Globalization of Contamination: A Case for Environmental Justice in the Transnational Trade of Electronic Waste

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Joanna Groccia
Abstract

This thesis explores the international trade of electronic waste along with the social and environmental threats that this waste poses for those living in conditions of poverty. Although not a new phenomenon, the hazardous waste trade has grown over the years as the amount of technological waste has increased both domestically and worldwide.

Quantitative data along with the application of different disciplines help to assess the environmental, economic, and public health issues associated with the international trade of e-waste. An examination of the history and politics of international trade laws in relation to waste provide context for a discussion of the existing international agreements that allow for this trade to continue. Additionally, it is important to consider the economics that drive the transnational movement of waste and the pollution haven hypothesis. Finally, a case study of the Indian informal recycling industry in conjunction with a discussion of environmental justice helps to investigate the links between the trade of electronic waste, globalization, and poverty.

A synthesis of these findings suggest stricter international regulations for the transnational movement of hazardous waste, market incentives, and technological innovation as potential solutions to this trade-- ideally leading to a more just distribution of environmental costs.
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Introduction: There Is No “Away”

“One of the chief reasons for the present environmental crisis is that great amounts of materials have been extracted from the earth converted into new forms, and discharged into the environment without taking into account that ‘everything has to go somewhere.’ The result, too often, is the accumulation of harmful amounts of material in places where, in nature, they do not belong.”

–Barry Commoner

In his 1971 book, “The Closing Circle,” American biologist and environmentalist Barry Commoner introduced what he viewed as the four fundamental laws of ecology: Everything is connected to everything else, everything must go somewhere, nature knows best, and there is no such thing as free lunch. Commoner understood that human society and the values that drive governments and corporations are fundamentally at odds with these laws. He argued that this incompatibility with our ecosphere is the main cause for environmental degradation and injustice. Over forty years later, we face the same challenge, but with a larger population, new technologies, increased globalization, and much greater consumption levels. Yet in the developed world, it is quite difficult to see the direct effects of our consumer lifestyle. When we replace old clothes, cars, and electronics with newer, better models, our thoughts about our old items are usually discarded with the objects themselves. But where do our iPods, laptops, and cell phones go after we throw them “away?”

The answer to this question is most often found in developing nations and populations living under conditions of extreme poverty. The international trade of hazardous waste, and more recently of electronic, or e-waste is an overlooked

2 Ibid., 33-48.
environmental issue that only worsens as our demand for the newest, fastest, sleekest electronics increases. But this demand is creating one of the largest environmental and ethical problems of our time. This paper looks to explore the complexities of the international transport of e-waste, using examples from communities most greatly affected by the trade, and looks for potential solutions to a consumption cycle that seems never-ending.

Chapter One provides quantitative information about the trade of hazardous waste across the global economy, with a specific focus on electronic waste. This information will provide insight to the extensiveness of this environmental problem and the quantitative effects of the waste on environment and human health, especially in the communities that are receiving the mass amount of waste. Chapter Two explores the international regulation and trade laws both past and present that have influenced the flow of waste across national boundaries. Here, I will explore the inadequacies that exist which allow the discarded and dangerous electronic remnants of developed nations to end up among the most vulnerable populations in the world. Chapter Three examines the economics of this trade. There are certainly monetary benefits for the exporters who do not have do deal with disposing of the waste properly, but there are also gains for the populations who wind up with the waste—gains that perpetuate the industry despite the associated risks. Building off of this information, Chapter Four will look at the ethical dimensions of e-waste as it relates to globalization and international development using theories of Environmental Justice. This section will also address the public health concerns that arise from the largely unregulated industry.
Finally, Chapter Five suggests potential solutions to solve the problem of hazardous waste related to the consumption of electronic goods. These solutions will focus on innovation within the production stage of these goods, stricter international trade laws and regulations, with the goal of a greater distribution of justice for all.

**CHAPTER 1: Trade of Hazardous Waste: The Economic, Environmental, and Health Effects by the Numbers**

*What is e-waste?* According to the United Nation’s Environmental Programme, electronic waste is one of the fastest growing streams of waste worldwide. While there are many definitions of what exactly constitutes e-waste, a broad description is any disposed electronic equipment that is broken, obsolete, or simply undesired. The EPA’s definition also specifies that these products are either approaching or are at the end of their lifetime. This waste can be categorized into three groups: large household appliances like dishwashers, refrigerators, and washing machines; information technology and telecommunication equipment like personal computers, laptops, and printers; and consumer entertainment equipment like TV’s, MP3 players, cell phones, and stereos. These groups can be respectively referred to as white goods, brown goods, and grey goods.

In recent years, we have seen a drastic increase in the consumption of brown goods and grey goods as the rate of technological turnover increases. This growth is easy to measure in terms of personal computer use. In 2011, PC use exceeded 1.6 billion

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4 Ibid., 88.
5 Ibid., 88.
worldwide, and this number is expected to climb to 2.45 to 2.55 billion by 2016. Globally, this will be a PC per capita use of about 33 percent.\(^6\) In the United States, these numbers are even higher. In 2011, PC per capita was already at 99 percent and will approach 116 percent in 2016.\(^7\) These numbers are especially dangerous when we consider that the lifespan of computers has decreased from approximately four to five years, to just two years.\(^8\) This decrease in lifespan, coupled with technological improvements creates a rapidly growing waste stream. Gordon Moore, founder of the Intel Corporation, predicted back in 1965 that the processing power of computers would double every eighteen months. This prediction, later coined “Moore’s Law,” has proven to be extremely accurate in describing the rapid rate of computer obsolescence.\(^9\) EPA estimates say that about 30 to 40 million PCs will reach the end of their life just in the next few years to come.\(^10\)

Unfortunately, computers aren’t the only electronics that face this fate. The invention of high-definition television a few years back leaves the older models that use an analog signal outdated, even if they are still functioning perfectly.\(^11\) Cell phones, MP3 players, and tablets surely face the same fate when newer, sleeker, faster models are so rapidly released onto the market. In 2005 alone, 25 million cell phones in the just in the U.S were replaced, and the EPA approximates that 1.5-1.9 million tons of electronic equipment

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\(^6\) Ibid., 92.
\(^7\) Ibid., 92.
\(^8\) Ibid., 95.
\(^11\) Ibid.
was discarded in total. A worldwide tally of e-waste would yield a figure around 50 million tons.  

**Where does e-waste come from, and where does it wind up?** Global consumption patterns show that e-waste largely originates in developed countries. However, as globalization increases and the technology gap closes, a good amount of waste is produced within developing and industrializing nations, such as China. In the United States, e-waste mainly comes from three sectors. Individuals, households and small businesses dispose of a large amount of electronics, since new technology is constantly replacing older, obsolete models. Most states, excluding California and Massachusetts, have legal exemptions in place that allow for this group of consumers to dispose of their devices and appliances in the garbage or nearby landfill. In this case, the e-waste stays within the domestic waste stream.

Businesses, corporations, institutions, and governments that replace electronics (especially computers) every few years are another large contributor to the electronic waste stream. The same exemptions that exist for individual consumers do not apply to this sector, so the devices are usually directed to recycling centers or sometimes donated or auctioned off.

Waste can also be created in the manufacturing process, which is the final major stream of e-waste in the United States. The by-products of manufacturing electronics and devices that don’t pass quality control are disposed of before they even reach the market. In this case, the original equipment manufacturer can either handle the recycling and

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12 Ibid.
14 Ibid., 90.
disposal of the goods themselves, or they can subcontract the waste to an outside recycling company.  

Oftentimes, individuals and corporations alike do not abide by the national recycling regulations that are currently in place. In 2009, only 17.7 percent of e-waste generated in the United States was recycled, leaving the remaining 82.3 percent to be disposed in landfills, incinerators, or through nighttime dumping. Nevertheless, the waste that does actually reach the recycling companies goes through a process that would seem equally unjust.

Those not exempt from disposing e-waste in normal municipal streams must rely on electronic waste recyclers to take unwanted electronics off their hands. Often times, environmentally minded individuals will do the same in order to avoid landfills as the final destination for their unwanted goods. But, according to Exporting Harm: The High Tech-Trashing of Asia, a documentary released by the Basel Action Network, e-waste recyclers are essentially akin to waste distributors.

There are many obstacles that make it near impossible for even the best-intentioned recycling companies to disassemble and recycle electronic goods in developed countries. While there are surely some recyclers who do their best to process the electronics and minimize harmful pollution and health risks, labor standards and costs, environmental regulations, and the absence of a market for the recycled parts, make it somewhat economically unfeasible for the “recyclers” to deal with the waste themselves. Once the waste reaches their facilities, it is sold to brokers who then send the electronic goods in container ships to the developing world. Here, barriers are either more lax, or do not exist.

\[\text{\footnotesize 15 Ibid., 90.}\]
\[\text{\footnotesize 16 Ibid., 95.}\]
all together.\textsuperscript{17} Figure 1 below illustrates the e-waste streams into Asia, which along with western Africa, is the main receiving hub of these unwanted electronics. Once the waste reaches its destination abroad, it is sorted to pick out any materials that can be valuable. The rest of the “junk” left from the container is just dumped and burned.\textsuperscript{18} Brokers who have dealerships set up near the ports take the valuable electronics to processing areas to disassemble and salvage useful materials by hand.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{E-waste Streams into Asia\textsuperscript{19} (Source: Wildmer et. al, 444)}
\end{figure}

\textsuperscript{17} Jim Puckett, \textit{Exporting Harm: The High-Tech Trashing of Asia}, Film, (2002, BAN), Web.
\textsuperscript{18} Peter Klein, \textit{Digital Dumping Ground}, Film (2009: WGBH Educational Foundation), Web.
What is the recycling process, and what are the related harms? The material composition of e-waste is extremely varied given the diverse range of electronics that compose the stream. Figure 2 below illustrates a general breakdown of the materials that are typically found. Metals like iron and steel are usually the large percentage of the make-up followed by plastics.

The metal components of the waste are what hold the most value. Steel, copper, aluminum, and especially gold are the most sought-after materials in the disassembly process, and there are many labor-intensive and dangerous ways to retrieve them. The cathode ray tubes found in monitors contain copper at the end of their glass tube, which can be extracted and sold. However, these tubes also contain about 4-8 pounds of toxic

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metal lead and are internationally considered a hazardous waste.\textsuperscript{21} Despite this fact, CRT’s are often cracked by hand without any protection in order to get to the copper, leaving the broken, lead-laden monitors behind.

Aluminum, steel, and copper can also be recovered from wires taken from the electronics. But, this usually entails openly burning the wires to release the metals from the plastic coating. Burning plastic releases carcinogens such as polycyclic hydrocarbons, toxic dioxins and furans, along with other pollutants that are harmful to those working and living in the area, not to mention degrading to the surrounding air quality and environment.\textsuperscript{22} This process also leaves behind an ashen residue to be disposed of. Other plastic wastes are separated, chipped, and melted to create lower-quality plastics to be used elsewhere. Melting plastics, especially PVCs, is proven to release brominated flame-retardants, dioxins, and other hydrocarbons into the air.\textsuperscript{23}

Printer and copier parts are also valuable in the recycling activities, because toner remnants can be swept out of cartridges using paintbrushes. Toner usually contains Carbon Black, a possible carcinogen for humans, along with other potentially hazardous materials. Yet, workers expose themselves to these fumes, often without any protection—making them vulnerable to dangerous respiratory problems.\textsuperscript{24}

However, one of the most profitable recycling operations is the processing of circuit boards. Workers place the boards over coal-fired grill and de-solder the circuit boards to release the chips. This process also releases toxic lead and tin fumes into the air, and the heavy metals disperse throughout the environment. Once this process is complete, the

\begin{flushright}
\textsuperscript{21} Jim Puckett, \textit{Exporting Harm: The High-Tech Trashing of Asia}, 2002.  \\
\textsuperscript{22} Ibid.  \\
\textsuperscript{23} Ibid.  \\
\textsuperscript{24} Ibid.
\end{flushright}
remaining boards themselves are often just burned. The chips can either be sold for re-use, or to acid strippers to extract their small amounts of gold. The chips are first dissolved in mixture of hydrochloric and nitric acid. Then later on, another chemical is added to settle the gold at the bottom of the container to be collected. This substance is finally melted to produce beads of pure gold. While the exposure to both the acid itself and the acid fumes is harmful to the workers, the process also releases chlorine and sulfur dioxide gasses. The sludge from the process is then disposed of into the environment, likely making its way into water sources vital for the area’s ecosystems and inhabitants.  

The above processes create countless dangers for the workers involved in the e-waste recycling industry, while exposing their environment to some of the most toxic chemicals on earth. Table 1 below shows the hazardous materials involved in the recycling of personal computers alone, and all the potential health effects that each could cause.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Use/Location</th>
<th>Recyclability (%)</th>
<th>Adverse Health Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>Structural, conductivity/housing, CRT, PWB, connectors</td>
<td>80</td>
<td>Damage to kidneys and central nervous system, skin rashes, skeletal problems, respiratory problems, linked to Alzheimer’s disease</td>
</tr>
<tr>
<td>Antimony</td>
<td>Diodes/housing, PWB, CRT</td>
<td>0</td>
<td>Pneumoeoniosis, heart problems, stomach ulcers</td>
</tr>
<tr>
<td>Arsenic</td>
<td>Doping agents in transistors/PWB, light emitting diodes</td>
<td>0</td>
<td>Allergic reactions, nausea, vomiting, decreased red and white blood cell production, abnormal heart rhythm</td>
</tr>
<tr>
<td>Barium</td>
<td>Vacuum tube/CRT</td>
<td>0</td>
<td>Breathing difficulties, increased blood pressure, swelling of brain, damage to heart, liver and kidneys</td>
</tr>
<tr>
<td>Beryllium</td>
<td>Thermal conductivity/PWB, Connectors</td>
<td>0</td>
<td>Lung damage, allergic reactions, Chronic Beryllium Disease</td>
</tr>
<tr>
<td>Cadmium</td>
<td>Rechargeable batteries, blue-green phosphor emitter/housing</td>
<td>0</td>
<td>Pulmonary and kidney damage, bone fragility</td>
</tr>
</tbody>
</table>

^25 Ibid.
<table>
<thead>
<tr>
<th>Metal</th>
<th>Function</th>
<th>Hazard Score</th>
<th>Health Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium</td>
<td>Decorative hardener/housing</td>
<td>0</td>
<td>Ulcers, convulsions, liver and kidney damage, asthmatic bronchitis, DNA damage, carcinogenic</td>
</tr>
<tr>
<td>Cobalt</td>
<td>Structural, magnetivity, housing, CRT, PWB</td>
<td>85</td>
<td>Lung and heart effects, dermatitis, liver and kidney problems</td>
</tr>
<tr>
<td>Copper</td>
<td>Conductivity/CRT, PWB, connections</td>
<td>90</td>
<td>Chronic exposure can irritate nose, mouth and eyes and cause headaches, dizziness, nausea and diarrhea</td>
</tr>
<tr>
<td>Europium</td>
<td>Phosphor Activator/PWB</td>
<td>0</td>
<td>Cancer of the liver and bone</td>
</tr>
<tr>
<td>Gallium</td>
<td>Semiconductors/PWB</td>
<td>0</td>
<td>Carcinogen in experimental animals</td>
</tr>
<tr>
<td>Germanium</td>
<td>Semiconductors/PWB</td>
<td>0</td>
<td>Carcinogen in experimental animals</td>
</tr>
<tr>
<td>Gold</td>
<td>Connectivity, conductivity, PWB, collectors</td>
<td>99</td>
<td>Damage to the heart, kidney, liver, and may be teratogenic</td>
</tr>
<tr>
<td>Indium</td>
<td>Transistors, rectifiers/PWB</td>
<td>60</td>
<td>Damage to the heart, kidney, liver, and may be teratogenic</td>
</tr>
<tr>
<td>Lead</td>
<td>Metal joining</td>
<td>5</td>
<td>Damage to central and peripheral nervous system, kidneys, and brain development</td>
</tr>
<tr>
<td>Manganese</td>
<td>Structural, magnetivity, housing</td>
<td>0</td>
<td>May cause kidney damage and scarring of the lung if inhaled</td>
</tr>
<tr>
<td>Mercury</td>
<td>Batteries, switches/housing, PWB</td>
<td>0</td>
<td>Chronic brain, kidney, lung, and fetal damage</td>
</tr>
<tr>
<td>Nickel</td>
<td>Structural, magnetivity, housing, CRT, PWB</td>
<td>80</td>
<td>Allergic reactions, asthma, impaired lung function, chronic bronchitis, carcinogenic</td>
</tr>
<tr>
<td>Niobium</td>
<td>Welding alloy/housing</td>
<td>0</td>
<td>May cause kidney damage and scarring of the lung if inhaled</td>
</tr>
<tr>
<td>Organo-tins</td>
<td>Heat stabilizer in PVC products, antifouling agent</td>
<td>0</td>
<td>Immunotoxic, teratogenic, neurotoxic, memory deficits</td>
</tr>
<tr>
<td>Palladium</td>
<td>Connectivity, conductivity/PWB, connectors</td>
<td>95</td>
<td>Damage to bone marrow, liver and kidneys, may also cause skin, eye, and respiratory tract infections</td>
</tr>
<tr>
<td>Platinum</td>
<td>Thick film conductor/PWB</td>
<td>95</td>
<td>Cancer, damage to kidneys, intestines, hearing, and bone marrow</td>
</tr>
<tr>
<td>Rhodium</td>
<td>Thick film conductor/PWB</td>
<td>50</td>
<td>Carcinogen, central nervous system dysfunction in animals</td>
</tr>
<tr>
<td>Ruthenium</td>
<td>Resistive circuit</td>
<td>80</td>
<td>Yet to be determined, may cause skin and eye irritation</td>
</tr>
<tr>
<td>Selenium</td>
<td>Rectifiers/PWB</td>
<td>70</td>
<td>Breathing problems, skin, lung and throat irritation, stomach pain</td>
</tr>
<tr>
<td>Silver</td>
<td>Conductivity/PWB, connectors</td>
<td>98</td>
<td>Eye and skin irritation</td>
</tr>
<tr>
<td>Tantalum</td>
<td>Capacitors/PWB, power supply</td>
<td>0</td>
<td>Eye and skin irritation, other effects yet to be investigated</td>
</tr>
<tr>
<td>Terbium</td>
<td>Green phosphor activator, dopant/CRT, PWB</td>
<td>0</td>
<td>Yet to be determined, may cause skin and eye irritation</td>
</tr>
<tr>
<td>Tin</td>
<td>(see organo-tins)</td>
<td>n/a</td>
<td>See organo-tins above</td>
</tr>
<tr>
<td>Titanium</td>
<td>Pigment, alloying agent/housing</td>
<td>0</td>
<td>No conclusive evidence</td>
</tr>
<tr>
<td>Vanadium</td>
<td>Red phosphor emitter/CRT</td>
<td>0</td>
<td>Damage to lungs, throat and eyes,</td>
</tr>
<tr>
<td>Substance</td>
<td>Potential Harm</td>
<td>Hazardous Substance</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>----------------</td>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td>Yttrium</td>
<td>Red phosphor emitter/CRT</td>
<td>Damage to lungs and liver of animals reported</td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td>Battery, phosphor emitter/PWB, CRT</td>
<td>Very high levels can damage the pancreas and it is a danger to unborn and newborn children</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Hazardous Substances in PCs, Recyclability, and Their Potential Health Effects

While conscientious consumers and businesses that take their electronics to recycling centers believe that they are responsibly disposing of their unwanted electric goods, they are unknowingly shifting the damage and risk to another part of the globe as part of a basically unregulated international operation.

CHAPTER 2: From the Basel Convention to Today: International Regulation and Movement of Hazardous Waste

*History of Hazardous Waste Dumping* As scientific data has become more conclusive about the dangers of chemicals and materials used in industrial processes, so too has the incidence of hazardous waste trafficking. The dawn of the Environmental movement in the United States largely prompted by Rachel Carson’s Silent Spring in 1962, brought about an increased awareness of the chemicals and potentially hazardous substances being emitted into the environment. This fear was compounded as other environmental disasters, such as the Love Canal incident in the late 70’s gained attention around the country. National regulations dealing with waste disposal strengthened as a response to these concerns about chemical pollution. Table 2 below summarizes all of the federal statutes passed from 1965-2001 that made waste disposal more regulated than ever before. These heightened policies consequently increased the cost of disposal.

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26 Adapted from: Francis O. Adeola, *Hazardous Wastes, Industrial Disasters, and Environmental Risks*, 103-105
Between 1980 and 1988, the cost of discarding waste increased from 15 dollars a ton to 250 dollars a ton.\textsuperscript{27} As this was happening throughout the 1970's and 1980's, national debt was also increasing throughout Latin America and much of the global south. As part of an attempt to pull themselves out of recession, these countries began importing toxic waste as a source for income.\textsuperscript{28}

\begin{table}
\centering
\begin{tabular}{|l|l|l|}
\hline
Statutes & Year Passed & Agency & Enforcement Target of Regulation \\
\hline
Solid Waste Disposal Act & 1965 & EPA & Municipal wastes \\
Clean Air Act & 1965 & EPA & Air pollution; air emission from area, stationary and mobiles sources. \\
& 1970 & EPA &  \\
Clean Water Act & 1972 & EPA & Water pollution; restoration of water quality \\
Water Pollution Control Act & 1977 & EPA &  \\
Hazardous Materials Transportation Act & 1975 & DOT & Interstate transportation of hazardous materials in commerce \\
& 1994 &  &  \\
Toxic Substances Control Act & 1976 & EPA & Existing and impending new toxic chemical hazards, hazardous substances including asbestos, radon, lead, PCBs, etc. \\
Resource Conservation and Recovery Act (RCRA) & 1976 & EPA & Cradle-to-grave management of wastes and recovery of resources. \\
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) & 1980 & EPA & Hazardous waste sites, compensation for and restoration of contaminated sites \\
Hazardous and Solid Waste Amendments & 1984 & EPA & Underground storage tank and waste treatment, storage, and disposal facilities. \\
Asbestos Hazard Emergency Response Act (AHERA) & 1986 & EPA & Asbestos abatement in schools and commercial buildings. \\
Lead Exposure Reduction Act & 1992 & EPA & Reduction of lead contamination and toxicity. \\
Emergency Planning and Community Right to Know Act & 1986 & EPA & Emergency preparedness, minimization of chemicals’ accidents and dissemination of information to the community. \\
Pollution Prevention Act & 1986 & EPA & Waste reduction, pollution prevention education, training and information exchange. \\
\hline
\end{tabular}
\caption{Federal Statutes Regulating Hazardous Materials in the United States\textsuperscript{29} (Source: Adeola 203)}
\end{table}

\textsuperscript{27} Peter Stoett, \textit{Global Ecopolitics: Crisis, Governance, and Justice}, (Toronto: University of Toronto Press, 2012), 132.
\textsuperscript{28} Ibid., 132.
\textsuperscript{29} Francis O. Adeola \textit{Hazardous Wastes, Industrial Disasters, and Environmental Risks}, 203.
Between 1989 and 1994, 2.5 million tons of hazardous waste was exported from OECD countries to non-OECD countries in the developing world. Often times, this trade was disguised through mislabeling ship cargo. There is a documented case where an American company was selling fertilizer to farmers in Bangladesh, but mixed it with 1,000 tins of copper smelter furnace dust containing sizeable amounts of lead. A European ship of radioactive milk was sent to Jamaica in 1987 disguised as humanitarian assistance, and illegal pesticides were sent to Albania by Germany in 1992. One of the most publicized occurrences of waste trafficking occurred in 1987, when an Italian company exported 8,000 tons of radioactive and hazardous waste to Nigeria. The cargo was simply labeled “substances related to the building trade.” When the shipment was discovered, it was re-packed and sent back to Italy, leaving many of the workers that handled the waste hospitalized from chemical burns, nausea, vomiting blood, and paralysis.

These events caused concern for the international community. Many NGOs and developing countries called for more regulation and even bans of hazardous waste exports from developed to developing countries. In June of 1987, the United Nations Environmental Programme’s Governing Council drafted a mandate to develop an international convention regulating the international trade of hazardous waste. The developing nations involved in the negotiations insisted upon a ban on the export of hazardous waste from countries with higher incomes to those of lower incomes. On the other side of the debate were the industrialized nations like the United States, who preferred a less stringent agreement based on prior informed consent. This approach

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30 Ibid., 131.
31 Ibid., 131.
32 Ibid., 132.
(referred to as a PIC) would be more regulatory in nature, and it would require exporting countries to inform the importers of the exact content before they decided if they would receive the shipment. When the final draft of The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal was submitted in 1989 in Basel Switzerland, it catered to the latter's preferences and was denounced by many for not taking a strong enough stance against the dangerous and immoral trade.\(^{33}\) Despite this, 105 states along with the European Community signed on to the convention, which was ratified in 1992.\(^{34}\)

Since 1989 there have been other conferences of the parties (COP) to strengthen the convention and address some problems and loopholes that became apparent. At the second COP, a total ban on exports of hazardous wastes from OECD countries to non-OECD countries was proposed and later adopted as an amendment at the third COP in 1995. This amendment called the “Ban Amendment” currently has 78 ratifications, but still has not received enough support to be officially put into force.\(^{35}\) The fourth COP in 1998 defined and listed what the convention considered to be hazardous wastes and in 1999, a liability protocol was added to ensure that responsible parties were held accountable for the damages they caused through their exported materials. This was followed by a compliance procedure in 2002 to help make sure that the nations were following through with their commitment.\(^{36}\)

\(^{33}\) Ibid., 133.
\(^{36}\) Peter Stoett, *Global Ecopolitics: Crisis, Governance, and Justice*, 135.
Weaknesses of Basel Convention Despite all of the progress made by the Basel Convention, there are many weaknesses and loopholes that allow the trade of hazardous and electronic waste to continue at alarming rates. One of the major problems with conventions in general is that they are very difficult to enforce and regulate. Article 10 of the agreement outlines the implementation of the convention and states:

1) The Contracting Parties shall adopt the legislative, regulatory and administrative measures necessary to implement the Protocol.
2) In order to promote transparency, Contracting Parties shall inform the Secretariat of measures to implement the Protocol, including any limits of liability...
3) The provisions of the Protocol shall be applied without discrimination based on nationality, domicile or residence.  

The convention calls upon the nations that have participated and ratified the agreement to individually implement regulations that are consistent with the agreement through national legislation. It therefore requires the cooperation of each of the signatories’ legislative systems and a commitment from them to make the issue a priority. The convention also has very limited funds and resources to help enforce the compliance cause or to help the signatories implement prior informed consent procedures. Additionally, all of the participating countries have to have established, well functioning, and uncorrupt governance systems for the conditions of the convention to function properly. For a lot of the developing nations who support the convention, this could be a real issue.

Illegal trafficking of hazardous wastes is one of the major ways that the waste continues to get transported throughout the word. Labeling shipments of waste as materials for second use, donations, or materials to be recycled can also allow exporters to

39 Peter Stoett, Global Ecopolitics: Crisis, Governance, and Justice, 136.
circumvent any commitments they made under the convention. For example, in 1996 a German company sent a shipment of “raw materials for industrial production” to Beirut, which was later, exposed to contain about 560 tons of partially contaminated plastic waste. With such limited means for comprehensive global enforcement and monitoring, it is easy to question the effectiveness of the convention, regardless of the support and attention it has brought to the issue.

In order for the Basel Convention to be effective, it also must have support from the large majority of the international community. Unfortunately, one of the biggest players in the trade of hazardous waste, the United States, has not supported convention, making it the only OECD country to not ratify. There are many explanations as to why the United States has refused to back the convention. The ambiguous and complex nature of the regulations within the convention has probably played a role in dissuading American leaders from signing on. Another major basis for this decision is the action that would be required by the American legislative system to comply with the conditions of the convention. Ratification would necessitate amendments to domestic regulation like the Resource and Conservation and Recovery Act, which as outlined in Table 2, governs domestic hazardous waste dealings and hazardous waste entering and exiting the country (and currently has an e-waste exemption).

Another likely explanation is the probable pushback that would occur from American industries and businesses that rely on exporting these wastes in order to maintain their profits. Since handling hazardous waste is a very expensive process, it keeps

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40 Ibid., 136.
manufacturing and industrial costs way down to send the materials, whether it be plastics, defective devices, or known harmful substances, to areas of the world where costs and regulations are lower. Of course, this practice is very beneficial to the U. S economy. Nevertheless, when the nation responsible for about 75-80% of the world’s hazardous waste has not agreed to the conditions of the Basel Convention, it is certainly difficult to call this global effort a success, no matter how much progress it has made. 42

*International Efforts Today* While the Basel Convention has been at somewhat of a standstill, there have been other efforts to call attention to the issue and to slow this toxic trade, especially within the European Community. Throughout the 70’s and 80’s, the EU started to define waste and specifically hazardous waste, and to regulate its disposal and movement. In 1984, the Directive on Trans-frontier Movement of Hazardous Wastes mandated a required system of notification and tracking of hazardous waste movements. It was amended two years later to include states outside of the European community pending mutual agreement and capacity to properly handle the waste. 43 Then in 2003, the Waste Electrical and Electronic Equipment Directive (WEEE) and the Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) were put into place to directly address electronic waste as a hazardous waste. 44 WEEE places responsibility on producers to collect and recycle waste from many different types of electrical and electronic equipments at the end of their lifespan, while

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42 Peter Stoett, *Global Ecopolitics: Crisis, Governance, and Justice*, 134.
RoHS bans certain hazardous substances from the production of electronic goods. The member states can then each choose how to fulfill each obligation within their own state.  

While the legislation that exists in the European community is by no means exhaustive, they are taking steps to protect human and environmental health domestically, and around the world, including the development of an “extended producer responsibility” directive to charge producers with the task of recovering the waste that they generate. These improvements can act as a model for regulations in other nations looking to tackle this problem—especially in other wealthy nations that have the infrastructure to develop and implement the regulations.

The United Nations University has also taken on the issue of e-waste through their StEP (Solving the E-Waste Problem) initiative, founded in 2004. The Initiative uses scientific data to account for social, environmental, and economic ramifications of the e-waste problem, conducts research on the lifecycle of EEE as well as their material flows, conducts research and pilot projects, denounces illegal activity related to e-waste, and looks to promote responsible use and recycling of electronics across the globe. The initiative now has over fifty members from industry, governments, NGOs and other international organizations that work to optimize the lifecycle of EEE, promote re-use, and raise public, scientific, and business awareness and knowledge. Past projects included partners with universities around the world, the US EPA, and Dell, and this past February, United Nations University and the WHO teamed up to release the first survey on e-waste’s

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48 Ibid.

CHAPTER 3: The Economics of Contamination

The Role of a Globalized Economy Throughout history, the international community has undergone many changes in the economic environment, in terms of policy and openness. The idea of free trade and liberalization of economic markets stemmed from the Classical Era of the 19th Century. Technological progress in terms of transportation and communication reduced the costs and paved the way for international trade and finance. It was a huge period of cooperation and economic growth, influenced by the ideas of economists like Adam Smith and David Ricardo. Free trade and comparative advantage drastically changed the economic landscape.

These ideas re-emerged again in the 1970’s as the economic situation began to shift again due to the break of the gold standard, an increase of foreign lending to developing countries, and the OPEC crisis. The work of Margaret Thatcher and Ronald Regan to reduce regulation and government involvement in economies in the 1980’s led to a more integrated international economy. Decreased trade and investment barriers encouraged the process of globalization, as did the invention of The World Bank, the International
Monetary Fund, and The World Trade Organization. These institutions worked to facilitate trade liberalization policies as well as to support free trade agreements between nations. While most economists would agree that free trade has encouraged economic growth, FTAs can interfere with regulations that are meant to encourage environmental responsibility. If labor, safety, and environmental standards and laws in a certain country pose some sort of barrier to trade, these regulations can be appealed to the WTO in order to increase the easiness of trade between multinational corporations or even between nations.\(^5\)

According to environmental activists Kenny Bruno and Josh Karliner, “Since it was created in 1995, the WTO has ruled every environmental policy it has reviewed as an illegal trade barrier that must be eliminated or changed.”\(^5\) Ignoring the environmental externalities that result from these types of decisions can be dangerous, and it is precisely this type of recklessness that allows for global environmental injustices like transnational movements of hazardous waste to left to those with the less economic influence.

**The Pollution Haven Hypothesis** While working at the World Bank in 1991, Lawrence Summers, a former economic advisor under the Clinton administration, signed a very controversial memo that was later leaked to the public. While there is debate over whether the contents of the memo were meant to be sarcastic, the text really articulates the economic sentiments for leaving environmental externalities to less developed countries:

> Just between you and me, shouldn’t the World Bank be encouraging more migration of the dirty industries to the LDCs? ... I think the economic logic behind dumping a load of toxic waste in the lowest wage country is impeccable and we should face up to that... I’ve always thought that under-populated countries in Africa are vastly under-polluted.\(^5\)

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\(^{51}\) Ibid., 177

\(^{52}\) Ibid., 179
While his remarks seem harsh, this is essentially the logic of the Pollution Haven Hypothesis. This theory states that pollution-intensive industries and activities from developed countries of the north will migrate to the less developed countries of the south as environmental regulations and their associated costs increase. In economic terms, it makes sense for the countries that have the comparative advantage in these types of industries, or can carry out production at the cheapest cost to the business, should specialize and produce the good or service.\(^5^3\) As stated by Pam Woodall of the Economist, “The benefits of international trade come from allowing countries to exploit their comparative advantage...And much of the third world’s comparative advantage lies, in one way or another, in the fact of its poverty; in particular, cheap labor and a greater tolerance of pollution.”\(^5^4\) In the case of hazardous manufacturing, and even hazardous waste processing, developing nations often have the comparative advantage. They consequently become “sinks” or dumping sites for waste generated by the wealthier countries and consumers of the global economy. \(^5^5\)

**A Closer Look at Trade Patterns of Electronic Waste** Indeed, the trend of the transnational movement of electronic waste tends to move from the global north to the global south, but this is by no means an exhaustive depiction of how hazardous waste travels around the world. According to Josh Lepawsky and Chris McNabb in their article, “Mapping International Flows of Electronic Waste,” the trade patterns of electronic waste resembles those of other commodities. The Americas, Europe and Asia are considered the three largest trading areas in the world, and the majority of trade happens internally

\(^5^3\) Francis Adeola, *Hazardous Wastes, Industrial Disasters, and Environmental Risks*, 95
\(^5^4\) Daniel Faber, *Capitalizing on Environmental Injustice*, 171.
within each region. In contrast, areas like Africa, the Caribbean, the Middle East, and Oceania are mostly export oriented.

However, the little data that has been collected on the movement of electronic waste shows that there is a large amount of trade happening within and between developing countries. This makes sense, since the parameters of the Basel Convention only explicitly work to ban the trade between developed and developing nations.\(^{56}\) By 2006, more than 10 percent of Africa’s trade was internal. This number was over 20 percent for the Caribbean and the Middle East and over 60 percent for Oceania. These increases are most likely due to the spread of electronics and technological use as the regions experience growth.\(^{57}\) Figure 3 below illustrates this volume and flow of e-waste as of 2006.


\(^{57}\) Ibid., 8.
Another trend that has emerged is the vast increase of e-waste movement to Asia. It is currently the main recipient of global e-waste exports, accepting over 96 percent of export from the Americas, 98 percent of Middle Eastern exports, and 99 percent of both Europe and Oceania’s exports, by 2006. However, these trade statistics are not so surprising, since they correlate with production patterns. If take China as an example, the countries’ largest sector is industry, making up 45.3 percent of its national GDP. It is the world leader in industrial output in terms of gross value, and its main industries include

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59 Ibid., 9.
mining and ore processing, metal production, machinery, chemicals, consumer products and telecommunications equipment. The prominence of these industries require a demand for material components, such as metals—a very common constituent in electronic waste. It therefore makes sense that countries like China would be willing to import e-waste in order to re-process and salvage useful materials and return them back into the production cycle.

Not only is there a demand for the materials, but there is also a demand for labor—one that is easily filled by those desperate to make a livelihood in poverty-stricken areas. The Documentary, *Digital Dumping Ground*, visits an area in Ghana referred to as “Sodom and Gomorrah” on the banks of the Korle Lagoon. Once a fertile wetland, it is now one of the most polluted bodies of water on earth where people come to earn money, surrounded by dangerous health hazards. In Hong Kong, an e-waste broker explains, “I can only say one thing, if you want to do it environmentally, you have to pay. They have to invest in machinery, labor, everything. It isn’t worth it to pay so much money.” The combined monetary benefits for both wealthy nations/corporations and low-wage workers sustain this economic, environmental, and social injustice.

**CHAPTER 4: The Ethics of Globalization and Development**

As illustrated in the previous chapter, the global, capitalistic forces that are at play in the international economic sphere drive the movement of hazardous wastes across borders, and usually to the south. However, the demand for such materials in developing

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61 Ibid.
64 Ibid.
nations creates jobs and livelihoods for many, despite the health and environmental risks that accompany the waste. Yet, the jobs and industries created often serve to perpetuate further environmental, social, and economic injustices within the structures of importing societies. These complexities of the waste trade are extremely apparent through a closer examination of the informal recycling industry in Indian society— one of the main centers for electronic waste processing.

Unregulated Recycling: A Case Study of India’s Informal Sector

Since British Colonization, the Indian economy has experienced growth due to infrastructural changes, industrialization, and global trade. But, with the second largest population in the world and a significant percentage of this population living in poverty, many issues within the country must still be addressed. The existence of an informal sector perpetuates some of these problems, specifically in relation to waste recycling. The uneven distribution of wealth and environmental health problems within this informal recycling industry reflects the hierarchal structures that dominated Indian culture for centuries and exhibits their continued influence within Indian social structure. The addition of electronic waste recycling to the already prominent waste trade only reinforces the social inequalities of the lower class and perpetuates the unregulated risks that go along with the industry.

The Indian caste system originates from the Hindu tradition within the country, although similar systems have been seen all throughout the world. Under this social organization system, every person is born into a caste and remains there until death, unless a marriage agreement is established where a woman marries into a higher level. It was a

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rigid system enforcing social inequality with the Brahmins at the top, followed by the Kshatryias, the Vaishyas, Sudra and finally Harijans, or “the untouchables” placed below the pyramid with several subdivisions within the castes themselves.\textsuperscript{66} From top to bottom the castes were made up of priests and academics; soldiers and kings; merchants, farmers, and landowners; commoners, peasants and servants; and street sweepers and cleaners in the lowest class. So while it was primarily a system of social and political organization, the castes also served a role in labor division. The untouchables were separated from the four main castes and were so stigmatized, that they weren’t even considered as part of the official system.\textsuperscript{67}

Research in the twentieth century revealed some intriguing ideas about relationships between the castes of the social system. A notable contribution was Dumont’s Theory, that said the separation between the highest and lowest caste represents a division between purity and pollution. The traditional professions of the lower class tended to deal with garbage, filth, and waste, which meant the upper classes did not have to. The highest caste was the most pure since they were socially furthest from the untouchables, and the lowest caste was “polluted” through their exposure to this very waste—a relationship that is useful in the discussion of the present-day waste and recycling industry. Moreover, the untouchables kept the Brahmins pure through their labor, so the caste was a necessary system to maintain this complementary relationship.\textsuperscript{68}

According to Dumont, these types of relationships characterized the entire caste system. In his work \textit{Caste} Christopher Fuller says, “In principle, all castes are mutually

\textsuperscript{67} Ibid., 479.
\textsuperscript{68} Ibid., 482.
ranked by their relative purity: for example by whether they are vegetarian or meat eating and, whether they ban widow remarriage or permit it. However, Indians hardly acknowledge the traditional caste system in public anymore and usually discuss hierarchal distinction in terms of cultural differences instead of inequalities. Despite this rhetoric change, caste still plays a central role in Indian identity and social formations. In fact, those who would be considered part of the untouchable caste, still deal with the separation and even discrimination more than any other group.

Dumont’s Theory has major implications in the prominence of the informal sector in India of both the past and present. Sometimes called “the zone of unorganized or unregistered labour” or “the unprotected sector,” the informal sector has been a fixture in Indian social and economic structure for quite some time, even though little research has ever been consistently conducted to further explore its inner workings. It is distinguished from the formal sector in that it lacks regulations in labor conditions, organization, and even in entry into the sector itself. This absence of an organized labor structure perpetuates poor working conditions, safety regulations, wages, and overall way of life. While it is difficult to collect concrete data, it is believed that between 30-70 percent of the urban workforce in India is part of the informal sector. However, there is a presence of informal work in rural settings such as seasonal farming, so the sector is not exclusive to urban centers.

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69 Ibid., 482.
70 Ibid., 488.
72 Ibid., 1293.
73 Ibid.,1293.
In her work “The Informal Sector,” Jan Breman outlines the common features of the social identity of the informal class. She says that they have little to no formal training, are often illiterate, and have no alternative income source besides their own labor. They receive very low wages for their large amount of work that has a low status in society, and there is also a higher participation rate of women and children within the sector. All of these things act as obstacles to informal workers and often make it difficult to experience upward mobility. A lack of education decreases the amount of job opportunities to begin with and compounded with low wages, provides little ability to remove themselves from their situation. The high rate of women and children in the sector is also very telling of the vulnerability of these workers who are even further exploited through this work. Perhaps most pertinent to this discussion is the low status of the workers in the informal sector. While all of the previously mentioned factors contribute to their low status, the “socially inferior origin of this workforce” has a historical influence that greatly contributes to this condition.

The high participation of the Untouchable castes in the informal sector comes as no surprise given their low placement within the traditional caste system. Breman says, “The strenuous physical effort that is often demanded, goes with sweat, filth, and other such bodily features which bear the odium of inferiority and subordination…. Tainted with the stigma of pollution.” These characteristics fit particularly well with the traditional understanding of the lowest caste.

\(^{74}\text{Ibid., 1303-1304.}\)
\(^{75}\text{Ibid., 1304.}\)
\(^{76}\text{Ibid., 1304.}\)
Along with these inferior and undesirable working conditions, also come health hazards that cannot be minimized by labor laws or health regulations. An obvious drawback of informal labor is the difficulty of worker organization and regulation. Unions are very difficult to organize because of the irregularity of informal work. Often workers aren’t based in a single location, nor do they always participate in the same line of work for extended periods of time. It is consequently a challenge to unify this fragmented labor force to establish a common platform to improve their conditions. Also, the lack of government regulation makes it impossible to enforce any kinds of labor, health, or environmental regulations for the various lines of work. More recently there have been regulation efforts by the rest of Indian society, but this largely stems not from the desire to improve the lives of informal workers but from the fact that informal workers evade government control.  

While there are many lines of work within the informal sector, waste recycling has been a historically prominent occupation within Indian urban society and other similar settings throughout the world--often taking place in slums, or right outside major cities. \(^{78}\) This sector also relies on a hierarchical structure with recycling units at the top, followed by large recyclable dealers, medium recyclable dealers, and small recyclable dealers. The waste gets sorted more specifically as it moves up the chain to isolate the most valuable materials from the rest of the waste. At the very bottom of the chain are the rag-pickers or scavengers who collect the trash from households, garbage cans, landfills etc. and bring them to the dealers. \(^{79}\)

\(^{77}\) Ibid., 1306-1310.
While they fill the lowest division of the hierarchy both within the informal sector and the caste system themselves, rag-pickers have filled a key economic role for centuries. They even played a large part in the papermaking industry of the mid-1800s, collecting materials to be used at the mills. The estimated economic value attributed to the present day scavengers is about 280 million U. S. dollars, yet they only make an average of $1.35 a day. Despite their economic importance, this group of people makes up the majority of the recycling industry and receives the lowest cut of its profits. In addition, they are subject to the poor working conditions of the informal sector that were previously discussed, again, resulting in the vulnerability of the population.

The increasing number of electronics has lead to a large section of the waste recycling industry that is referred to as electronic waste, or e-waste recycling. The traditional waste-pickers easily adapted their normal municipal waste collecting activities to account for the new material as the market for the valuable metals in electronics grew in Indian society. The domestic e-waste business functions very similarly to the traditional waste trade, with workers even paying consumers for their old electronics. Since the growth of PC use of India is about 3 times higher than the world average, the domestic influx of e-waste is particularly significant.

But, the industry has really taken off because of the international trade in e-waste. In 2007 alone, a study showed that an additional 50,000 tons of e-waste is imported to

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81 Ibid., 211.
82 Anknit Agarwal, Ashisha Singhamar, Mukul Kulshrestha, Atul K. Mittal, “Municipal solid waste recycling and associated markets in Delhi, India,” 81.
India from foreign countries, most of them developed nations.\textsuperscript{84} Delhi in particular has been coined as the e-waste capital of the world as it receives around 70 percent of the global e-waste and has around 3,000 recycling shops and industries in the area.\textsuperscript{85} An examination of the structural chain of this specific trade reveals a caste or feudal-like relationship between traders and recyclers who both participate within the informal sector. In this case, the traders would be akin to the feudal lords, or the high castes, while the recyclers/dismantlers/extractors act as the peasants. The traders receive the most profit in the industry due to their interaction with more formalized industries in reselling the recycled metals, and sometimes even purchasing large quantities of electronic wastes at auctions. But, it is the extractors and dismantlers who have to deal with all of the waste and turn it into the valuable material that can enter back into the market. Thus, the health and environmental risks are more concentrated within this area of the industry, while the wealth is concentrated higher up with larger traders and owners.\textsuperscript{86} While the “peasants” certainly rely on the traders for their wages and employment, the higher-ups rely equally as much on the cheap and unregulated services that the recyclers provide in order to profit. In this way, the organization of the recycling industry itself mirrors the complimentary relationship between the “pure Brahmins” and “polluted Untouchables” of the traditional caste system.

The electronic waste recycling industry poses many challenges for the government of India and presents an interesting mingling of traditional hierarchical social structures.

and a very modern, global environmental issue. On one hand, the informal sector has been a presence in Indian society for years and provides a great deal of services and economic benefits to India. The activity of electronic waste recycling within the sector has even brought in opportunities for capital gain (in terms of the precious metals that can be extracted) from all around the world. However this industry only seems to reinforce the inequality that has plagued the untouchables for decades. The scavengers, rag pickers, and recyclers are the ones left to deal with the health, safety, and environmental effects of others’ trash and they get very little compensation for their undesirable work. Now because of globalization and widened economic markets, they are even left to deal with the pollution of other nations.

*Environmental Justice* While Environmental Justice can be defined many different ways, it is generally the idea that there should be an equal or proportionate share of environmental hazards. The official EPA definition is, “the fair and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.” 87 Therefore, the environmental justice movement requires us to recognize race, class, and national inequalities when addressing the transnational movement of e-waste. Often, Environmental Justices goes hand in hand with distributive justice or fairness. One of the main concerns is how environmental benefits and burdens are distributed across different populations. 88 Another type of justice invoked within Environmental Justice is procedural or representative justice. This has to do with unequal bargaining power, or

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unequal representation in the decision-making process that determines the distribution of environmental benefits and harms. Finally corrective or commutative justice demands “just compensation” for those harmed by environmental injustice. 89

In the case of e-waste trade within India, it is clear that the environmental burdens of the waste recycling industry are concentrated in the lowest class of society, and amongst those who play a minimal role in the consumption of the electronic and consumer goods that create the necessity for the trade in the first place. In this societal arrangement there is a lack of distributive justice. The untouchable class also happens to be the population with the least amount of political and economic power. Thus, they have virtually no representation or voice on the national or international stage, and little power to demand just compensation for the dangerous work that they endure on a daily basis that keeps the industry alive. Their wages are low, but the little opportunity for upward mobility keeps them reliant on recycling for their livelihood. The informal nature and organization of the industry increases the difficulty of bringing justice, environmental, distributive, procedural, or corrective, to the situation. The capitalist-driven forces of globalization make institutional and legal change very difficult both in the Indian context, and in less developed countries across the world.

As a result, the poorest of populations get stuck with the majority of environmental and health problems, and have the least amount of resources to deal with them. Figure 4 below shows the many different ways that the movement of e-waste can contribute to issues of public health. Communities aren’t just affected by direct contact with harmful substances and fumes in the scavenging and recycling process itself, but they also have to

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deal with contamination of water sources and soils; natural resources that they rely on for sustenance.

![Diagram of Global E-Waste Movement](image)

**Figure 4: A Model of Global E-Waste Movement**[^90] (Source: Adeola, 97)

Increases in scientific knowledge have improved environmental protection in recent years, but about half of the world’s population (about 3 billion people) lives in unhealthy

environments with very little income. This strong, undeniable link between poverty and pollution exposes vulnerable groups to problems such as inadequate access to clean water, inadequate sanitation, and air pollution. Contaminated drinking water and air pollution, two major ramifications of electronic waste, along with untreated human excrement account for 7.7 million deaths per year. In other words, just three environmental issues contribute to 15 percent of the global death toll of 52 million. Unsurprisingly, these unsafe conditions most often occur in areas of the world (both in developing in industrialized nations) where populations are living in conditions of extreme poverty. Therefore, solutions to electronic waste disposal, sustainable development, or any other environmental justice issue for that matter, have to address both the cause of poverty and pollution.

CHAPTER 5: Stricter Regulations and Creative Solutions for a More Just Global Society

“We stand now where two roads diverge. But unlike the roads in Robert Frost’s familiar poem, they are not equally fair. The road we have long been traveling is deceptively easy, a smooth superhighway on which we progress with great speed, but at its end lies disaster. The other fork of the road — the one less traveled by — offers our last, our only chance to reach a destination that assures the preservation of the earth.”

-- Rachel Carson

As is the case with many other environmental concerns, the proliferation of electronic waste present in international trade flows can be easily ignored as long as the

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92 Ibid., 281.
93 Ibid., 294.
practice is economically favorable to powerful actors and if the negative effects are largely felt by those with less political influence. This issue in particular creates class, racial, and national hierarchies that are reinforced by the increasing demand for electronics and new technology--especially in Asian nations where the majority of the waste winds up. The true challenge is to address these injustices and on the institutional, industry, and consumer level.95

**Strengthened Policy, International Commitment** As discussed in previous chapters, there is some groundwork for both international and national level legislation restricting and regulating transnational movement of e-waste that has on the whole, been insufficient and ineffective. A commitment to closing the loopholes that perpetuate and incentivize exporting waste and unsafe recycling industries is a necessary first step in paving the way for solutions to mass amounts of unwanted EEE.

As mentioned in Chapter 2, part of the issue with regulation that exists today is that there are many discrepancies with the definition of electronic waste, along with many shortcomings that arise from a lack of global enforcement procedures and varying national commitments to these conventions. The policing the of the trade and disposal of harmful chemicals at the national level can also be a problem, especially when failing to do so can result in economic gain. Daniel Faber summarizes the issue with current forms of regulation:

The implementation of new international agreements and treaties to address the environmental injustices fostered by corporate-led globalization cannot be piecemeal in approach. Strong baseline standards around particular issues is not enough. Agreements must be comprehensive in nature, taking into account all the

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interconnected processes by which ecological hazards are displaced and transferred between countries and especially between the north and south.\textsuperscript{96}

So, along with rigid, mandatory standards that apply to all nations involved in the trade, rules also must be in place so that e-waste (and other types of hazardous wastes) can’t find its way into other countries as materials for re-use, donations, or as mislabeled shipments. Foreign investment in toxic industries in general, or the movement of such processes to areas with lenient environmental and health standards should also be combated through these more comprehensive regulations.\textsuperscript{97} This requires increased commitment, involvement, and authority exercised by international institutions such as the United Nations to fight for human and environmental health over destructive types of economic growth. The neoliberal sentiment that defines our current globalized economy has certainly opened up markets and created opportunities for gain, but perhaps the WTO and large multinational corporations need to be checked so as to preserve resources and human lives that are being sacrificed in the process. Faber suggests that in order to restore a balance with the institutions that work to maintain trade liberalization, we need to utilize strategies to make international institutions and politics more democratic. This includes democratization of transnational corporations, the IMF, large banks, the GATT, and the UN. A greater public say in international decision-making could be the key to a more careful examination of health and environmental harms associated with the globalizing economy.\textsuperscript{98}

Effective policy implemented on the international stage will also need to be accompanied by commitment from individual countries, especially from players like the

\textsuperscript{96} Daniel Faber, \textit{Capitalizing on Environmental Injustice: The Polluter-Industrial Complex In The Age of Globalization}, 211.
\textsuperscript{97} Ibid., 211-212.
\textsuperscript{98} Ibid., 212.
United States who create mass quantities of waste. Without the cooperation of the biggest polluters, international agreements are rendered useless. But, strict bans and commitment will not be enough, if the trade can continue underground. If companies are able to externalize the cost of e-waste disposal or recycling, there really isn’t an incentive to develop less toxic products. The recycling business must reflect the actual costs to developing countries, including automated, safer processing and protection for workers.\footnote{99}

Another alternative solution is to standardize and regulate the recycling industry, much like what has been done in Switzerland. As a small nation in terms of land area, Switzerland does not have much room for landfills to dispose of their trash, hazardous or otherwise. Thus, they became the first nation to implement a federally regulated electronic waste-recycling program back in 1991.\footnote{100} Modern, clean-burning facilities recycle or incinerate 98 percent of electronic waste, which produces energy for use. These factories are fit with scrubbers to prevent air pollution and the release of toxins into the environment. In St. Galen alone, energy produced in this fashion heats 10,000 homes.\footnote{101}

E-waste therefore can be transformed from a toxic nuisance to a potential for another energy source. Then again, Switzerland has a very different outlook than large countries such as the United States. According to the former chairman of the Environmental Commission of the Swiss Association for Information, Communication and Organizational Technology, Peter Bromand, “We are a small country with no access to the sea and no raw materials. The problem in the United States is that you believe your

\footnote{101} Ibid., 138.
resources are endless."\textsuperscript{102} Thus, the incentive to take advantage of any potential energy resources available, in this case e-waste, is there. In the United States, our reliance on cheaper, finite sources of energy could discourage the development of such sophisticated facilities.

On the other end of the spectrum, countries where these types of recycling industries exist informally in great numbers may not have the desire, or the economic means to create safe processing plants. While steps can be taken to improve the safety of the recycling process that already exists, there really isn’t a low-tech, green and efficient solution to e-waste recycling.\textsuperscript{103} Furthermore, lack of regulation and abundance of cheap labor willing to process the materials under current conditions could undercut any attempts to formalize the industry. According to Puckett of BAN, “Even if you have a state-of-the-art facility in a country like India, the free market will send it to the lowest common denominator, to the worst facilities where people are sitting on the streets just picking through it by hand. It’s a myth to think that you can just solve the problem immediately with technology alone."\textsuperscript{104}

\textit{Creating Market Incentives and Opportunities for Innovation} The current practices of electronic waste “disposal” certainly create an economic incentive for consumers and businesses to be content with the status quo. However, an internalization of all the associated health and environmental externalities could change the tides and create a more accurate representation of the true cost of electronic goods consumption. This internalization can come in the form of market-based incentives. As of now, the

\textsuperscript{102} Ibid., 138.
\textsuperscript{103} Lubick, Naomi, "Shifting Mountains of Electronic Waste," \textit{Environmental Health Perspectives} 120, no. 4, (2012): A149.
\textsuperscript{104} Peter Klein, \textit{Digital Dumping Ground, Film} (2009: WGBH Educational Foundation), Web.
incentive that seems to be making the most progress in the United States is a front-end fee. This would charge a set amount for the consumers to pay at the purchase time of their new product, which would be placed in a fund to finance the safe recycling and or disposal of the products at the end of their lifecycle. The goal of this system is to allocate the costs of disposal fairly. However, this would presuppose that a safe, ethically sound recycling system is already in place, and beg the question of who should manage the fund.

National recycling funding systems could create the opportunity for new business, as exemplified in Massachusetts back in 2000 after the statewide ban of cathode ray tubes in landfills. The state contracted with ElectroniCycle, Inc., a specialized recycling company located within the state. They were contractually bound to “seek the highest use of the products it receives—meaning repair and re-use is the first priority.” In 2001, ElectroniCycle recycled six million pounds of electronic material, five percent of which was tested and reused/resold within the United States.

While it is important for companies and industries on the whole to encourage environmentally sound production practices and innovate for the future, consumers must take it upon themselves to examine their own consumption patterns, think about the products that they buy, and what happens to those same products after they have reached the end of their lifecycle or become “obsolete.” Some manufacturers as well as stores that sell electronic goods offer voluntary take-backs, but it is ultimately up to the consumer to take advantage of these opportunities, as there is no incentive to do so apart from ethical obligation.

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106 Ibid., A199.
107 Ibid., A199.
**Opportunities for Innovation: Cradle to Cradle Design** At this point in time, another realistic market incentive to reduce the amount of electronics in the waste stream is the subsidization of innovative technologies, with low-waste designs. Cradle-to-Cradle design, made famous by architect William McDonough and chemist Michael Braungart, has received a lot of attention lately for precisely this reason. In their book *Cradle to Cradle: Remaking the Way we Make Things*, McDonough and Braungart suggest that we need to radically change the way we approach designing and producing our products, including electronics using nature’s design principles, creativity, and goodwill.¹⁰⁸

Manufacturing, as we know it today, is largely “cradle to grave,” where products are made using valuable materials and energy and eventually are disposed of in landfills, wasting their value.¹⁰⁹ In this way the products are designed for a very linear system, and this is true of electronic goods. The goal of the recycling industry in general is to reduce the amount of materials that find themselves in landfills, thus lessening the waste associated with consumption, or making the waste “less bad.” This reduction is often referred to as eco-efficiency. However, the circular, cradle-to-cradle model advocates for a more eco-effective model. The distinction is that instead of down cycling products to be used in lower-grade materials, we can circulate them in the production process and retain their value. According to McDonough and Braungart, “Eco-efficiency is an outwardly admirable, even noble, concept, but it is not a strategy for success over the long term, because it does not reach deep enough. It works within the same system that caused the problem in the

¹⁰⁹ Ibid., 27.
first place, merely slowing it down with moral proscriptions and punitive measures.”\textsuperscript{110} It only moves to make the system less destructive, but not to address the problems that make it so. Eco-effectiveness emphasizes growth, regeneration, upcycling and improving quality of life. This type of mindset fosters an innovation so foreign to our current approach, and requires a radical shift in perspective where we see humanity as irrevocably tied and within nature. Because of this, our actions and production should work to preserve and nourish the natural systems that sustain us and of which we are apart. McDonough and Braungart believe that an eco-effective mindset can help build industries that create things like buildings that produce more energy than they use and that purify their own wastewater; factories that produce drinking water as effluents; products that can decompose and become food for animals, plants or nutrients for soil—or that can return as valuable parts of industrial processes.\textsuperscript{111} With this type of mindset, the e-waste problem that we face can be an opportunity to change the how we construct electronic goods—an opportunity to create a world of abundance as opposed to hazardous waste.

\textbf{The Challenges Ahead} While there is no clear-cut solution to the injustices and harms surrounding the transnational trade of electronic waste, new perspectives that encourage innovation and distributive justice will be necessary in protecting human and environmental health, for present and future generations. This approach clearly supported by present-day environmentalists like McDonough and Braungart is however, not a new sentiment. Decades ago Barry Commoner warned against the separation of humanity and nature, and our linear use of resources. The advice that he leaves readers with at the end of

\textsuperscript{110} Ibid., 61-62.
\textsuperscript{111} Ibid., 90-91.
The Closing Circle rings true to this day: “Once more, to survive, we must close the circle. We must learn how to restore to nature the wealth that we borrow from it.”

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Bibliography


**Figures and Tables**


Figure 4: Adeola, Francis O. *Hazardous Wastes, Industrial Disasters and Environmental Health Risks: Local and Global Environmental Struggles*. New York: Palgrave Macmillan. 2012. 97.


Table 2: Adeola, Francis O. *Hazardous Wastes, Industrial Disasters and Environmental Health Risks: Local and Global Environmental Struggles*. New York: Palgrave Macmillan. 2012. 203