



LAW
ENVIRONMENT AND
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JOURNAL

LEAD

THE INFLUX OF USED ELECTRONICS INTO AFRICA: A PERILOUS TREND

Aniyie Ifeanyichukwu Azuka

COMMENT



VOLUME
5/1

LEAD Journal (Law, Environment and Development Journal)
is a peer-reviewed academic publication based in New Delhi and London and jointly managed by the
School of Law, School of Oriental and African Studies (SOAS) - University of London
and the International Environmental Law Research Centre (IELRC).

LEAD is published at www.lead-journal.org

ISSN 1746-5893

*The Managing Editor, LEAD Journal, c/o International Environmental Law Research Centre (IELRC), International Environment
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This document can be cited as
Aniyie Ifeanyichukwu Azuka, 'The Influx of Used
Electronics into Africa: A Perilous Trend',
5/1 *Law, Environment and Development Journal* (2009), p. 90,
available at <http://www.lead-journal.org/content/09090.pdf>

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* Thanks to Aniyie Uwandi Kelvin for the provision of the route for sourcing of a majority of the resources utilised in putting together this article as well as the hardware with which I worked, Omiunu Omoikehi for providing medical referencing and my anonymous specialist reviewer; your comments improved this essay.

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1

INTRODUCTION

Rather than having to face the problem squarely, the United States and other rich economies that use most of the world's electronic products and generate most of the E-Waste, have made use of a convenient, and until now, hidden escape valve – exporting the E-waste crisis to the developing countries.¹

Imagine living with a waste dump as your next door neighbour? However, this is not like your everyday dumpsite. The peculiarity of this dumpsite lies in the fact that it is mostly composed of remains of televisions, computer keyboards, monitors, GSM handsets, and a variety of other electronics and electrical appliances. Furthermore, imagine that this dumpsite is the 'place of work' or 'play pen' of hundreds of children and unemployed adults. This is not a pale shadow of our reality. This scenario exists in numerous cities of Africa. Upon a walk through the major streets of the cities of Africa, one finds dumpsites made up of a motley collection and remains of electronics and electrical appliances.² In the city of Lagos, Nigeria – where a whole community in Ikeja hosts the trade of electronics and electrical appliances of different ages – these dumpsites clog canals and channels meant for run – off water, thus aggravating the state of an already bad environment.

Where do the items constituting these dumpsites come from? This question is pertinent in view of the fact that the African countries where these e-waste are being stockpiled at an alarming rate, lack the technology to manufacture the primary product or have the consumption pattern to generate these remains or put them to other use. This paper is divided into two parts: the first is dedicated to answering the foregoing question

and bringing to light the lethal nature of these items. The second examines the conduct of the actors amidst the precinct of international environmental instruments and postulates that a lot more needs to be done by all and sundry to stem this hideous and dastardly trend.

2

USED ELECTRONICS ARE E-WASTE

Electronics waste or e-waste is electronics that have outlived their use or have exceed their shelf life. They are basically what the original purchaser has no desire of keeping any longer and thus it amounts to waste.³ Used electronic are e-waste as a result of the forgoing. E-waste encompasses a broad and growing spectrum of electronic and electrical devices ranging from large household appliances such as refrigerators, air conditioners to personal computers and cellular phones.

Used electronics is an amalgam of materials ranging from precious metals like gold and silver to complex compounds like Brominated Flame Retardants (BRTs), Triphenyl Pphosphate (TPPs), plastics and gases. These materials are found in different parts and components of used electronics (e-waste) in varied quantities as a result of the use to which they are put.

1 Jim Puckett *et al.*, *Exporting Harm: High – Tech Trashing of Asia 1* (Seattle, WA: The Basel Action Network, 2002) available at <http://www.etoxics.org/site/DocServer/technotrash.pdf?docID=123>.

2 In this article, 'electronics' and 'electrical appliances' will be used sometimes independent of each other, and where this is done, it is with reference to the other.

3 The World Health Organisation (WHO) defines waste in similar terms. It states that waste is something which the owner no longer wants at a given place and time and which has no current or perceived market value. *See* Michael Purdue, 'Defining Waste', 2 *Journal of Environmental Law* 259 (1990), cited in Folarin Dimowo and Vincent Akpotiare, 'Hazardous Waste Management in Nigeria and Europe: The Point of Diversion and Its Consequences', 1 *Nigerian Contemporary Law Journal* 20 (2000).

Figure 1: Used Electronics Unravalled

NAME	U SE	LOCATION	EFFECT/ DISEASE
Lead	Metal joining; Radiation shield; Lead acid; Stabilisers in PVC ⁴ cables; Spray painting; Foundry work; Battery component	Cathode ray tubes (CRT); Batteries; PVC cables; Paints	Renal toxicity; Anaemia; Colic; Insomnia; Kidney Damage in the form of Chronic Tubulointerstitial; Sensory and intellectual impairment; Retarded psychomotor development; Blindness; Seizures and coma in children
Cadmium	As cadmium metal in some switches and solder joints; Phosphor coatings in CRT; Ultra violet stabilisers in PVC cables; in rechargeable batteries	Housing; CRT; Batteries; PVC	Damage to kidney and bone structure; Renal toxicity; Prostrate cancer
Mercury	Lightening components for flat screen display units; Switches and relays; Battery components;	Batteries; Housing; Medical equipment	Renal toxicity; Muscle tumours; Mental retardation; Cerebral palsy; Inhibits enzymatic activity
Antimony	Flame retardant; Metal solders; Diodes; Additive in plastics, manufacture of lead starter batteries	Housing; CRT	Skin problem; Dermatitis
Arsenic	Doping agents	Transistors	Cancer of skin, lung, liver
Beryllium	Thermal and electricity conductor	Connectors; Mother boards and finger clips	Skin disease; Acute lung irritation; Berylliosis; Lung cancer
Nickel	Electroplating; Structural work	Steel housing; CRT	Cancer of lung and nasal sinuses
Chromium	Decorative or hardener of steel housing; Corrosion protection of untreated and ungalvanised steel plates	Steel housing	Cancer of lung and nasal cavity; Damage to DNA ⁵
Cobalt	Structural work; Magnetivity	Steel housing; CRT	Lung fibrosis; Asthma

4 PVC is acronym for polyvinyl chloride. It is a tough synthetic material made by polymerising vinyl chloride.

5 DNA is acronym for deoxyribonucleic acid. It is a nucleic acid molecule in the form of a twisted double strand double helix. It is the major component of chromosomes and carries genetic information. It is found in all living organisms except some viruses. It reproduces itself and is the means by which hereditary characteristics pass from one generation to the next.

Barium	To protect computer users from radiation	CRT, Vacuum tube	Brain swelling; Muscle weakness; Damage to the heart, liver and spleen
Toner ⁶	Printing	Printers	Respiratory tract irritation
Brominated Flame Retardants (BRTs)	Flame retardant	Plastic housing of electronic equipment and circuit boards	Suspected immune and endocrine system disruptors; Capable of interfering with normal brain development in animals
Polychlorinated Biphenyls (PCBs) ⁷	Insulating fluids; Flame retardant; Transformer oils	PVC and polymer; Electrical transformers and capacitors; Paints; Printing inks	Suppression of immune system; Damage to the liver, nervous as well as the male and female reproductive systems
Silica	Glass; ⁸ Solid state devices	CRT	Silicosis ⁹
Nonylphenol (NP)	As antioxidant in plastics	Housing; Casing; Insulators	Endocrine disruptor; Capable of causing damage to DNA and sperm function in humans; Capable of causing intersex ¹⁰ in fish
Triphenyl Phosphate (TPPs)	As flame retardant	Casings of monitors	Acutely toxic to aquatic life; Causes contact dermatitis; Endocrine disruptor

6 These are usually black or coloured. The main component of black toners is a pigment known as carbon black which the International Agency for Research on Cancer has classed it as a 2B carcinogen. Coloured toners contain heavy metals which are also hazardous. *See* Jim Puckett et al., note 1 above at 12.

7 PCBs are a group of synthetic chemicals that contain about 209 individual compounds known as congeners. Each of these compound is a hazardous material and lethal to man, flora, fauna and the environment. *See* Kevin Brigden et al., Recycling of Electronic Waste in China and India: Workplace & Environment Contamination Report 31 (Netherlands: Greenpeace Int., 2005), available at <http://www.etoixics.org/site/DocServer/greenpeace.pdf?docID=281>.

8 The glass of monitors and television is about 20 per cent lead by weight. *See* 'Toxic TVs and Poison PCs' available at <http://etoixics.org/site/DocServer/ppc-ttv1.pdf?docID=124>.

9 This is caused by the inhalation of crystalline silica.

10 A condition where individuals have both male and female characteristics.

Chlorofluorocarbons (CFCs) ¹¹	As refrigerants, propellants	Domestic and commercial refrigeration and air conditioning/heat pump equipment; Air conditioning and heat pump units ; Aerosol products; Portable fire extinguisher; Insulation boards, panels and pipe covers; Pre-polymers	Depletion of the stratospheric ozone layer and an increase in the earth's temperature (the 'greenhouse effect'); Significant increases in skin cancer in humans and dramatic changes in weather patterns; Damage to crops and to marine phytoplankton
Hydrofluorocarbons (HFCs) and Hydrochlorofluorocarbons (HCFCs)	-ditto-	-ditto-	Capable of acute effects, including anesthetic and affecting the central nervous system; Can lead to heart damage; Risk of liver damage and liver tumour formation as a result of exposure to it.

SOURCE: Adapted from the Kumar *et al.*,¹² Toxic TVs and Poison PCs¹³; K. Brigden *et al.*,¹⁴ Jim Puckett *et al.*,¹⁵ Workplace Health and Safety Bulletin (Revised, November 2006) Chemical Hazards;¹⁶ The Montreal Protocol on Substances that Deplete the Ozone Layer: as either adjusted and/or amended in London 1990, Copenhagen 1992, Vienna 1995, Montreal 1997, Beijing 1999¹⁷.

Used electronics is a mix of bio – accumulative, non - degradable¹⁸ and carcinogenic lethal toxins. The table above contains information as to some of the materials used in the manufacture of the primary products that transforms into e-waste, the use to which they are put amongst other things. Also, the effect of the primary product on the physiology of man, flora and fauna are adumbrated in the table. The effect on the environment where these e-waste are dumped was however not included at every point in the table, but it should be noted that it is deleterious, catastrophic and often

11 As part of efforts to protect people and the environment, an international agreement - the *Montreal Protocol on Substances that Deplete the Ozone Layer* - was reached in September 1987 to phase out all fully halogenated CFCs by the year 2000 and to regularly review the use of transitional ozone-safe alternative refrigerants, which are scheduled to be replaced not later than 2040. Under it, almost all the members of the United Nations agreed to restrict the future availability of fully halogenated CFCs.

12 See Vinay Kumar et.al ed., *Robbins Basic Pathology* 268-280 (India: Elsevier, 2003).

13 See Toxic TVs and Poison PCs, note 8 above.

14 See Brigden, note 7 above at 3 – 6.

15 See Puckett *et al.*, note 1 above.

16 See Workplace Health and Safety Bulletin, available at http://employment.alberta.ca/documents/WHS/WHS-PUB_ch043.pdf.

17 The Montreal Protocol on Substances that Deplete the Ozone Layer, available at <http://www.unep.org/OZONE/pdfs/Montreal-Protocol2000.pdf>.

18 Sequel to finding its way into the human system, cadmium settles in the kidneys where it remains for a duration of at least 10-20 years as it has a half life of that duration. The world is not oblivious of the lethal nature of Lead. The United States government in 1978 placed a ban on the use of Lead – based paints in houses after the fact that the major source of Lead exposure among US children is Lead-based paint and Lead-contaminated dust found in deteriorating buildings was confirmed. Presently, approximately 434,000 children aged 1-5 years in the US have blood Lead levels greater than the US Centre for Disease Control recommended level of 10 micrograms of lead per decilitre of blood. See anonymous, Lead Poisoning available at http://www.medicinenet.com/lead_poisoning/article.htm.

irreversible.¹⁹ Consequently, used electronics and/or e-waste are hazardous waste.²⁰

Figure 2: Quantity of Materials in E-waste²¹

MATERIAL	WEIGHT OF MATERIAL (lbs)	PERCENT OF MATERIAL IN E-WASTE
LEAD	13.8	6.2988
ALUMINUM	8.5	14.1723
IRON	12.3	20.4712
BERYLLIUM	<0.1	0.0157
ANTIMONY	<0.1	0.0094
CHROMIUM	<0.1	0.0063
CADMIUM	<0.1	0.0094
PLASTICS	13.8	22.9907
SILICA	15	24.8803
NICKEL	0.51	0.8503
SELENIUM	<0.1	0.0016

19 For example, in the village of Guiyu in the Chaozhou region of Guangdong Province of China, studies reveal that as a result of the dumping and primitive recycling of e-waste that had been undertaken by the villagers in that community, the Lead level in the natural occurring water bodies is 2,400 times higher than the WHO Drinking Water Guidelines. Likewise other heavy metals found in circuit boards and CRTs were found in very high quantities. Barium was found to be almost 10 times higher than the level benchmarked by the Environmental Protection Agency. Tin and chromium were found to be 152 and 1,338 times respectively higher than the limit set by the Environmental Protection Agency. Another impact of the activities in the community is the deterioration of the local drinking water supply. The e-waste recycling in Guiyu has being on for over six years and due to groundwater pollution, water has had to be trucked in from the town of Ninjing, 30 kilometers away. The local residents claim that the water has become foul tasting. See Puckett, *et al*, note 3 above at 16 – 22. See also, Elizabeth Grossman, Where Computers Go to Die - and Kill, available at <http://www.salon.com/news/feature/2006/04/10/ewaste/>.

20 Hazardous wastes are materials that are intended to be discarded and which are potentially injurious to human health and the environment because of their intrinsic hazardous characteristics. See Margret Okorodudu – Fubara, *Law of Environmental Protection*, 795 (Nigeria: Caltop Pub., 1998).

SOURCE: Adapted from *Toxic TVs and Poison PCs*²²

From the above table, the materials come across as existing in trace amounts and ostensibly innocuous. That is far from the truth. This is because their deadliness is as a result of the fact that they are bio – accumulative and leaving them lying around without being recycled or disposed of in an environmentally sound manner leads to their accumulation and they become patently lethal as a result of the fact that they are not degradable.²³

21 These statistics are with reference to a typical desktop computer with a fourteen or fifteen inches monitor weighing about 60 lbs.

22 See *Toxic TVs and Poison PCs*; note 8 above.

23 It is on record that as at 2004, over 315 million computers had become obsolete. This represents a total of almost 2 million pounds of cadmium, more than 400,000 pounds of mercury and about 1.2 million pounds of chromium present and left lying around within the environment. This will slowly but steadily poison all that exists within same. See *Electronic Product Recovery and Recycling Baseline Report*, cited in *Toxic TVs and Poison PCs*, note 8 above at 12 – 14.

3

E-WASTE: WHERE DO THEY COME FROM²⁴

This section focuses on determining the origin of the e-waste finding its way into Africa. The creation and proliferation of e-waste is as a result of the advancements in ICT, electrical and electronics engineering which has in turn given birth to the throw – away culture now existing in industrialised nations of the world;²⁵ the manufacture of non upgradeable goods/ products with limited life spans and in availability of components, a stratagem referred to as planned obsolescence;²⁶ and the fact that manufacturers of these electronics do not have the facilities to adequately take care of the cast – offs from the manufacture of the primary products; or have not being able to successfully design and manufacture eco – friendly products²⁷ or are just not interested in improving the status quo, has further led to the proliferation of e-waste.

The quantity of e-waste on the planet has reached crisis level on a global scale. According to the United Nations, about 20 to 50 million tons of it is generated annually globally,²⁸ the bulk of it being generated by the

industrialised nations of the world.²⁹ Exportation of waste to developing countries is one of the routes which the latter have taken in dealing with this menace so as to dodge the expense of disposal and close public scrutiny within their borders. Up to 80 per cent of the e-waste from the United States of America is shipped off to developing countries, while a massive 75 per cent of about 8.7 million tons of e-waste which is generated annually within the European Union is not accounted for and not part of the internal recycling process.³⁰

It should be noted that this movement of e-waste from industrialised nations to developing nations is never always ex gratia. As a matter of fact, there is a booming trade in used electronics – and by extension, e-waste. The export to developing countries is motivated entirely by economic forces. The bulk of the e-waste generated by industrialised economies end up in developing countries after going through an export/ import trail created by numerous players. Generators find it profitable because it saves cost and more often than not, earns them income as they pass the used electronics to other persons to dispose off instead of incurring disposal cost, as well as provide them with the opportunity of complying with the legal/ regulatory regime of the polity wherein they operate or dodging

24 See Hidden Flow: The Rising Tide of European Waste in West Africa, available at <http://ghanaconsumerwatch.wordpress.com/2009/06/17/hidden-flow-the-rising-tide-of-european-e-waste-in-west-africa-ghana/>.

25 Toxics Link, E-waste in India: System Failure Imminent – Take Action Now!, available at <http://www.noharm.org/details.cfm?type=document&id=1175>.

26 See Mario Rautner and Casey Harrell, Green Electronics - The Search Continues 11 (The Netherlands: Greenpeace Int., 2008), available at <http://www.greenpeace.org/raw/content/usa/press-center/reports4/green-electronics-the-search.pdf>.

27 *Id.* This is a publication of the result of a survey carried out by Greenpeace International on which consumer electronics company has the most eco – friendly product for the year 2008.

28 See Kevin Brigden et al., Chemical Contamination at e-waste Recycling and Disposal Sites in Accra and Korforidua, Ghana 2 (The Netherlands: Greenpeace Int., 2008).

29 In USA, it accounts for about one per cent to three per cent of the total municipal waste generation. In European Union (EU), e-waste is growing three times faster than average annual municipal solid waste generation. A source estimates that total amount of e-waste generation in EU ranges from 5 to 7 million tonnes per annum or about fourteen to fifteen kg per capita and is expected to grow at a rate of three per cent to five per cent per year. In developed countries, currently it equals one per cent of total solid waste generation and is expected to grow to two per cent by 2010. See Anonymous, E-waste Generation Scenario, available at http://envis.maharashtra.gov.in/envis_data/files/Ewastgeneration_scenario.html.

30 See Grossman, note 19 above and Brigden, et al., note 7 above. See also Consumer International, E-waste: West Africa Continues to Drown in the Rich World's Obsolete Electronics, available at <http://www.consumersinternational.org/Templates/Internal.asp?NodeID=97534>.

same.³¹ Middle men – who could be called ‘waste merchants’ – are participants as a result of the income derivable from the trade in used electronics and e-waste and the end purchasers are involved in the venture for the same reason as the middle man.

E-waste is shipped to Africa under various guises. Amongst them is the movement to Africa and other third world nations subsequent to an agreement between the recipient and the generating country wherein the latter promises aids, money or the execution of a project within the territory of the recipient nation. This is the same ruse that is put to use in the movement of hazardous or toxic waste to Africa.³² Governments of African countries have repeatedly entered into agreement with industrialised nations that will enable the latter stockpile and dump their waste which are often toxic, hazardous and radioactive.³³ Also, disheartening is the fact the generators and waste merchants target illiterate and semi illiterate businessmen; offering them money

so as to lure them into accepting the waste they generate and deal in.³⁴

These used electronics, especially computers as well as their accessories and peripherals are also shipped to developing countries ostensibly for the purpose of helping to bridge the digital divide between the industrialised economies and the former.³⁵ That is what they make the unsuspecting public within the country of generation believe or the charade which the generators and dealers in used electronics and e-waste put up when they seek to frustrate the provisions of municipal legislation within the country of generation requiring the recycling or disposal of e-waste in an environmental – friendly manner.³⁶ It is indubitable that the trade in e-waste as well as its mechanics is fuelled by

31 The European Union with the Waste Electrical and Electronic Equipment Directive, 2002 has made the generators of e-waste in the form of used electrical and electronic equipments responsible for the disposal and with the Directive on the Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronics Equipment (ROHS) has taken the concept of prevention being better than control further by directing that the use of hazardous substances in the production of electrical and electronics equipment be phased out by 2008. See the Directive 2002/95/EC and Directive 2002/96/EC of the European Union Parliament on the restriction of the use of certain hazardous substances in electrical and electronic equipment and on waste electrical and electronic equipment (WEEE) respectively in the Official Journal of the European Union L 037, 19–23 and 24–39.

32 See Jennifer Clapp, ‘Africa and International Toxic Waste Trade’, in Moses K. Tesi ed., *The Environment and Development in Africa* 114 (Lanham, MD: Lexington Books, 2000).

33 In 1988, the government of the Republic of Benin entered into separate agreements with the French government and an Anglo-American company, Sesco-Gibraltar enabled them import radioactive and industrial waste in return for \$1.6 million down payment and 30 years of economic assistance from France and that called for the country to stockpile as much as 50 million tons of toxic wastes from Sesco-Gibraltar for over a ten years period. See Anonymous, Benin Hazardous Waste, available at <http://www.american.edu/ted/benin.htm>.

34 An example is the case of the dumping at Koko, in the present day Delta State, Nigeria in 1987 where Italian businessmen shipped toxic waste of several Italian industries to Nigeria for storage in the backyard of a Nigerian businessman, who described them merely as miscellaneous construction materials as a result of the fact that he was made to believe that that was what the barrels contained. See Anonymous, *Nigeria Waste Imports from Italy*, Available online at <http://www.american.edu/TED/nigeria.htm>.

35 Greenpeace in a report published in 2008, credited an EU official with the statement that most of the used computers, electronics and electrical appliances imported into Africa were broken down and could not be used again. See, Anonymous, ‘Greenpeace Lashes Rising e-waste in Africa’, *The Guardian*, 20 August 2008 at 43 and Brigden et al., note 28 above. Also, it has been reported that a UK-based organisation offered to donate 10,000 computers to a Nigerian NGO. However, only 2,000 of the computers proved to be functioning. See Consumer International, note 31 above.

36 See Justine Thornton and Silas Beckwith, *Environmental Law* 196 (London: Sweet & Maxwell, 2nd ed., 2004), where the main objectives and requirements of the EU Landfill Directive of April 26, 1999 on the landfill of waste was highlighted; the movement of e-waste to Africa amounts to a frustration of this Directive as well as others.

sheer economics.³⁷ This goes to affirm the assertion that economic activity is both the *cause*³⁸ of environmental harm in its diversified manifestations and paradoxically, the means by which resources can be generated that is capable of being put to use in addressing environmental harm.³⁹

African nations have become favoured destinations for the export of e-waste emanating from the United States of America and the European Union as the 'cost of doing business' is minimised and profit is guaranteed.⁴⁰ It is believed that the endemic poverty, high foreign debt burden; corruption; lack of environmental regulation or the existence of lax regulation coupled with inept enforcement mechanism as well as the pervasive lack of scientific/ medical expertise and knowledge of the effect of e-waste on human health and its environmental impacts has made Africa a target for e-waste

merchants.⁴¹ It is estimated that while it costs about \$50 to recycle a personal computer in the United States, unscrupulous importers pay no more than \$15 a piece, which translates to a net gain of \$35 for a US recycler. By extracting the usable parts and then dumping it at the backyard scrap-trading outfits, an importer can generate profit of about \$10 per piece; thus giving birth to a win – win situation for all.⁴²

This waste is shipped from ports in the countries of generation that are prone to serious lack of regulation and are usually shipped with a sprinkling of a few functional electronic/ electrical appliances. An average of 500 containers of used electronics and electrical appliances is shipped monthly into Nigeria, where there seems to be a burgeoning appetite and preference for the use of 'second hand' items, of which 75 per cent are end-of – life junk and unrepairable.⁴³ Once in Nigeria, they are put into the market and are bought as 'tested' or 'non – tested' electronics/ electrical appliances.⁴⁴

37 For instance, it is on record that in the late 1980s the average disposal cost for one tonne of hazardous waste in Africa was between \$US 2.50 and \$US 50, while in the OECD countries, it ranged from \$US 100 to \$US 2000 per tonne. See Jonathan Krueger, 'The Basel Convention and the International Trade in Hazardous Wastes' in Olav S. Stokke and Oystein Thommessen eds., *Yearbook of International Cooperation on Environment and Development* 43 (London: Earthscan Publications, 2001/2002); Emmanuel Kocou, 'Third World Used as a Dumping Ground for Toxic Waste', 2022 *Socialist Worker*, 14 October 2006, available at http://www.socialistworker.co.uk/article.php?article_id=9903. For an incisive exposition on the soaring costs of hazardous waste disposal industrialised nations, see also Donna Valin, 'The Basel Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal: Should the United States Ratify the Accord?', 6 *Ind. Int'l & Comp. L. Rev.* 267, 269-70 (1995).

38 'Cause' here refers to conducts like the sale of used electronics collected for recycling to waste merchants; the outsourcing of e-waste recycling to developing countries because it is a feat that it is achievable at a very profitable cost.

39 For an exposé on the nexus between economics and the environment, see David Wilkinson, *Environment and Law* 170 (London: Routledge, 2002).

40 Nigeria is fast becoming a haven for the dumping of electronic waste from the developed countries of the world. See Silicon Valley Toxics Coalition, *Global E-waste Crisis Threatening Communities Around the World*, available at http://www.etoxics.org/site/PageServer?pagename=svtc_global_ewaste_crisis; Aparna, E-waste Poisoning in Nigeria, *Green Diary*, 13 September 2007, available at <http://www.greendiary.com/entry/e-waste-poisoning-in-nigeria/> and 'Greenpeace Lashes Rising e-waste in Africa', note 36 above.

41 For a discourse on these factors and how the acts pursuant to them have affected some specified third world nations, see Damilola Sunday Olawuyi, *The Emergence of International Environmental Law on Chemicals – An Appraisal of the Role of Soft Law*, 2007 available at <http://ssrn.com/abstract=996430>.

42 Indrajit Basu, 'E-Waste: E-trash Swamps the Developing World', *Toxic Trade News*, 19 June 2008 available at http://www.ban.org/ban_news/2008/080619_e-trash_swamps_the_developing_world.html.

43 Charles W. Schmidt, 'Unfair Trade: e-waste in Africa', 114/4 *Environmental Health Perspective*, A233, A234 (2006), available at <http://www.ehponline.org/members/2006/114-4/ehp0114-a00232.pdf> and Laurie J Flynn, Poor Nations are Littered with Old PCs, Report Says, *The New York Times*, 24 October 2005, available at http://learning.berkeley.edu/cipolat/PDF/ISF100E/SupportMat/E_Waste05.pdf.

44 Both phrases are used to class second hand electronics. They enable the purchaser of the second hand electronics/ electrical appliances know what options he is faced with. Also, the classing affects the pricing of the second hand electronics, with the former usually being more expensive than the latter. As per options, if 'tested' is used, it means that there will be a test run of the item sought to be purchased in his presence and if he is not satisfied, he has the option of changing it or not buying at all. But if it is 'non – tested', there is no test run of the item and the purchaser takes same as it is presented to him on at the point of purchase. Notwithstanding the foregoing, the shadow of an option which the use of these phrases dangles before the purchaser vanishes with the realisation of the fact that most appliances that do work on arrival only have a short lifespan, as they are already old, and /or were damaged in transit. In the end virtually all used electronics end up in scrap yards potentially exposing workers, children and local residents to a lethal cocktail of hazardous chemicals.

The situation in Ghana is not any different as it is equally alarming.⁴⁵ There is presently a thriving makeshift e-waste recycling and material extraction industry in the country. According to Greenpeace International,⁴⁶ the main centre for the recovery of materials from e-wastes is within the Agbogbloshie Scrap Market in Accra, the capital city of Ghana. The primary activity at this site is the manual stripping/ disassembling of obsolete electrical/ electronic equipments so as to isolate metals and the open burning of scraps to isolate metals from the plastics in which they are encased. More disheartening is the fact that much of this work is carried out by children, using only rudimentary tools and with little or no protective equipment/clothing.

A study carried out by Greenpeace International on soil/ ash samples taken from e-waste recycling sites within the Agbogbloshie Scrap Market in Accra revealed the presence of metals and compounds at levels above those typically found in uncontaminated soils. Also, water and sediment samples from a shallow lagoon located near the e-waste disposal and open burning areas within the Agbogbloshie Market contained a concentration of metals similar to those in the soil/ash samples referred to above. The concentrations of these metals were all of significantly higher levels than what is typically found in the environment.⁴⁷

Suffice it to state at this juncture that there is truly nothing like recycling when it comes to hazardous waste, especially with e-waste for the purpose of getting a product that is of use and no harm to man and his environment. This is because in the best of circumstances, it is a venture that inevitably pollutes the environment and causes harm to man, flora and fauna as a result of the toxic residues or emissions. Consequently, the supposed recycling of hazardous materials like e-waste results in hazardous waste in another form. This is an issue that is real and biting hard in the industrialised world. For example, a full eleven per cent of the Priority Sites cleaned up vide the

Superfund⁴⁸ in the US were caused by recycling operations.⁴⁹ Also in the US, existent secondary metals smelters are institutionally recognised notorious polluters and that is the reason no new smelters are being planned for. If the US is faced with this problem what would be the plight of impoverished and developing economies like those that abound in Africa.⁵⁰

4 E-WASTE AND INTERNATIONAL ENVIRONMENT LAW

With the establishment of the nexus between used electronics and e-waste; the fact that the latter is hazardous and dangerous to the environment; the origin of the latter as well as the driving force behind the invidious act of import/ export of same to Africa, the focus of this thesis turns to an examination of the contributions of the participants in the import/export of used electronics and e-waste to Africa in the light of the provisions of a few international instruments – soft law inclusive - targeted at protecting and safeguarding the environment.

48 Superfund is the common name for the United States environmental policy embedded in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The Superfund law was created to protect people, families, communities and others from heavily contaminated toxic waste sites that have been abandoned. It provides broad federal authority to clean up releases or threatened releases of hazardous substances that may endanger public health or the environment and carry out activities like the establishment of the National Priorities List, investigating sites for inclusion on the list, determining their priority. The US Environmental Protection Agency administers the Superfund with co – operation from States' government. See the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or the Superfund Act), 42 U.S.C. §§9601-9675.

49 See Basel Action Network, Hazardous Waste Recycling: No Justification for Toxic Trade (Seattle: The Basel Action Network, Briefing Paper 7, 2008), available at http://www.ban.org/Library/BP07_June_2008.pdf.

50 *Id.*

45 Jo Kuper and Martin Hojsik, *Poisoning the Poor: Electronic Waste in Ghana* (The Netherlands: Greenpeace, 2008).

46 *Id.* See also Brigden et al., note 28 above.

47 *Id.*

4.1 The Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (hereafter referred to as the Basel Convention) was adopted in 1989 for the purpose of, inter alia, regulating the transboundary movements of hazardous wastes and the provision of a scheme that would ensure the environmentally sound management of hazardous wastes.⁵¹ Prior to this time, transboundary movements of hazardous wastes were governed by the customary international law principle of 'good neighborliness' or *sic utere tuo, ut alienum non laedas* as exemplified in the Trail Smelter Arbitration⁵² and reaffirmed in Principle 21 of the Declaration of the United Nations Conference on the Human Environment.⁵³

The Basel Convention does not place a ban on the transboundary movements of hazardous wastes and their disposal; it only attempts to control the latter. For this purpose, it created a scheme to be followed by Parties involved in the movement of hazardous waste across State lines. The scheme requires an exporter/importer to seek and get the consent of the States through which the waste is to go through as well as that of the State of import before the actual movement of the hazardous waste.⁵⁴ Furthermore, the Basel Convention enjoins parties to ensure that export/import of waste is carried out only where the State of export is lacking technical facilities and capacity to dispose of the waste in an environmentally sound and efficient manner or where the waste in question is raw material for recycling or recovery industries in the State of

import.⁵⁵ The flaw in the foregoing is that the determination of whether an exporting State lacks the technical facility and capacity to dispose of e-waste and every other form of waste is the preserve of the exporting state. This puts the exporting state in rather advantageous position in terms of the waste.

Thus, the question now as regards e-waste that is being heaped on Africa is: can it be truly said that the industrialised nations lack the technical facility and capacity to dispose of it? Or, is the e-waste raw material for recycling or recovery industries in the State of import? With regards to the first question, it is submitted that Article 4 (8), (9) and (10) imposes two conditions that must be simultaneously satisfied before the exportation can take place. Firstly, the exporting State must demonstrate lack of technical capacity and expertise to dispose of the e-wastes. Secondly, the importing State must have the technical expertise and appropriate disposal or recycling facilities to manage the e-wastes in an environmentally sound manner. It is obvious that the answer to both questions is in the negative as the exporters have reason(s)⁵⁶ to believe that e-waste is not being managed in an environmentally sound manner in the towns and cities of Africa where they are dumped. Furthermore, it is obvious that the import of e-waste is done without compliance with the consent requirement provision as most of the importation/ exportation are done clandestinely or under diverse guise and without the knowledge of the appropriate authority.

Subsequently, the Ban Amendment to the Basel Convention (hereafter referred to as the Basel Ban) was adopted.⁵⁷

The Basel Ban seeks to strengthen the convention by prohibiting export of hazardous waste for any reason

51 Article 4, Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 22 March 1989, U.N. Doc.UNEP/WG190/4 (1989).

52 Trail Smelter Arbitration, US and Canada, 3 RIAA 1907(1941).

53 Declaration of the United Nations Conference on the Human Environment, Stockholm, 16 June 1972, 11 ILM 1416 (1972).

54 See Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, note 51 above, Articles 6 and 7.

55 See Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, note 51 above, Article 4(9).

56 The studies and reports of studies carried out by Greenpeace International and other environmental NGOs are within the reach of all who are desirous of knowing what happens to the e-waste when they arrive Africa. This fact is also physically manifested in the streets of cities and towns of Africa. See Grossman, note 19 above; Brigden et al., note 7 above; Kuper and Hojsik, note 45 above.

57 Decision Adopted by the Third Meeting of the Conference of the Parties to the Basel Convention, 22 September 1995, UN Doc. UNEP/CHW.3/35.

from Organisation of Economic Cooperation and Development (OECD) member States to non-OECD States: essentially from wealthy to poorer nations. It provides robust incentives for countries desirous of reducing transboundary movements of hazardous wastes as well as creates a platform for the consolidation of policies geared towards treating and disposing of wastes as close as possible to their source of generation.⁵⁸ Notwithstanding the fact that Basel Ban has been incorporated into the Basel Convention as Article 4(A), it has not yet entered into force.⁵⁹

The Basel Protocol on Liability and Compensation for Damage Resulting from Transboundary Movements of Hazardous Wastes and their Disposal (hereafter referred to as the Basel Protocol) was also adopted.⁶⁰ It seeks to provide a comprehensive regime for liability as well as adequate compensation for any damage resulting from the transboundary movement of hazardous wastes.⁶¹ It settles the issue of who is financially responsible in the event of an incident in the course of a transboundary movement, from the point at which the wastes are loaded on the means of transport to their export, international transit, import, and final disposal.

At the time of the formulation of the Basel Convention and subsequent instruments e-waste was not a topical issue at the time of discourse pertaining to the transboundary movement of hazardous waste: the discourse had at its epicentre, toxic and/ or hazardous waste save radioactive substances. However, they are a formidable tool for protecting the African environment from the scourge of e-waste as a result of the fact that the latter come within the gamut of the Basel as a result of the fact that it comprises of a lethal mix of materials⁶²

which are either expressly listed in Annex I, or otherwise exhibits some of the characteristics in Annex III.⁶³ For example, lead which constitutes over ten per cent of a standard desktop computer weighing 60 pounds is listed in Annex I, making its transboundary movement prohibited by the Basel Convention. However, with the export to Nigeria of about 500 containers per month filled up with e-waste, the amount the quantity of lead that ends up in Nigeria. Premised on the foregoing, e-waste ought not to be exported to any nation for whatever reason. With the movement of e-waste to Africa the exporters – whether states or business concerns or individuals - have honoured their obligations under the treaty in breach.

However, their utility and efficacy is constrained by the activities of some parties to these instruments⁶⁴ and the status of the Protocol⁶⁵ is a further limitation to its efficacy. Furthermore, the efficacy of the Basel Convention as a means of tackling the e-waste debacle in Africa is jeopardised by its provisions. Relying on the premise that the Basel Convention guarantees parties' right to self determination and sovereignty over resources,⁶⁶

58 Iwona Rummel-Bulska, 'Transboundary Movement of Hazardous Waste', 4 *Y. Int'l Emvtl. L.* 218, 219 (1994).

59 Its entry into force will take place upon ratification by at least three-fourth of the Parties who accepted it. *See* Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, note 51 above, Article 17 (5).

60 Protocol on Liability and Compensation for Damage Resulting from Transboundary Movements of Hazardous Wastes and their Disposal, 10 December 1999, UN Doc. UNEP/CHW.1/WG/1/9/2.

61 It was drawn up pursuant to Article 12 of the Basel Convention in 1999.

62 *See* Table 1 above for a list of some of the components of used electronics and other forms of e-waste. *See also* Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, note 51 above, Annex 1.

63 *See* Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, note 51 above, Article 1.

64 *See* Gurdial S. Nijar, Move to undermine Basel Convention Ban on Hazardous Wastes Rejected, available at <http://www.twinside.org.sg/title/basel-cn.htm>.

65 The Protocol is not yet in force as it has as on 14 February, 2009 only 13 signatories instead of the 20 as required by Article 29. *See* the status of the Protocol at <http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&tid=126&chapter=27&lang=en>.

66 This is evident in provisions that provides for:

- a. the express recognition of the sovereign right of states to ban hazardous waste imports;
- b. the right of states to enter into separate agreements between non - parties and thus exempt themselves from the Convention's provisions;
- c. the requirement of prior informed consent and notification, which itself is simply an expression of the sovereignty of a state over the use of its territory and resources; and
- d. the Convention's failure to define hazardous wastes, leaving the definition of 'wastes' to national governments.

See Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, note 51 above, Preamble & Article 4(1), (6), (11) & (13); Sejal Choksi, 'The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal: 1999 Protocol on Liability and Compensation', (28) *Ecology L. Q.* 509, 519 (2001). *See also* Cyrus Mehri, 'Prior Informed Consent: An Emerging Compromise for Hazardous Exports', 21 *Cornell Int'l L.J.* 365, 387 (1988) who theorised that prior informed consent preserves the sovereignty and self-determination of importing states.

it could be argued that as a means of protecting the environment from the e-waste scourge, the Basel Convention is of no help. This is because, in exercising their sovereign right over their resources, developing nations or third world countries can enter into agreements which amount to making their environment available to others as disposal sites.⁶⁷

4.2 Bamako Convention on the Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa⁶⁸

The Bamako Convention on the Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (hereafter referred to as the Bamako Convention) prohibits the import of any hazardous waste into the region. The Bamako Convention is reactionary in nature. It was prompted by the failure of the Basel Convention to prohibit the trade of hazardous waste to less developed states, and from the realisation that many developed nations were exporting toxic wastes to Africa.⁶⁹ It came into force on 2 April 1998 and as on 12 June 2007, of the independent countries that make up the African Union⁷⁰ 29 have signed while a total of 23 have ratified/ acceded to the treaty.

In form, the Bamako Convention⁷¹ is similar to the Basel Convention save for the difference highlighted below. The major difference between the treaties is that the Bamako Convention makes no exception as per the kind of waste that can be moved across State lines within Africa unlike the Basel Convention.⁷² Under the Convention, the exporting State or generator is obligated to notify in writing through the competent authority of the state of export, the competent authority of the state of import of any proposed transboundary movement of hazardous waste.⁷³ However, e-waste is moved within the region without compliance with this provision. It also enjoins parties to minimise the production of hazardous wastes and co - operate to ensure that wastes are treated and disposed of in an environmentally sound manner.

The issues that arise in relation to the applicability of the Bamako Convention to the e-waste issue in Africa are similar to those under the Basel regime. This assertion stems from the fact that the Bamako Convention is on all four with the Basel Convention save for the differences highlighted *ante*. The applicability of the former is further hampered by the fact that it does not ban the movement of hazardous within the region. Consequently, it is submitted that the Bamako Convention is not of any help in the crusade against the importation of e-waste into Africa, rather it has worsened the situation.

67 Incidence of this nature abounds in history. *See* Olawuyi, note 41 above.

68 Bamako Convention on the Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, Bamako, 30 January 1991, 30 ILM 775 (1991).

69 Ifeoma Y Ajunwa, *The Illicit Transfer and Dumping of Toxic Waste: The Adverse Effects of Toxic and Electronic Wastes on Human Rights* (San Francisco: Human Rights Advocates, 2007), available at http://www.humanrightsadvocates.org/images/HRC_Ajunwa_Illicit%20Transfer%20Dumping.doc.

70 *See* the list of African nations that have signed, ratified/ acceded and/or deposited the African Union Convention on Bamako Convention on the Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa with the appointed depository, available at <http://www.african-union.org/root/au/Documents/Treaties/List/Bamako%20Convention.pdf>.

71 The Bamako Convention has been described as being incomprehensible in several aspects, not amenable to the rules of legal interpretation and brimming with several loopholes as well as inconsistencies. *See* Okorodudu – Fubara, note 20 above at 840.

72 The difference between the two treaties is that the Basel Convention excludes radioactive materials from wastes which come within its purview, thus creating a partial ban on transboundary movement of hazardous waste while the Bamako Convention includes same. *See* Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, note 51 above, Article 3, paragraph 3 and Bamako Convention on the Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, note 68 above, Article 2, paragraph 2.

73 *See* Bamako Convention on the Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, note 68 above, Article 6.

4.3 Vienna Convention for the Protection of the Ozone Layer⁷⁴ and the Montreal Protocol on Substances that Deplete the Ozone Layer

The Vienna Convention for the Protection of the Ozone Layer (hereafter referred to as the Vienna Convention). It establishes a framework for negotiating international regulations without including legally binding reduction goals as it relates to CFCs which Parties are to strive towards achieving. The Convention imposes a duty to co-operate on legal, technical, and scientific assessments on parties⁷⁵ and also enjoins them to exchange information.⁷⁶

The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer⁷⁷ (hereafter referred to as the Montreal Protocol) seeks to protect the ozone layer by a systematic and controlled phasing out of the production of a number of substances believed to be responsible for ozone depletion.⁷⁸ 194 out of 196 members of the United Nations have ratified the original Montreal Protocol.⁷⁹ The Montreal Protocol constituted a compliance regime built on transparency, that is, parties must report on production, imports, and exports of all controlled substances.⁸⁰

The ozone regime stands out as an attempt at giving life to the principle of 'common but differentiated

responsibility'⁸¹ and the 'precautionary principle' which embodies the idea that action should be taken by states without full scientific certainty so as to prevent an emerging problem from becoming a crisis.⁸² But with the movement of e-waste that contains ODS – for example, the shipment of a 40 feet container load of used air conditioners and refrigerators - to Nigeria, the perpetuating state if a signatory to the above mentioned treaties breaches same and shifts her responsibility to the unfortunate recipient state. Also, the movement of e-waste to Africa by the United States and other rich economies that use most of the world's electronic products and generate most of the e-waste is audacious breach of the treaties and cannot pass for acting pursuant to the precautionary principle.

5 CONCLUDING REMARKS

This essay set out, inter alia, with the aim of contributing to the growing jurisprudence on environmental education albeit with focus on the seemingly uncharted and grey region of the subject matter of e-waste. Thus, without attempting to dither, e-waste are hazardous. As had already been noted *ante* the Basel trio does not have e-waste as its epicentre, so also does the Bamako Convention, the Vienna Convention and the Montreal Protocol. The reason for this is the same as that preferred with regards to the Basel Convention. Notwithstanding the foregoing, since e-waste contains materials that come under the ambit of the aforementioned treaties, they come within the gamut of these international

74 Vienna Convention for the Protection of the Ozone Layer, Vienna, 22 March 1985, 1513 UNTS 323.

75 *Id.*, Annex I and Article II.

76 *Id.*, Annex II and Article IV.

77 See Montreal Protocol on Substances that Deplete the Ozone Layer, note 17 above.

78 These ozone depleting substances (ODS) are basically hydrocarbons to which chlorine or bromine has been added to form a compound known as halogenated hydrocarbon. Examples of these compounds include Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs) and are referred to as controlled substances by the Protocol which defines it to mean substances in Annexes A, B, C and E to the Protocol. See Montreal Protocol on Substances that Deplete the Ozone Layer, note 17 above, Table 1 above for a summary of the effect of CFCs and HCFCs on man and the environment.

79 See the status of the Protocol as on 14 February, 2009 at <http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&id=504&chapter=27&lang=en>.

80 See Montreal Protocol on Substances that Deplete the Ozone Layer, note 17 above, Article 7.

81 The core of the principle is that states have different concerns and responsibilities based on their capacities and contribution to environmental damage; past, future and present. It recognizes the incontrovertible fact that developing countries (as with greenhouse gases) have contributed little to the problem and hence are entitled to special consideration even though all nations are responsible for protecting the ozone layer. See Thornton and Beckwith, note 36 above at 44. See also Mohamed T. El-Ashry, 'A New Compact', *Our Planet Magazine*, 2007, available at <http://new.unep.org/PDF/OurPlanet/2007/sept/EN/ARTICLE4.pdf>.

82 *Id.*

instruments that seeks to control, discourage or ban their use, movement and trade in hazardous waste.

Events of today show that the purpose for which these treaties were drafted has not been achieved. What one finds is a situation where states and their nationals at world fora advocate positions that differ from the course on which they are actually on or by their conduct are in breach of the duty imposed on them by these treaties. To correct this treacherous situation, states are enjoined to leave up to the billing of international instruments and principles that recognises the fundamental right of man to live in an environment of a quality that permits a life of dignity and well being⁸³ notwithstanding his situation *vis - a - vis* the economic divisions of the world.⁸⁴

Furthermore, the participants, especially the generators, in the movement of used electronics (e-waste) are enjoined to note that there cannot be a localisation of environmental degradation,⁸⁵ and its consequences especially with the species of toxins found in used electronics. This is because our world is a closed circuit. What happens at one point usually has a consequential

effect elsewhere.⁸⁶ Also, states participating in this dastardly act are responsible for whatever the impact of their act is in Africa. This is premised on the fact that by moving their waste to Africa they have deviated from their obligation not to cause transboundary pollution; an obligation embedded in Principles 2 and 21 of the Rio and Stockholm Declarations respectively. On the hand, African states who under the guise of sovereignty over resources which the above mentioned treaties seems to provide as a route for escaping their responsibilities as signatory to the treaties, and make their territory available as dumpsites for e-waste should remember that there is a *jus cogens* customary international law rule which enjoins states to ensure that activities within their domain do not harm the territory of other nations.⁸⁷

The stoppage of the trade in used electronics and e-waste is bound to give birth to unemployment, loss of income and revenue; but it is without doubt that it is posited that the life and health of the people within an environment as well as the environment are of greater importance than the economic realities of the times and are thus worthy of a concerted effort geared towards protection and preservation. To achieve the foregoing, African nations are enjoined to utilise economic tools⁸⁸

83 See Articles 25 (1) and 28, Universal Declaration of Human Right 1948, the International Covenant on Civil and Political Rights 1966, the International Covenant on Economic, Social and Cultural Rights 1966, Articles 24, the African Charter on Human and Peoples' Rights. See generally also, the Hague Declaration on the Environment, March 11, 1989, reprinted 28 ILM 1308 (1989); Rio Declaration on Environment and Development, June 13, 1992, U.N. Doc. A/CONF.151/26 (Vol. I), 31 ILM 874 (1992); the Hague Recommendations on International Environmental Law of 1991; Stockholm Declaration of the United Nations Conference on the Human Environment, June 16, 1972, UN Doc.A/Conf.48/14/Rev. (1973), 11 ILM 1416 (1972).

84 A man's fortunes in terms of the issues discussed *above* should not be dependent on whether he is a national of an OECD or non - OECD nation.

85 The posture adopted by generators of e-waste in the movement of e-waste is a typical 'not in my backyard' stance. This is because all they are interested in is that the e-waste be taken far from them and their immediate environment and deposited somewhere else by their associates. People living in developed countries and the government of same should also note that they are also affected by the dumping of e-waste on Africa. This is because, the toxins in the e-waste lying around in Africa leaches into the soil and eventually end up in the agricultural products that leave Africa and end up in fridges, tables and eventually the stomachs of the nationals of the developed world.

86 It is now trite that most of the cause of environmental degradation and disasters originates in sovereign territories other than in the nation(s) where the effect is being felt. For example, the effect of the Chernobyl nuclear power plant disaster in Ukraine was felt in Belarus and Russia. The former being the most affected and losing about 22 percent of its land meant for agricultural and 21 percent of its forest. And it is estimated that the total damage to Belarus stood at USD 235 billion, a figure more than ten times the gross national product of 1997 and about 60 times the annual national budget. See Anonymous, Geographical facts, information on the political and economic situation in Belarus, the country most affected by the Chernobyl disaster, available at <http://www.chernobyl.info/index.php?userhash=160534&navID=5&IID=2>.

87 This rule is a preemptory norm. It embodies a principle that is binding on nations of the world, notwithstanding whether they consent or not and is not subject to derogation as a result of the consequence such a conduct would have on other nations and the world. See generally Franz X. Perez, 'The Relationship Between 'Permanent Sovereignty' and the Obligation Not to Cause Transboundary Environmental Damage', 26 *Envtl. L.* 1187 (1996). See also, Article 53, Vienna Convention on the Law of Treaties, 1155 UNTS 331, UN Doc. A/CONF/39/27 (1969); 8 ILM 679 (1969).

88 This includes the imposition by African nations of relatively high charges and/or taxes on imported used electronics and electrical appliances as well as the subsidisation of the cost of the production of those that are not environmentally harmful.

in curbing the menace of the importation of used electronics into the continent and by extension, the protection and preservation of the environment which is of crucial importance to the future of mankind. This suggestion is proffered as a result of the recognition of the nexus between economics, law and the environment; and the fact that there exist linkages between economic measures, or instruments and changes in human behaviour which can turn out to be favourable to the environment and is capable of protecting same.⁸⁹ Furthermore, it is time for a paradigm shift from the present scheme to sustainable production, environmental justice, and corporate and government accountability in order to achieve the creation of an environment wherein the health of man, fauna and flora will not be in jeopardy. Thus, a total ban must be placed on the import of e-waste as they are hazardous. This is consistent with the amendment to the Basel Ban and the logic behind the argument that there is no reason for the poor of the world to bear the burden created by the existence of e-waste, particularly when they have not benefited from the products and services that created that risk in the first place.

Manufacturers of electronics and electrical devices containing hazardous materials must be made responsible, via legislation or the handing down of policy by governments, for educating consumers and the general public regarding the potential threat to public health and the environment posed by their products and for raising awareness for the proper waste management strategies.

To address the rising tide of e-waste, all manufactures must through changes in product design and process technology embrace the use of less hazardous materials. This again cannot be done without the creation of an enabling environment vide tough legislation. At this

juncture, it must be stated that the path taken by some nations of the world in this wise is laudable.⁹⁰

⁸⁹ It is common knowledge that the imposition of taxes and charges on goods and services usually affect their pricing. Thus where an imported used electrical appliance turns out not to be cheap in relation to a new one as a result of the tax imposed on it, consumers tend to settle for the new one and by extension the market for the former shrinks and the environment is the better for it. Alternatively, the production of products which the government is desirous of encouraging as a result of the fact that it is eco – friendly can be subsidised. This will have the same effect as the imposition of taxes on products which are to be discouraged on environmental grounds.

⁹⁰ Recent efforts by states of the US, especially that of the state of California (*see the California Health and Safety Code* discussed in Ajunwa, note 74 above at 11) to stem the tide of the illicit trade in e-waste and the lawsuit like *Massachusetts v. EPA* 127 S. Ct. 1438, 1455 (2007) recently decided by the US Supreme Court by states to force the federal government to act are also laudable. However, it should be re-echoed that piecemeal attempts like the aforementioned will not dam the flood of e-waste from the US.

*LEAD Journal (Law, Environment and Development Journal) is jointly managed by the
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