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International Regulation of Hazardous Chemicals and its Efficacy in Promoting Sustainability for Developing Countries

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Abstract: The past fifty years has witnessed an unprecedented growth in the chemical industry. Some chemicals offer considerable benefits in such areas as health care, agriculture and industry. However, in many cases, especially in developing countries, the generation, use and disposal of these chemicals pose a serious risk to human health and the environment. These dangers are addressed by three international conventions: the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal 1989, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade 1998 and the Stockholm Convention on Persistent Organic Pollutants 2001. These conventions aim to provide a framework for the environmentally sound management of hazardous chemicals throughout their lifecycles. All three conventions cover some aspect of “cradle-to-grave” management of hazardous chemicals, including persistent organic pollutants which have been identified as the most dangerous. The Stockholm Convention deals exclusively with persistent organic pollutants and is the only convention to impose a ban on their production and use. This paper evaluates the capacity of these conventions to address the global dangers of hazardous chemicals. First, the nature and character of these chemicals are discussed. Next, the international framework for “cradle-to-grave” management of hazardous chemicals is assessed. Finally, the paper considers whether these conventions adequately protect developing countries and whether they address their needs for long term environmental and economic sustainability.

Keywords: International Regulation, Hazardous Chemicals, Cradle-to-grave Control, Sustainability for Developing Countries, Environmental Sustainability

The past fifty years have witnessed an unprecedented growth in the chemical industry. Some chemicals offer considerable benefits, however, in many cases, the generation, use and disposal of these chemicals pose a serious risk to human health and the environment. In the 1980’s stringent environmental regulations in developed countries resulted in an escalation in the cost of hazardous waste disposal. Developing countries soon became “dumping grounds” or repositories for hazardous waste exports because they offered a disposal option at a fraction of the cost. In many cases, these countries lacked the capacity to manage these wastes in an environmentally sound manner. International concern about these exports led to the adoption of the Basel Convention on the Control of the Transboundary Movements of Hazardous Wastes and Their Disposal 1989 (Basel Convention).1 Two further Conventions have since been adopted to prohibit the generation of certain hazardous chemicals and to regulate their export: the Stockholm Convention on Persistent Organic Pollutants 2001 (Stockholm Convention)2 and the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade 1998 (Rotterdam Convention).3 These three conventions together provide a “cradle-to-grave” framework for the environmentally sound management of hazardous chemicals and wastes throughout their lifecycles.

This article evaluates the capacity of these conventions to protect developing countries from the global dangers of hazardous chemicals and waste. First, the nature and character of these chemicals are discussed. Next, the scope of the conventions and the framework which they apply for the regulation of chemicals and waste is examined. The article then evaluates the capacity of these conventions to adequately address the environmental and economic sustainability needs of developing countries. The article will detail how the initial success of the Basel Convention in stopping the hazardous waste trade to developing countries has been undermined by exporters who claim to be exporting commodities for re-use or recycling, and not hazardous wastes for disposal. Two case studies of hazardous waste exports to developing countries will be discussed: electronic waste and ship scrapping. These exports are currently the main focus of international concern. The legality of these exports will be examined and recommendations will be made.
as to how a more sustainable outcome can be achieved.

**Hazardous Chemicals and Waste**

In 2004 it was estimated that approximately 70,000 chemicals were available globally, with about 1,500 new chemicals being introduced each year. Although these chemicals play a vital role in industry, medicine and agriculture, a large number have been found to be highly toxic to human beings and the environment. One group of chemicals, known as persistent organic pollutants (POPs) has been identified as posing the greatest dangers. They are very hard to destroy and are resistant to degradation by chemical, physical or biological means. They are also bioaccumulative in humans, animals and plants.

Once released into the atmosphere, they can travel great distances across air and sea currents. Hence, their four main distinguishing characteristics are: toxicity, persistence, bioaccumulation and long-range dispersion. POPs include chemicals such as polychlorinated biphenyls (PCBs), which were introduced in the 1920s for use in electrical equipment.

Since POPs bioaccumulate in the fatty tissues and organs of human beings and animals, the main danger to human beings arises from exposure to POPs in the food chain. These chemicals move up through the food chain increasing their concentrations each time a contaminated prey is eaten. POPs are semi-volatile in that they can change easily from a liquid to a gas and back to a liquid again. Once released, they spread from tropical countries by evaporating into the atmosphere and ultimately condensing over colder areas. Thus, although most POPs are produced in industrialized countries they are more highly concentrated in the polar regions. The result is that human and animal populations in the polar regions tend to have an abnormally high concentration of POPs. For example, the Inuit population of the Canadian Arctic have a higher concentration of POPs in their bodies than any other human population. Levels of PCBs in the breast milk of Inuit women are reportedly at least five times higher than women in urban Canada.

Many POPs are classified as probable human carcinogens, based on scientific evidence of carcinogenicity in animal studies. In addition, they have been shown to have a wide variety of adverse health impacts, including endocrine disruptions with resultant reproductive and development abnormalities. There is also evidence that prolonged exposure to POPs could result in damage to the central and peripheral nervous systems, liver, thyroid, nervous system, bones, kidneys, blood and immune systems.

Agenda 21 stresses the importance of ensuring the environmentally sound management of toxic chemicals within the principles of sustainable development and improved quality of life for human beings. Developing countries are particularly vulnerable to toxic chemicals and pesticides since they often lack sufficient information and resources to assess the risks. In many cases, developed countries have continued to export hazardous chemicals and pesticides to developing countries long after they have been banned domestically. Chemicals and pesticides also create enormous disposal problems, since stockpiles often result in land and water contamination. It has been estimated that there are approximately 400 million tonnes of hazardous waste in storage awaiting disposal. Although this includes solid waste, the hazardous characteristics are often a result of POPs components or chemical contamination.

**Chemicals and Wastes Covered by the Conventions**

**The Stockholm Convention**

The Stockholm Convention was adopted in 2001 and entered into force in May 2004. Its objective is to protect human health and the environment from POPs. The Convention requires the elimination or restriction of production and use of certain intentionally produced POPs. It also requires the continuing minimization, and where feasible, the ultimate elimination of certain unintentionally produced POPs.

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11 Agenda 21 Ch 19.1
12 Ibid Ch 19.2.
The Stockholm Convention targets 12 specific POPs which have been identified as posing the greatest danger to human health and the environment. These POPs have been widely used as pesticides and industrial chemicals, or are by-products of industrial processes. The majority of these POPs have been produced intentionally for commercial purposes, while the remainder are by-products of industrial processes, such as incineration of chlorinated based products, or certain plastics.

The Rotterdam Convention

The Rotterdam Convention was adopted in 1998 and entered into force in 2004. Its objective is to promote shared responsibility and co-operation among Parties in the international trade of certain hazardous chemicals to protect human health and the environment. It introduces a mandatory prior informed consent procedure for certain hazardous chemicals. The Rotterdam Convention is of particular assistance to developing countries whose assessment capabilities and regulatory regimes may be inadequate to monitor the import and use of certain chemicals.

The Rotterdam Convention is the formalization of a voluntary prior informed consent procedure administered jointly by the United Nations Environment Program and the Food and Agricultural Organization since 1989. The chemicals and pesticides subject to the prior informed consent procedure in the Rotterdam Convention are listed in Annex III. These include pesticides, severely hazardous pesticide formulations and industrial chemicals.

The Basel Convention

The Basel Convention was adopted in 1989 to control exports of hazardous wastes. It entered into force in 1992. Its principal concern was to protect developing countries from hazardous waste dumping by industrialized countries. The Convention regulates international movements of hazardous waste through a system of prior informed consent and in accordance with the principles of environmentally sound management. It provides the final link in the chain and, together with the Stockholm and Rotterdam Conventions creates a cradle-to-grave approach to hazardous chemical management.

The Basel Convention covers hazardous wastes that are subject to transboundary movements. “Wastes” are broadly defined to include substances or objects which are intended to be disposed of. “Disposal” is defined to include operations leading to final disposal as well as operations which may lead to recycling or recovery. Annexes I and III to the Basel Convention define which wastes are hazardous. Annex I lists general categories of wastes to be controlled, while hazardous characteristics are listed in Annex III. The hazardous characteristics in Annex III are: explosiveness, flammability, toxicity, and ecotoxicity. A waste listed in Annex I will be considered “hazardous” if it possesses the characteristics listed in Annex III. Wastes are also regarded as hazardous if they are listed in Annex II. This includes household wastes and ash from the incineration of household wastes. Wastes are also classified as hazardous if they are defined as hazardous in the national and domestic legislation of the exporting, importing or transit Party. This broad definition of hazardous wastes has resulted in uncertainty as to which substances are hazardous wastes and subject to the Basel Convention. To clarify matters, lists of specific wastes have been developed and adopted as annexes to the Convention. Wastes designated as hazardous and subject to the Convention are now listed in Annex VIII, while non-hazardous wastes are listed in Annex IX. These annexes are subject to ongoing review.

There is considerable overlap between the chemicals regulated by the three conventions and also considerable gaps in coverage which need to be addressed. Fortunately, each Convention has a mechanism for adding new chemicals, but this is subject to the agreement of the Parties. Consequently, the cradle-to-grave management of hazardous chemicals is far from comprehensive, except in the case of POPs which are covered by all three conventions.

Regulation of Chemicals and Wastes

The Stockholm Convention

Of the three Conventions, only the Stockholm Convention adopts a cradle-to-grave approach to chemical management. It specifically requires Parties to take POPs characteristics into account when carrying out an assessment of new chemicals, so as to prevent

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14 These are: aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, polychlorinated biphenyls, DDT, dioxins and furans.


16 Listed are 30 hazardous pesticides, such as: aldrin, binapacryl, captafol, chlordane, chlordimeform, chlorobenzilate, DDT, and so forth.

17 Basel Convention art 2.

18 Ibid.

19 Ibid art 1(1)(b). Radioactive wastes and wastes discharged from ships are excluded from the Convention as they are covered by other international instruments: art 1(3).
the production and use of new pesticides or industrial chemicals which exhibit POPs characteristics.\(^{20}\) Parties are also required to consider POPs screening criteria in assessing existing chemicals.\(^{21}\) The Stockholm Convention requires parties to develop strategies to identify stockpiles of POPs waste and to manage them in a safe, efficient and environmentally sound manner. In disposing of POPs waste, it is a requirement that the POPs content be destroyed or irreversibly transformed. In developing environmentally safe disposal technologies for POPs, the Stockholm Convention links closely with the work of the Basel Convention.\(^{22}\)

The Stockholm Convention imposes an immediate ban on certain specified intentionally produced POPs. Article 3 requires Parties to take immediate action to prohibit the production and use of ten chemicals listed in Annexes A and B, namely: aldrin, chlordane, dieldrin, endrin, heptachlor, HCB, mirex, toxaphene, PCBs and DDT. POPs that are released unintentionally as by-products of industrial and combustion processes, namely: hexachlorobenzene, polychlorinated biphenyls, dioxins and furans, are also regulated by the Stockholm Convention.\(^{23}\) Parties are required to promote measures to reduce releases and eliminate sources, including developing substitute or modified materials, products and processes, and requiring the use of best available techniques and best environmental practices.

Any party can propose the listing of a new POP which is then considered by the Persistent Organic Pollutants Review Committee. After conducting a risk assessment, a decision is made whether to proceed with the listing. This involves the application of screening criteria and a precautionary approach.\(^{24}\)

The Stockholm Convention imposes strict controls on exports and imports of POPs. Generally, exports and imports are prohibited, except for environmentally sound disposal or for a use or purpose which is permitted for that Party;\(^{25}\) for example, a country may be permitted to use DDT for disease vector control. This requirement also applies to exports to non-Parties; subject, however, to annual certification specifying the intended use of the chemical and a commitment by the non-Party to protect human health and the environment by taking measures to prevent releases and manage stockpiles.\(^{26}\) POPs must not be transported across international boundaries without observing relevant international rules, standards and guidelines.\(^{27}\) A Party is also permitted to register specific exemptions when ratifying the Convention but safe alternatives must be adopted as soon as they are available. Each Party is required to develop a National Implementation Plan in which it details how it plans to meet the objectives of the Convention.\(^{28}\)

### The Rotterdam Convention

The Rotterdam Convention permits the continuation of trade in chemicals, without imposing bans or phase-outs. It imposes a prior informed consent procedure for the international trade of chemicals listed in Annex III. The Convention initially listed 27 chemicals, but several more were added at the first meeting of the Conference of the Parties in 2004. New listings include a range of highly toxic pesticides traded internationally such as parathion, monocrotophos, and additional forms of asbestos. The prior informed consent procedure imposed by the Convention facilitates the monitoring and control of trade in hazardous chemicals. A Party has nine months to make a decision as to whether it will accept future imports of a listed chemical. Parties are provided with full information concerning the potential hazards of the chemical.\(^{29}\) If a Party does not respond, it is assumed that it has declined to accept future imports.

There is an efficient procedure for adding new chemicals to Annex III. Parties are required to notify the Secretariat and to supply full information regarding any chemical that has been banned or severely restricted in the exporting country.\(^{30}\) When the Secretariat has received at least one notification from two of the seven designated prior informed consent regions, which meet specified criteria,\(^{31}\) the chemical is referred to the Chemical Review Committee. The Committee then decides whether to propose that the

\(^{20}\) Stockholm Convention art 3(3).
\(^{21}\) Ibid art 3(4).
\(^{22}\) Ibid art 6(2).
\(^{23}\) Ibid art 5.
\(^{24}\) Ibid art 8(9).
\(^{25}\) Ibid art 3(2).
\(^{26}\) Ibid.
\(^{27}\) Ibid art 6(1).
\(^{28}\) Ibid art 7.
\(^{29}\) Rotterdam Convention art 10.
\(^{30}\) Ibid art 5.
\(^{31}\) Criteria are set out in Annex 2 to the Rotterdam Convention.
chemical or pesticide be added to Annex III. Developing countries can also short-cut the listing procedure, by notifying the Secretariat of “severely hazardous pesticide formulations”, namely pesticides that produce severe environmental or health effects within a short period of exposure. If the pesticide formulation meets specified criteria, it will be considered by the Chemical Review Committee for possible listing on Annex III.

**The Basel Convention**

The Basel Convention deals with the disposal and export of hazardous wastes. It requires transboundary movements of hazardous wastes to be reduced to a minimum consistent with environmentally sound management. It also requires hazardous waste to be disposed of as close as possible to its point of generation. Further, Parties generating hazardous waste are required to ensure that adequate disposal facilities for environmentally sound management are available within their own territory. Exports of hazardous waste for final disposal are only permitted when the exporting state does not have the technical capacity and the necessary facilities to dispose of the waste in an environmentally sound and efficient manner. These principles are re-iterated in the principles of environmental sound management of hazardous waste developed by the Secretariat of the Basel Convention.

Hazardous wastes covered by the Basel Convention can still be manufactured and used by the country of origin. The Basel Convention itself does not ban, but only regulates exports of hazardous waste. Trade with non-Parties is generally not permitted. The initial focus of the Convention was on hazardous waste dumping in developing countries. However, concerns later shifted to exports of hazardous waste to developing countries for recycling. Some exports were for “sham recycling”; while in other cases recycling activities were carried out in an unsafe manner with devastating consequences for local inhabitants and the environment. The Convention was subsequently amended to impose a total ban on hazardous wastes exports from developed to developing countries. This was achieved by inserting a new Annex VII into the Convention. Parties listed in Annex VII (effectively OECD countries) are prohibited from exporting hazardous wastes for either disposal or recycling to non-Annex VII Parties (effectively non-OECD countries). The amendment has not yet come into force but, with the notable exceptions of electronic waste and ship scrapping, most OECD Parties appear to be observing the ban in practice.

**Do these Conventions Adequately Protect Developing Countries?**

The Basel, Rotterdam and Stockholm Conventions provide an integrated approach to hazardous chemical and waste management. The synergy of these conventions also provides a framework for improved domestic chemical management. All three conventions cover some aspect of “cradle-to-grave” management of hazardous chemicals and wastes. Together, they afford a considerable measure of protection for developing countries. The Stockholm Convention prohibits the generation and use of some of the most dangerous chemicals in existence. The Convention will put an end to POPs contamination of other countries, either through export or atmospheric transfers. Stockpiles of chemical waste still present a major problem and the Convention emphasizes the need for their identification and destruction.

The Rotterdam Convention provides developing countries with information about the hazards of chemicals and the opportunity to ban imports. The benefits of the Rotterdam Convention for developing countries were expressed by Jacques Diouf, the Director-General of the United Nations Food and Agriculture Organization, as follows:

The Convention will help countries to avoid using pesticides that are recognized to be harmful to human health and the environment and highly toxic pesticides that cannot be handled safely by small farmers in developing countries. The treaty promotes sustainable agriculture in a safer environment, thereby contributing to an increase in agricultural production.

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32 Rotterdam Convention art 5.
33 Rotterdam Convention art 6.
34 Criteria are set out in Pt 3 of Annex 4 to the Rotterdam Convention.
37 Ibid.
38 Ibid art 4.9(a).
40 Basel Convention art 4(5) art 11, however, provides for agreements to be entered into with non-Parties provided that the waste management regime is as rigorous as that specified by the Convention.
and supporting the battle against hunger, disease and poverty.\textsuperscript{42}

The Basel Convention has drastically reduced the number of hazardous waste exports to developing countries and promoted waste minimization policies and sound management.

The three Conventions are, however, subject to a number of problems which undermine their effectiveness. First, not all countries have ratified these conventions or the Basel ban amendment. This failure has been exploited by hazardous waste traders, who claim to be exporting products to developing countries for recycling or re-use, and not hazardous wastes for disposal or recycling. Further, regulation of exports has led to an illegal trade in hazardous chemicals and waste. The two case studies below illustrate these problems.

\textbf{Case Study: Electronic Waste Exports to Developing Countries}

The global production of electronic products has escalated with 20-50 million tonnes generated every year.\textsuperscript{43} Electronic waste is the fastest growing waste stream as people are frequently upgrading their computers, mobile phones and other electronic equipment. Electronic waste contains a mixture of several hundred components, including heavy metals and hazardous chemicals. These include beryllium, cadmium, chromium hexavalent, lead, mercury, brominated flame retardants, polyvinyl chloride (PVC) and organics.\textsuperscript{44} Most of these substances are toxic to humans and several are known carcinogens.\textsuperscript{45}

Electronic waste poses enormous disposal problems. Globally, millions of tonnes are being consigned to landfills where they leach into land and water over time, or are released into the atmosphere. Incineration can result in heavy metals such as lead and cadmium being released into the atmosphere. If the waste contains PVC plastic, dioxins and furans are also released.\textsuperscript{46} As a result, many developed countries have introduced legislation prohibiting electronic wastes being dumped in landfills or incinerated.

In the 1990s most developed countries, including the European Union, Japan and some states in North America established recycling facilities for electronic wastes. However, because wastes generated by every stage of the recycling process are contaminated with a range of toxic heavy metals and persistent organic pollutants, costs of recycling are high. This has resulted in hundreds of thousands of old computers and mobile phones being exported to developing countries, such as Asia and Africa, where recycling costs are a tenth of the price of recycling in the United States.\textsuperscript{47} Many of these shipments are illegal operations.

There is considerable demand for electronic waste imports in developing countries because they contain valuable substances such as copper, iron, silicon, nickel and gold. The largest electronic waste recycling operation is located in Guiyu in Guangdong Province in China, just four hours drive north east of Hong Kong.\textsuperscript{48} Most of this waste is reported to have originated in North America, with Japanese, South Korean and European waste present to a lesser degree.\textsuperscript{49} In Guiyu, about 100,000 migrant workers are involved in breaking down obsolete computers and other electronic scrap. These workers include women and children working under primitive conditions without any awareness of the health and environmental hazards involved. Recycling operations are conducted by hand in scrapyards without the use of safety equipment. Recycling activities include burning of plastics and wires, riverbank acid works to extract gold, melting of toxic soldered circuit boards, and cracking and dumping of toxic lead-filled cathode ray tubes.\textsuperscript{50} Tonnes of electronic waste are being dumped along, or in, rivers and irrigation canals in the rice growing area. The area has become heavily contaminated and well water in Guiyu is undrinkable with the result that water has to be brought in from a distance of thirty kilometres away.\textsuperscript{51}

According to reports, large quantities of computers, mobile phones and other electronic equipment

\textsuperscript{42} UNEP-FAO news, op cit n 4.
\textsuperscript{45} Ibid.
\textsuperscript{49} J Puckett, “Exporting Harm: The High-Tech Trashing of Asia”, (2005), Basel Action Network & Silicon Valley Toxics Coalition.
\textsuperscript{50} Ibid.
\textsuperscript{51} Ibid.
are being exported from the United States and Europe to Nigeria for “re-use and repair”. Although these exports are technically waste, they are being exported as products to obviate the requirements of the Basel Convention. The Basel Action Network estimates that approximately 400,000 computers or monitors are arriving in Lagos each month. Most of this equipment is not economically repairable or resalable. Since Nigeria does not have any electronic waste recycling infrastructure, it is being dumped or burned, creating serious health and environmental contamination.

**Legality of Electronic Waste Exports to Developing Countries**

The Basel, Stockholm and Rotterdam Conventions have so far failed to prevent electronic waste exports to developing countries. A first difficulty is that not all countries have ratified the conventions. In particular, the United States, the world’s largest chemical manufacturer and waste generator, has not ratified any of these conventions. Also, as the amendment to the Basel Convention imposing a ban on hazardous waste exports from OECD countries to non-OECD countries has not yet come into force, Parties are not legally bound to observe it. In other cases, electronic waste is purportedly being exported for “re-use and repair” and is consequently not classifiable as hazardous wastes under the Basel Convention. The Stockholm and Rotterdam Conventions also offer little assistance, since exports only become hazardous during the recycling process. A single electronic product contains minute quantities of hazardous substances. It only becomes a danger when large quantities are stockpiled and disassembled.

It is, however, illegal for Basel Parties, such as China, India and Pakistan to import wastes from the United States, since the Basel Convention does not permit trade with non-Parties. China’s electronic waste imports are also in breach of their domestic legislation. In 2000 China amended the Law on the Prevention and Control of Solid Waste Pollution to the Environment to prohibit imports of computers, monitors, cathode ray tubes, and other electronic equipment. Unfortunately, this law does not appear to be enforced.

**Recommendations for Regulating Electronic Waste**

Developed countries should take responsibility for their own waste and not pass it on to developing countries. The best option is not to generate the waste in the first place. Governments in developed countries should require manufacturers of electronic products to replace hazardous materials in electronic products with safer alternatives. Policy measures could also be introduced to promote safe recycling, such as tax incentives and product design. Manufacturers of electronic goods must also accept full cradle-to-grave responsibility for their goods. Extended producer responsibility has been introduced in a number of countries and should be comprehensively applied to electronic products. This concept has been defined by OECD as:

transferring the costs of environmentally significant post-consumer characteristics of products, such as waste volume, toxicity and recyclability, from local authorities to the producers. It is anticipated such a cost transfer will provide economic incentives for the producers to prevent waste generation, reduce usage of toxic materials, increase recycling and enhance markets for secondary materials.

A significant recent initiative is that taken by the European Union who enacted two directives in 2002 which introduce “cradle-to-grave” responsibility for manufacturers of electronic waste. All European Union member states must incorporate these directives into national legislation. The first directive phases out lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers in electrical and electronic equipment by 1 July 2006. The second directive requires manufacturers of such equipment to take back the appliance at their own expense, recycle it,

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53 Ibid.
54 In any event, even when the ban comes into force, only Parties who ratify the amendment will be bound.
55 The US is permitted to trade with Basel Parties if it enters into an agreement with the Party pursuant to art 11 of the Convention (see n 38). No art 11 agreement exists with respect to e-trade between India, Pakistan and China.
60 Directive on the “Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment” 2002/96/EC.
and dispose of the residual waste. These initiatives are a milestone in stemming the hazardous waste trade. Their only drawback is their geographical limitation and their restriction to specific toxic components, albeit some of the most hazardous. Similar measures should be introduced in other developed countries. Clean production and extended producer responsibility could stem the flow of electronic waste exports if implemented consistently in the developed world.

Case Study: Shipbreaking in Developing Countries

Each year approximately 700 of the world’s 45,000 ocean-going ships are scrapped. In the 1970s the shipbreaking industry was located in industrialized countries. However, as health and safety regulations in these countries increased, the industry relocated to poorer countries such as India, Bangladesh and China, Pakistan, the Philippines and Vietnam where there is a growing need for low-grade steel. To extract the steel, workers toil under the most arduous conditions without any safety precautions. Apart from the dangers posed by exposure to toxic chemicals, it is estimated that one in four of these workers will contract cancer from the asbestos on board these waste vessels.

Alang in India is the largest ship “recycling” facility. Here, approximately, 40,000 men, women and children are employed to dismantle ships. The ships are sailed in as far as possible, beached, and dragged into shore by workers. The workers then climb onto the ships and cut them apart with bare hands and without safety gear. Greenpeace reports that workers in Alang are removing asbestos with bare hands; toxic materials are being dumped in the sea or on agricultural land, and workers are inhaling toxic fumes from lead paint. The sea and surrounding area is reported to be contaminated and asbestos is being widely distributed as waste or for re-use.

Older ships contain a number of hazardous materials such as PCBs, asbestos, heavy metals, hydrocarbons and arsenic. Asbestos is classified as a hazardous waste under the Basel Convention. Asbestos is also notifiable under the prior informed consent procedure of the Rotterdam Convention. Polychlorinated biphenyls found on ships are required to be eliminated under the Stockholm Convention and stringent requirements are placed on their disposal. However, these requirements are generally not being observed, as the shipping industry has taken the view that ships proceeding under their own power to a scrapyard are entities and not wastes or chemicals, and therefore not covered by the Conventions. There are also numerous instances of exporters not disclosing their intention to scrap the vessel until it arrives at the scrapyard. If the transaction then indicates a sale of the ship to a purchaser in a developing country, and the decision to scrap it is only made after the ship has arrived in the developing country, arguably, no transboundary movement of “waste” has occurred. This procedure enables it to bypass the requirements of the Basel Convention.

Recommendations for Regulating the Shipbreaking Industry

Exports of ships to developing countries for scrapping, without regard to the capacity of that country to ensure environmentally sound management, does not promote sustainable development. The International Maritime Organisation, the International Labour Organisation and the Basel Convention have established a Joint Working Group on ship scrapping. At their first meeting in February 2005, a decision was taken to develop a legally binding instrument on ship recycling. At their second meeting in December 2005, the working group concluded that ship recycling can contribute to sustainable development, but only by minimising the associated environmental, safety and occupational health risks. This is a welcome initiative although it may take some time introduce and implement appropriate measures to address the problem.

A legally binding instrument on ship recycling is essential. Parties to the Stockholm, Rotterdam and Basel Conventions should accept that ships travelling to the scrap yard for scrapping are not ships, but rather hazardous chemicals and wastes. Consequently, the Basel Convention prohibits their export to countries that do not have the capacity to manage them safely. The “ban amendment” also prohibits exports of hazardous wastes to developing countries, and although it has not yet come into force, should be observed. States should be vigilant to prevent end-of life ships allegedly being exported for use in developing countries, and then scrapped.

65 Ibid.
67 Stockholm Convention art 6(d).
69 Ibid.
Ships destined for scrapping in developing countries should be decontaminated prior to export. Guidelines developed by the working party of the Basel Convention for the environmentally sound management of ship recycling should be observed until appropriate alternatives have been developed.\textsuperscript{70} States should initiate a prior informed consent and reporting system for ship recycling. Measures should be adopted to promote occupational health and safety and environmentally sound management of ship scrapping. In keeping with the “polluter-pays” and “producer-responsibility” principles, a financial mechanism is essential to promote safe shipbreaking. The Basel Action Network has suggested that the shipping industry finance such a system.\textsuperscript{71} According to the Basel Action Network, the costs of the scheme would represent only 0.5% of the shipping industry’s total turnover and would cover the cost of pre-decontamination, site remediation and technological upgrading to ensure environmentally sound recycling.

Conclusion

Countries in the Asian Pacific region need more raw materials than can be supplied domestically. They are faced with a difficult choice regarding hazardous imports. A ban on imports may deprive them of employment opportunities and an important source of revenue. On the other hand, where imports are not being managed safely and present a danger to human beings and the environment, greater long term harm may be experienced. This is well illustrated in the case studies of electronic waste and shipbreaking.

The Basel, Stockholm and Rotterdam Conventions provide an effective framework for the environmentally sound management of hazardous chemicals and wastes throughout their life-cycles. Together these conventions afford a large measure of protection for developing countries. Although these conventions may not have been successful in eradicating all problems pertaining to hazardous chemicals and waste, they are an important first step on the road to sustainable practices. However, for the conventions to achieve maximum effectiveness it is essentially that all nations ratify these conventions, including the Basel ban amendment. Once ratified, developed countries have a responsibility to introduce and enforce domestic legislation to ensure that their citizens do not obviate their international obligations under the conventions. The case studies of electronic waste dumping and ship scrapping illustrate the need for governments to exercise greater vigilance over exports and imports. Trade should also be carefully monitored to prevent illegal exports.

Developed countries should promote clean technology through subsidies and other incentives. Extended producer responsibility schemes should be introduced to ensure that the manufacturers are responsible for the products they produce throughout their entire life cycles. The shipping industry has a responsibility to ensure that ships are scrapped in an environmentally safe manner. Any hazardous waste generated must be disposed of at source in keeping with the requirements of the Basel Convention and not exported to developing countries that lack the capacity to handle it safely.

Developed countries should assist developing countries in developing their own industries which are not reliant on hazardous waste imports. They should also assist developing countries to acquire the necessary expertise to safely manage any chemicals or hazardous wastes generated domestically. This requires financial assistance and technology transfer. Co-operation between developed and developing countries in this venture will benefit human health and support the fundamental interest of sustainable development.

About the Author

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Main research interests are environmental law, especially pollution law, international transfers of hazardous waste and chemicals and their impact on human health, corporate and directors’ liability, planning law and genetically modified organisms. Publications include 4 co-authored books and 40 chapters and articles. Have presented and chaired sessions at a number of leading international and national conferences. Co-author of the only books on pollution law in Australia - Corporate Liability for Pollution, (LBC 1998) and Pollution Law in Australia (Butterworths 2002). Memberships include: the Australian Government Hazardous Waste Policy Reference Group to advise Minister on Domestic Implementation of the Basel Convention and the IUCN Commission on Environmental Law.


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