronic wastes into their territories, this essay is simply a modest contribution to the intellectual inquiry required for a sustained culture of critique and reflection on the global waste menace and it would have achieved its purpose if it stimulates further scholarly discussions.

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