# Transboundary Trade in Hazardous Substances and Wastes – Case Summary

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## The Problem

Use of and exposure to hazardous substances increased considerably after the Industrial Revolution, particularly as the synthetic chemical industry expanded after 1870. By 1950, a broad range of hazardous substances – including lead-based additives to paints and motor fuel, mercury emissions from industrial processes, pesticides, strong acids, and chlorides – were widely used in everyday products. Additional hazards were created in subsequent decades as a wider range of plastics and other types of synthetic chemicals were invented and used in products or manufacturing processes. The manufacture and use of these substances also created the parallel problem of handling hazardous wastes – the gaseous, liquid, or solid residues created in production processes or left over after consumers were finished using a product containing them. For most of human history burning or dumping wastes posed few environmental, safety, or health problems. Few pre-industrial wastes caused harmful smoke when burned, and only a small portion of dumped waste was persistent (remaining in the same physical form for an extended period rather than decomposing on contact with ground, water, or air). Many of the new synthetic wastes are quite persistent. A significant portion are also corrosive, explosive unless handled carefully, or poisonous (toxic) to humans, animals, or plants. The worst toxins are those that add bioaccumulation and/or bioamplification to persistence. Substances bioaccumulate, by lodging in the fatty tissue of humans or animals rather than being eliminated through sweat or digestion; they bioamplify if they form in stronger concentrations as humans or animals higher in the food chain eat plants or smaller animals having the substance in their bodies.

The seriousness of hazardous substances problems was acknowledged at the United Nations Conference on the Human Environment (Stockholm Conference) in 1972. Principle 6 of the Conference Declaration stated that

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> "The discharge of toxic substances or of other substances and the release of heat, in such quantities or concentrations as to exceed the capacity of the environment to render them harmless must be halted in order to ensure that serious or irreversible damage is not inflicted upon ecosystems." Principle 7 indicated that governments should "take all possible steps" to prevent pollution of the seas by substances hazardous to the marine environment or human health. Several of the Stockholm Action Plan's 109 Recommendations stressed the need for increased domestic action and intensified international cooperation and research on hazardous substances.[1]

The 1992 UN Conference on Environment and Development (Rio Conference) addressed hazardous substances in very general terms. Principle 14 reflected the strong developing country interest in preventing the spread of hazards in specifying "States should effectively cooperate to discourage or prevent the relocation and transfer to other States of any activities and substances that cause severe environmental degradation or are found to be harmful to human health." Principle 15 embodied a widely supported version of the Precautionary Principle without using that term in specifying "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."[2]

Paragraph 22 of the Plan of Implementation approved at the World Summit on Sustainable Development (Johannesburg Summit) in 2002 made the clearest statement about hazardous substances. It stressed the urgency of developing sustainable production and consumption patterns that will "prevent and minimize waste and maximize reuse, recycling and use of environmentally friendly alternative materials." Paragraph 23 recorded commitments to "promote reduction of the risks posed by heavy metals that are harmful to human health and the environment" and that all chemicals should be "used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment" no later than the year 2020.[3]

Efforts to regulate use and disposal of hazardous substances have been hobbled by the lack of agreement on which substances should be classified as "toxic" or "hazardous," particularly in the area of waste disposal. This is reflected in Article 1 of the Basel Convention on Transboundary Movements of Hazardous Wastes and their Disposal, which defines "hazardous wastes" as:

a.) Wastes that belong to any category contained in Annex I, unless they do not possess any of the characteristics contained in Annex III; and

b.) Wastes that are not covered under paragraph (a) but are defined as, or are considered to be, hazardous wastes by the domestic legislation of the [state from which it is exported, the state into which it is imported, or a state through which it is transported from seller to buyer].

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[1]Declaration of the United Nations Conference on the Human Environment (Stockholm Conference). 1972. Available at http://www.unep.org/Documents.Multilingual/Default.asp?documentid=97&articleid=1503 (accessed 20 Aug. 2010).

[2] Declaration of the United Nations Conference on Environment and Development (Rio Conference). 2002. Available at http://www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163 (accessed 20 Aug 2010).

[3] World Summit on Sustainable Development. 2002. *Plan of Implementation of the World Summit on Sustainable Development*. Text available at http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/POIToc.htm (accessed 20 Aug. 2010).

The Annex I categories include anything forming part of 18 distinct waste streams (such as wood preservatives or organic solvents), or anything containing certain ingredients (such as mercury, arsenic, or chlorates). Annex III lists 14 dangerous characteristics (including explosive, infectious, corrosive, and toxic).[4] Each industrial country has developed its own list of hazardous wastes, and even scientists cannot agree on a single global list because the hazards posed by a particular substance, product made with the substance, or waste are often specific to the context of use, re-use or disposal.

Some regulations attempt to address the definitional problem by classifying substances or wastes by seriousness of the hazard they pose. In 1975, the World Health Organization took an initial step with pesticides, a clearly distinguishable type of hazardous substance because they are designed to be toxic to insects, by dividing them into four classes: Extremely Hazardous (Class 1A) apt to poison humans or animals even at very low concentrations, Highly Hazardous (Class 1B), Moderately Hazardous (Class 2) and Slightly Hazardous (Class 3).[5] Though the actual hazard posed by a particular pesticide may depend as much on the particular climatic and other conditions in which it is used as on the chemicals forming its active ingredients, the classifications did help focus attention on the most dangerous ones. Many national and local waste management regulations differentiate between high-risk, intermediate-risk, and low-risk wastes, and focus most of the effort to control waste generation and disposal on the high-risk wastes. National and local regulations also deal with the fact that many hazardous wastes are generated in relatively small amounts by a large number of households and small businesses by adopting regulations that re-concentrate them by requiring users to separate their hazardous wastes from other wastes for special collection and disposal.

Hazardous substances and wastes can be handled in six responsible ways and one irresponsible way. The six responsible ways are:

1.) avoiding their production in the first place,
2.) reducing their production by decreasing need to use them,
3.) recovering and reusing them for some other purpose,
4.) recycling them by retrieval for later use,
5.) breaking them down into non-hazardous substances with heat, catalysts, or other physical processes before final disposal, and
6.) storing them in leakproof containers at sites where they cannot leech out and contaminate surrounding areas.

The irresponsible way is designing products and production processes without regard to the hazards of the substances involved and dumping wastes from such production or after the product is no longer useful wherever one can regardless of how the wastes are handled and whether the site is appropriate.

While many environmentalists and ecological economists regard avoidance as the best choice, it is not always attainable with current technology. Many individual toxic or hazardous substances have useful applications for which no good substitutes currently exist. In addition, the dividing line between safe and

[4] Basel Convention, Article 1 and Annexes I and III. Text available at http://www.basel.int/text/17Jun2010-conv-e.pdf (accessed 20 Aug. 2010).

[5] World Health Organization. 1975. Recommended Classification of Pesticides by Hazard. *WHO Chronicle* 29: 397-401 (1975).

hazardous substances is not always sharp. Though some substances are consistently safe and others are consistently hazardous, many are hazardous or not depending on the concentration in which it is used, the length of time humans, animals, or plants are exposed to it, the method by which it is applied, or the physical environment in which it is used.[6]

The next three responsible choices available are summarized in the environmentalist slogan "reduce, reuse, recycle." The difficulty of complete elimination does not justify failing to explore possibilities of reduction. Reduction might involve using less of the hazardous substance in making a product, determining and informing users of the smallest quantity that will suffice for the purpose (such as chemical processing, cleaning, or pest reduction) or by recovering them from manufacturing processes before they become waste. Reusing may be difficult since many hazardous wastes are not in forms conducive to finding a new use. Recycling is also difficult because reprocessing hazardous substances can pose severe hazards to the health of workers involved and may not yield materials easily used elsewhere.[7]

The fifth responsible choice becomes relevant with broken or obsolete manufactured goods, and involves separating the unwanted items into their hazardous and non-hazardous components, and either reusing or disposing of them separately. This practice is becoming more common as disposing of wastes by dumping them into landfills or the ocean has become more restricted. Almost all dumping of wastes into the sea is now banned, and increasing local opposition has made it more difficult to find additional landfill sites.

The sixth responsible action, leakproof containment at a safe site, is very expensive. A geologically stable, secure site away from populations and watersheds has to be found, appropriate leakproof containers constructed, wastes put into the containers, the loaded containers brought to the site, and the site monitored. Finding containment sites has become more difficult as more people have become aware of hazardous wastes and unwilling to have them stored nearby. NIMBY ("not in my back yard") objections are no longer the preserve of the wealthy; strong environmental justice movements in the major industrial countries have attained considerable success in keeping hazardous wastes away from poorer communities as well.

Individuals with scientific or engineering training have been involved dealing with hazardous substances in several ways. Industrial chemists and industrial process engineers develop products and manufacturing processes, which may employ hazardous substances, generate hazardous wastes, or both. Individuals with training in chemistry, engineering, and biology help develop and administer national and local chemical, product and waste regulations. Individuals with training in entomology and ecological science have been active in developing systems of integrated pest management (IPM) that are designed to limit pesticide use by employing pesticides as one element in a broader array of agricultural practices meant to reduce pest infestations. Individuals with training in medicine are involved in developing regulations and in documenting the health effects of hazardous substances and wastes for government agencies or for advocacy organizations.

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[6] Freon provides one of the more striking examples of differences in hazard posed by physical environment. It is stable and non-reactive on or near the ground, but breaks down in the higher ultraviolet light levels of the stratosphere after which freed chlorine atoms break down ozone molecules, thinning the ozone layer.

[7] Some basic information about recycling of hazardous wastes is available at Earth911's information on recycling hazardous materials at http://earth911.com/recycling/hazardous/ (accessed 23 Aug 2010); the US Environmental Protection Agency's hazardous waste recycling page at http://www.epa.gov/osw/hazard/recycling/index.htm (accessed 23 Aug 2010).

## Emergence of Uneven Regulation

Early efforts to regulate production and disposal of hazardous substances and wastes were hobbled by a widely shared perception that responsible actions cost more than irresponsible ones. This perception resulted from a very common baseline effect created because change is always compared to current practice. Prevailing practices regarding hazardous substances in the 1950s and 1960s imposed few restrictions on their manufacture or use and allowed for disposal in ordinary landfills or other dumping sites. The costs of coping with hazardous wastes were thus externalized – left for others to absorb – while the benefits of using or selling them were internalized – captured by the maker or user. The result was a lopsided perception overestimating net benefit (benefit minus cost) because costs were under-stated. This lopsided impression was further intensified by the normal human tendency to pay more attention to immediate results than to long-term results. Because shifts to any of the responsible actions would require changes in product design, manufacturing processes, and user routine, all of them were perceived as more expensive than irresponsible actions, and resisted for that reason.

Most exceptions to this inertia in favor of current practice resulted from labor movement pressures to limit workplace exposures to hazardous substances. These were very site-specific problems typically featuring fairly high concentrations of hazardous materials that quickly produced ill effects. Individual countries began adopting rules about workplace exposures in the late 19th century, and the International Labour Organization (ILO) began issuing recommendations on reducing workplace exposures immediately after its establishment in 1919. The dangers of exposure to lower concentrations of hazardous substances (apart from their presence in air and water pollution) were revealed more slowly, and did not become significant public issues until the late 1950s and early 1960s. Public awareness of the problem grew as the negative effects of over-using pesticides and other chemicals and exposures to lower concentrations of hazardous waste became more obvious through publicity given to particular accidental poisonings and through widely circulated accounts of pesticide hazards.[8] Several incidents of mass illness from exposure to chemically contaminated food received international attention in the 1950s and 1960s. Industrial accidents, like the massive chemical leaks in Seveso, Italy in July 1976 or Bhopal, India in December 1984, drew attention to the hazardous nature of chemical manufacturing processes. Meanwhile, medical and public health researchers identified several chronic health problems caused by exposures to certain hazardous substances. Though public attention was uneven and inconsistent, changes in public perceptions of some substances were far-reaching. DDT went from being the miracle chemical of the agricultural revolution to something likely to exterminate all bird life on Earth. Asbestos went from being a substance critical to the Allied war effort in World War II because asbestos coatings increased the fire-resistance of ships, aircraft, and tanks to being a substance that should not be used and should even be removed wherever it has been applied. Lead-containing additives in paint and gasoline went from being regarded as useful to being banned after medical research demonstrated the severe health effects of even low concentrations on children's mental and physical development.

Initial efforts to regulate production and disposal of hazardous substances met with strong resistance from industry, partly because complying with regulations was perceived as expensive and partly out from the normal inertia that leads human organizations to continuing doing what they have been doing unless there is a compelling impetus for change. Some early changes in liability law tightening standards of liability and

[8]The British and Australian governments banned arsenic-based pesticides in 1959 and 1961 respectively. Rachel Carson. 1962. *Silent Spring* (Boston: Houghton Mifflin) was the most widely circulated warning about the dangers of high pesticide use.

increasing the amount of compensation that could be required did create an impetus, but not until notions of product lifecycle analysis[9] and concepts of "green chemistry"[10] were diffused within industry was there an internal impetus for significant change.

Governments first approached hazardous substance problems piecemeal by banning or restricting use of particular chemicals, but efforts to develop regulations dealing with hazardous substances as a distinct class of substances attained some successes in the 1970s. In the USA the 1972 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) required registration of such chemicals and provision of data about their environmental effects while the 1976 Toxic Substances Control Act (TSCA) classified substances and imposed regulations on manufacture and use of the most hazardous. The European Community (EC)[11] adopted common maximum residue limits for fruits and vegetables in 1976 and broader regulations on manufacture and use of chemicals in 1979. The individual substances inspiring the most widespread and intense public fear were the first to be restricted or banned. Lead-based additives were progressively removed from gasoline in the USA in 1978-1995 and in the EU between 1985 and 1995. Use of asbestos was limited in the USA beginning in 1975, and the limits were tightened in the 1990s; both the EU and Japan moved to a complete ban in the mid 2000s. However, these regulatory victories were concentrated in the Western industrial countries where governments had ample administrative capacity, and regulatory agencies had scientifically-qualified staff able to assess the risks and benefits of various substances and developed science-based regulations.

Regulatory change was less prevalent in the Soviet bloc and the developing countries. Soviet bloc governments had ample expertise and administrative capacity, but they did not face the same public pressures to regulate. Neither their planning ministries nor industry managers gave high priority to environmental concerns. However, the full dimensions of the environmental situation in these countries were not revealed until after the end of the Cold War.[12] Regulatory capacity was far weaker in developing countries, lagging even in countries where the government was promoting expansion of the local chemical industry.[13]

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[9]C. T. Hendrickson, L. B. Lave, and H. S. Matthews. 2005. *Environmental Life Cycle Assessment of Goods and Services: An Input–Output Approach*, Resources for the Future Press. Lifecycle Analysis guidelines are included in the ISP 14000 standards. See ISO 14040. 2006. *Environmental management – Life cycle assessment – Principles and framework* (Geneva: International Organization for Standardization (ISO) and ISO 14044. 2006. *Environmental management – Life cycle assessment – Requirements and guidelines* (Geneva: International Organization for Standardization (ISO).

[10] Paul T. Anstas and John Charles Warner. 1998. *Green Chemistry* (Oxford: Oxford University Press) was one of the first textbooks. Sara Goodman, "'Green Chemistry' movement sprouts in colleges, companies," *New York Times* 25 May 2009 and Emily Laber-Warren, "Green chemistry: Scientists devise new 'benign by design' drugs, paints, pesticides and more," *Scientific American* 28 May 2010 summarize developments over the last 15-20 years.

[11] As it was known in the 1970s. In 1992 it adopted the name European Union (EU). This case summary uses the name prevailing at the time of a particular policy decision or action.

[12]Compare Marshall I. Goldman. 1972. *The Spoils of Progress: Environmental Pollution in the Soviet Union* (Cambridge, MA: MIT Press) with Murray Feshbach. 1995. *Environmental and Health Atlas of Russia* (Moscow: Paims) and Murray Feshbach. 1995 *Ecological Disaster: Cleaning up the Hidden Legacy of the Soviet Regime* (New York: Twentieth Century Fund);

[13] Indian engineers were concerned about such a lag in the early 1980s, e.g., R.N. Mukherjea, R.N. Bagchi, and S.C. Banerjee, "Safety in Indian chemical process industries: A case study," pp. 919-937 in *Report of the 9th International Symposium on the Prevention of Occupational Accidents and Diseases in the Chemical Industry. Lucerne, Switzerland 5-7 June 1984.* Heidelberg:

The US and EC regulations included different testing requirements and listed different substances as "hazardous." Firms manufacturing and selling products only in the USA or only in the EC were not affected by these differences; they conformed to the regulations prevailing where they did business. Companies selling in both areas found the differences irksome because they often meant different requirements applied to the same substance. These companies had a strong interest in persuading governments to harmonize their regulations and adopt common standards. Meanwhile, public discussion of hazardous substances issues focused far more on how differences in national regulations create strong incentives for displacing production and disposal of hazardous substances to countries where regulations and administrative capacity were relatively weak. The first potential displacement, summarized in notions of "race to the bottom" and "pollution havens", is that industries whose production processes create the highest amounts of pollution will relocate production to countries where regulations are lax, unenforced, or both. Though less of this displacement occurred than environmentalists anticipated, they mobilized considerable public support for their arguments that it would be a significant problem. Industry resistance to regulations seemed to confirm the environmentalists' assumption that the costs of complying with production restrictions and pollution controls were a significant factor in the firms' decisions about where to locate productive activity. However, closer analysis showed pollution-related costs are only one of several considerations and often less important than others.[14] The most clearly documented examples of cross-border relocation of pollution-intensive production, like the maquiladora zone on the Mexican side of the US-Mexico border, developed in places where the cross-border move did not take the production much further from the places where the products would be sold.[15] In the 1970s and 1980s, however, the "pollution haven" notion was accepted as true by enough environmentalists and members of the general public to make it a prominent feature of advocacy on hazardous substances issues.

The other two cross-border displacements involve international trade in goods. The first trade displacement arises whenever countries restrict use of a hazardous substance but do not ban making it. Unless a country bans all production of a particular hazardous substance, companies can export some or all of their production to other countries. The hazards of using the substance and the problem of handling wastes resulting from its use then occur in the importing country. The severity of the problem created by exports of hazardous substances subject to bans or limits on use in the country of production depend on government capacity in the importing country. Exports to industrial states, where administrative capacity is typically ample, pose fewer problems than exports to developing states, where administrative capacity is often much weaker.[16]

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Berufsgenossenschaft der chemischen Industrie, 1984. However, it became a public issue only after the December 1984 Bhopal toxic gas disaster.

[14] Such as P. Dicken. 1992. "International production in a volatile regulatory environment: the influence of national regulatory structures on the spatial strategies of transnational corporations," *Geoforum* 23 (3): 303-316.

[15]The Mexicans did not accept all the pollution. US-owned enterprises operating in the zone were required to ship hazardous wastes back to the USA for handling. However, the rule has not been consistently enforced. Kate O'Neill. 2000. *Waste trading among Rich Nations* (Cambridge: MIT Press), p. 41.

[16] A 1988 survey of government capacity by the UN Food and Agriculture Organization indicated that 40% of developing country governments had not adopted national pesticides registration laws and 60% had no information about which pesticides were being imported. FAO, "International Code of Conduct on the Distribution and Use of Pesticides: Analysis of Responses to the Questionnaire by Governments," FAO Doc. AGP:CG/89/BP.1 (January 1989), p. 6.

The “pollution haven" analogy applies with greater accuracy to the other international trade displacement – cross-border shipments of hazardous wastes for treatment or disposal in another country. Waste handling choices are strongly affected by the cost of disposal, which is significantly higher in countries where regulations are tighter and enforced more effectively. As the cost of waste disposal rose in major industrial countries in the 1980s, it became economically feasible to ship wastes abroad for disposal in places where regulations were less strict. Legal waste shipments increased,[17] and perceptions that illegal trade was even faster as companies sought to avoid the new waste disposal costs seemed confirmed by publicity surrounding particularly egregious cases (noted in the chronology). Here, too, the character of the transnational regulatory problem depends on the relative administrative capacity of the country where the shipments are sent.

The differences in average administrative capacity of industrial and developing states meant that multilateral efforts to develop common regulations on the production and use of hazardous substances and on disposal of hazardous wastes ran along two distinct tracks. Addressing differences in industrial country regulations was perceived as a problem of regulatory harmonization – of getting different governments to adopt identical or at least very similar regulations. In these discussions, environmentalist and industry preferences sometimes ran in parallel: companies producing products for sale in multiple markets often prefer harmonized regulations to uncoordinated ones because harmonization simplifies their business operations. However, the parallel paths did not converge into a shared view of the best content of harmonized regulations. Environmentalists preferred harmonization on either the strictest set of existing national regulations or a new set based on greatest minimization of risks to users and others; companies often preferred harmonization on a less demanding set of regulations.

As cross-border transportation of hazardous wastes became an issue in the 1980s, the Organization for Economic Cooperation and Development (OECD) became the primary international forum discussing the problem for two reasons. First, its North American and Western European members accounted for the largest shares of international trade in pesticides and other hazardous substances. Second, the USA preferred using OECD because EC members were represented individually rather than having the EC speak for them all. The US government prefers having the Europeans negotiating separately so it can offer a wider range of individualized deals to other countries and partly to keep negotiations from getting bogged down in intra-EU wrangling. OECD member Japan was less involved in international trade of hazardous substances, but strongly concerned about regulating their production and use at home. Much OECD discussion focused on rules for identifying and classifying hazardous wastes and for ensuring their safe transportation.

Addressing differences between industrial and developing country regulations ultimately diverged, but initially appeared to be following a similar track. The UN Environmental Programme took up waste issues in 1981 and established a working group to address the issue in 1982. The governments of developing countries, strongly encouraged and supported by environmental and development[18] groups, sought to

[17] The OECD statistics on legal trade cover only OECD member countries, but in the 1980s they were the source of most waste exports. See OECD Environmental Data: Wastes.

[18]The term “development organizations” denotes non-governmental entities, which engage in advocacy and field programs seeking to improve living conditions and income prospects for impoverished communities in developing countries. The largest, such as the UK-Based Oxfam International, operate in many countries; the smallest work in a few localities within a single country.

transfer the burden of administering regulations on hazardous substances and wastes to the governments of industrial countries. However, they did not always agree on the best way to bring about that result. Some preferred bans on exporting selected particularly hazardous substances and all hazardous wastes; they typically argued that this was the only way to ensure makers and users of hazardous substances would have to internalize their waste disposal and give them incentive to move towards replacement or reduction. Others preferred requiring prior informed consent (PIC). In a PIC system, the government of a country where waste exporters are located would be required to notify the government of a waste importing country of the intended exports, and give the government of the country where the importers are located, an opportunity to reject the shipment. Advocates of PIC realized that all governments would need better information about the characteristics and hazards produced by various wastes and that some would need help developing the administrative capacity to take part in a PIC system, but thought a ban would prevent mutually beneficial transactions.

Though the notion of a worldwide ban did not win much support, the related idea of imposing a ban on transfers of hazardous wastes from industrial countries to developing countries garnered wide support. Resolutions on international transport of wastes adopted in UN forums including the UN Conference on Trade and Development, the UN Environmental Programme, and the UN General Assembly,[19] endorsed PIC systems for industrial country transfers and bans on transferring the most hazardous types of waste from industrial to developing countries. Because developing countries generated relatively few hazardous wastes in the 1980s, little attention was given to the question of what rules should govern transfers between developing countries. This permitted dividing transfers into two types: from one industrial country to another, or from an industrial country to a developing country, and gave the debates a strong South versus North cast.

Bans and PIC systems have different administrative consequences. A ban concentrates the whole administrative burden on states where waste exporters operate. That state must take all measures to keep the exports from occurring by policing outbound shipments. PIC's administrative shift burdens in a more complicated way. PIC works properly only when all governments have good information about hazardous wastes; without this information *informed* consent is not possible. Most of the testing and assessment work generating this information is provided by the regulatory agencies in the larger industrial countries; the information component of PIC allows all participating countries access to the information for development of their own policies. However, the governments on both sides of a proposed international waste transaction have to file notices and the government on the importing side has to decide and communicate their decision in a timely fashion.

## Addressing the Problem of Uneven Regulation

In any international agreement short of a complete ban on all international shipments of hazardous wastes, governments will need to respond to the incentives for private actors created by differences in national regulations. This effort began in the OECD, and continues there, but was also taken up in the global negotiations leading to agreement on the Basel Convention in 1989.

[19] Their most notable success was General Assembly Resolution 37/137, which urged governments to permit export sales of chemicals banned at home only when the government of an importing country requests shipments or permits sale of the chemical in its territory.

## OECD Discussions

The OECD typically addresses new issues by convening expert working groups. Its approach to problems of international shipments of hazardous chemicals and wastes was no different. Pesticides and other hazardous substances were discussed in the Chemicals Group, consisting of officials with technical backgrounds working in government agencies regulating chemical sales and uses. Its work relating to hazardous chemicals was part of wider efforts to coordinate chemical regulation in OECD member countries. Since most use of chemicals occurred, and three-fourths of world trade in chemicals was conducted between OECD countries, industrial country governments and chemical firms regarded it as the most logical place to address issues relating to chemicals.

These OECD discussions were never intended to produce a single set of regulations; administrative traditions and local perceptions of wastes in the industrial countries were too well established for complete convergence. Yet they did produce three simplifications reducing the scope of differences in national regulations:

1.) a common notification form identifying the data needed for government assessment of a chemical's safety that had the effect of partly standardizing different countries' testing requirements,

2.) a rule that OECD members should accept toxicological data developed by other OECD members if the testing conformed to the 1981 OECD Guidelines on Good Laboratory Practice, and

3.) a set of principles on transfer of confidential industry data between government regulatory agencies allowing governments to share the full range of information they possessed while providing companies with assurance that foreign competitors would not be able to take unfair advantage of it.

The first OECD recommendations on hazardous chemicals appeared in the late 1960s. These urged member governments to eliminate "non-essential" uses of chemicals, promote greater care in pesticide use, develop less harmful pesticides, and promote alternative means of pest control. They gave a boost to nascent integrated pest management (IPM) programs suggesting a combination of controlling pests with their natural predators whenever possible, using more pest-resistant hybrid seeds, and applying pesticides less often in smaller amounts. In 1973, an OECD recommendation urged reducing environmental releases of mercury to the lowest possible levels.[20] On the whole, however, the OECD approach exemplified the "least common denominator" dynamic of international regulation: guidelines and recommendations typically represented what the most reluctant governments were willing to accept at any particular time.

However, there were moments when strong public pressure or initiatives from leading member governments having strong environmental concerns shifted the dynamic towards greater regulatory ambition. One of those occurred in 1985 when the OECD recommended that members ban exports of

[20] OECD Council. Recommendation on Measures to Reduce All Man-Made Emissions of Mercury to the Environment. OECD Recommendation C(73)172.

hazardous wastes to developing countries.[21] Though not accepted immediately by all OECD members, this recommendation had significant effect on the course of global negotiations regarding both hazardous chemicals and hazardous wastes by legitimizing the notion that different rules might be needed to compensate for local conditions in developing countries.

The OECD remains engaged with hazardous substances issues. Contrary to the often-expressed view that globalization creates irresistible pressures for standardizing regulations, differences in national regulations styles and in national perceptions of risks remain strong.[22] OECD discussions continue to provide a significant forum for exchange of views and identification of areas where greater regulatory harmonization would be desirable.

## UN Discussions

Public awareness in the industrial countries of the problems posed by increasing use of chemicals in and exports of wastes to developing countries originated in efforts by a coalition of environmental and development groups to expose the hazards of pesticide use in developing countries. World trade in chemicals, including pesticides, increased considerably during the 1970s. UN trade statistics suggested that by 1980 about one-fourth of chemical exports and about one-third of pesticide exports went to buyers in developing countries.[23]

Though pesticide use problems might have been blamed on poor government administration and weak agricultural training programs in developing countries, the advocacy coalitions framed the issue as one of corporate irresponsibility since a number of the pesticides involved in the poisonings had already been banned from the market in leading industrial countries. Coming in the wake of scandals over deceptive marketing of infant formula in developing countries by Nestlé and other multinational corporations, the corporate irresponsibility framing was both highly available and highly appealing to the advocacy coalition and the segments of Western publics most likely to support their campaigns. Focusing on major corporations also made sense logistically since they were the makers of the products causing harm. Persuading or pressuring them into ending production of the worst substances and limiting export of the next-worst to countries where they could be used safely would get at the problem directly. However, major corporations had considerable influence with governments and significant portions of the public in Western countries never supported as much regulation as environmentalists hoped to impose.

Large environmental organizations like the World Wildlife Fund and Greenpeace got involved, but the most prominent NGO actors on hazardous substances issues in the 1980s were the Pesticide Action Network (PAN), a coalition of environmental, rural development and consumer organizations based in more than 30

[21]OECD Council. 1985. International Cooperation Concerning Transfrontier Movements of Hazardous Wastes, 20th June 1985, Resolution C(85)100.

[22] E.g., J. Rogers Hollingsworth, Philippe C. Schmitter and Wolfgang Streeck, eds. 1994. Governing Capitalist Economies: Performance and Control of Economic Sectors (New York: Oxford University Press); Albert Weale. 1995. "The kaleidoscopic competition of European environmental regulation" *European Business Journal* 7(4): 19-25; Kate O'Neill. 2000. *Waste trading among Rich Nations* (Cambridge: MIT Press).

[23] UNCTAD (UN Conference on Trade and Development) 1981. *Trade Statistics*; FAO (Food and Agriculture Organization) *Trade Year Book* 1979.

countries, and a similar Basel Action Network organized to campaign on hazardous waste issues. In the 1990s Arctic indigenous peoples' groups became strong advocates of tighter global regulations on persistent organic pollutants (POPs) and heavy metals after publicity about research demonstrating that residues of polychlorinated biphenyls (PCBs) had contaminated arctic food supplies enough that individuals in Arctic Inuit communities had concentrations of PCBs in their bodies exceeding industrial country safety standards.[24] While many of the peope involved in these organizations are activists with liberal arts or policy backgrounds, their boards and collaborators also include a significant number of people with training in public health, entomology, ecology, and medicine.[25]

The basic components of a PIC regime for exports of hazardous substances had been suggested by environmental groups by the mid-1970s, and some of them were incorporated into national law at the time. Japan adopted prior informed consent rules for exports of DDT and BHC. The USA adopted a notification scheme for exports of pesticides banned or severely restricted in the USA. US companies intending to sell those pesticides abroad had to supply governments of importing countries with basic toxicological data about the pesticide and to secure from them a written "acknowledgment statement" indicating receipt of the data before shipping any of that pesticide to buyers in that country. However, it did not include provision for separate authorization of each shipment-by-shipment authorization as became characteristic of later PIC regime. The Dutch government adopted a more thorough PIC system in 1985.[26] Though some observers regarded these systems as ineffective, many developing country governments actively sought the informational materials, and they helped solidify the idea that prior notification of export activity and provision of basic hazard information form the benchmark of good international practice. The EC was slower than individual members to adopt such rules because the EC Commission gave priority to promoting harmonization of hazardous substance regulations among its own members, but did adopt an export notification scheme in 1986.

Yet, neither individually nor together did these national schemes provide global coverage of hazardous chemicals. The differences in national regulations meant the export notification schemes applied to a different set of chemicals and pesticides. Nor did the sum of their coverage include all of the chemicals or pesticides inspiring concern among environmental activists because their definitions of hazard were typically more wide-ranging than those used by national regulators. Since export notification applied only to hazardous substances banned or severely restricted in the country of origin, differences in national risk assessment procedures and benchmarks were also revealed more clearly.[27] Many developing country

[24]See, for example, Eric Dawailly, Albert Nantel, Jean-Pierre Weber, and Francois Meyer. 1989. "High levels of PCBs in breast milk of Inuit women from Acrtic Quebec," *Bulletin of Environmental Contamination and Toxicology* 43(5): 641-646.

[25] Many NGOs post information about their leaders' backgrounds on their websites. In early 2010, three of 12 PAN-North America board members had scientific training; while PAN-UK's national projects officer was a PhD cancer researcher, its international projects officer was trained in entomology and one of its seven board members held a PhD in public health; the president of PAN-Philippines was a professor of pharmacology and toxicology at the University of the Philippines. See www.panna.org for the North American information; www.pan-uk.org for the British information. Philippine information from internet search of the person's name.

[26] Marc Pallemaerts 1988. "Developments in international pesticide regulation," *Environmental Policy and Law* 18(3): 62-69, note 1.

[27] A descriptive summary of the differences prevailing in the early 1990s is provided in United States General Accounting Office (GAO). 1993. *A Comparative Study of Industrial Nations' Regulatory Systems.* GAO/PEMD-94-17.

governments were persuaded by transnational environmentalist and development advocacy coalitions that the only effective way to deal with regulatory unevenness was to develop a common global PIC regime.

The task of developing global rules and the problem of identifying which hazardous substances should be included in a global PIC regime could have been taken up by any of several UN agencies, including the World Health Organization (WHO) and the International Labor Organization (ILO). However, member government interest and organizational entrepreneurship concentrated activity in two – the UN Environmental Program (UNEP) and the Food and Agriculture Organization (FAO).

FAO had more experience in pesticides because it had been dealing with issues of pesticides in agricultural use for many years. Disseminating information about pesticides and their uses forms a prominent part of FAO field activity. FAO experts working in collaboration with experts from the World Health Organization (WHO) also formulate standards for food safety in the FAO-WHO Codex Alimentarius Commission. The Commission is composed of government-appointed experts in food safety matters, sometimes drawn from government agencies and sometimes from universities or research institutes. It produces the *Codex Alimentarius*, a compilation of recommended best practices and rules governments can use for guidance in developing their own food safety regulations. A subcommittee, the Committee on Pesticide Residues, assists the Codex Commission by developing recommendations regarding acceptable levels of pesticide residues in food. It also consists of government-appointed experts and also draws on evaluations of individual pesticides or chemical formulations of pesticides provided by scientists on the WHO and FAO staffs who are members of the Joint Meeting on Pesticide Residues (JMPR). While the JMPR is respected by experts and advocacy groups alike, many environmentalists believe the Committee on Pesticide Residues often puts industrial interests ahead of health or environment by tending to use the higher estimates of "tolerable risk" as the basis for its recommendations.

UNEP quickly became the favorite forum of environmental advocacy coalitions and the Group of 77 developing countries. It was new to the field, headquartered in Nairobi, and viewed as receptive to Group of 77 concerns. In addition, FAO was perceived as too closely tied to the agrochemical industry. However, UNEP had little experience with regulating chemicals and pesticides other than helping promote the Geneva-based International Register of Potentially Toxic Chemicals (IRPTC) in the 1970s. IRPTC was intended to provide an information clearinghouse maintaining central files on any chemical, including pesticides, known to be or identified as likely to be toxic and to share information about them with national governments through "national correspondents."

Publicity about the risks of pesticides to both agricultural workers applying them in fields and to consumers eating foods from sprayed areas started to increase in the 1960s. In 1973, the WHO published estimates indicating about half of the roughly 500,000 cases of accidental poisonings from pesticides were occurring in developing countries,[28] a striking finding since far less than half of global use occurred in those countries. At the time, however, the issue was overshadowed by rising concern about an impending world food crisis stemming from widespread droughts in Africa, failures of Soviet wheat crops, increasing populations, and stagnating agricultural yields. The UN's 1974 World Food Conference devoted considerable attention to ideas for increasing crop yields, with pesticides figuring as an important element of the solution because

[28] WHO. 1973. "Safe Use of Pesticides." 20th Report of the WHO Expert Committee on Insecticides. *WHO Technical Report Series*, No. 513.

pests were thought to consume some 35% of potential crop yield in developing countries.[29] Not until concerns about food scarcity receded later in the 1970s was the way opened for advocacy groups to gain wider attention to pesticide safety.

This campaign intersected with developing country government irritation about continued exports of chemicals, particularly pesticides, banned in the country where the manufacturer was based. The unhappy governments brought the issue to the UNEP Governing Council, where they held a majority of the votes. In 1977, they succeeded in adopting a Governing Council resolution affirming that hazardous chemicals should not be exported without the "consent" of the government of the importing country despite strong industrial country opposition.[30] The Reagan administration's 1981 decision to revoke the Carter executive order on prior consultations before export of hazardous chemicals triggered a new round of environmentalist and development organization campaigning. This created momentum for UN General Assembly adoption of a resolution endorsing the idea of express government consent to imports of chemicals banned in the country of manufacture.[31] The Pesticide Action Network rallied the European Parliament to a resolution calling on the EC Commission to adopt prior informed consent in October 1983.[32]

Concerns about other hazardous chemicals and about hazardous wastes were rising at the same time. Both advocacy coalition campaigns and intergovernmental negotiations proceeded with awareness of the similarities between the three issues, but typically divided consideration into distinct pesticides/chemicals and hazardous wastes negotiations. The primary reason for this separation was economic: pesticides and hazardous chemicals have a wider set of willing buyers desiring to put them to particular uses. In 2001, the OECD estimated that trade in chemicals of all types other than pharmaceuticals constituted about 10% of all international trade, and projected that even with rising concern about chemical hazards, total chemical output would need to increase by 85% to meet the level of demand projected to exist in 2020.[33] Even DDT, abhorred by environmentalists and the general public in many countries, is still used in countries where other chemical pesticides are not sufficiently effective against malaria-carrying mosquitoes.

UNEP discussions of the chemicals and pesticides issued in the early 1980s was focused on a Working Group of Experts given the task of drafting Guidelines for the Exchange of Information on Potentially Harmful Chemicals, in Particular Pesticides, and in International Trade. The Group of 77 wanted the working group to adopt shipment-by-shipment PIC requirements, but industrial countries rallied around a counter proposal for a "provisional notification scheme" based on the OECD Guiding Principles on Chemicals Trade.[34] The OECD principles involved information exchange and a one-time notification of

[29]World Food Conference Final Report, available at http://www.eclac.cl/cumbres/3/43/FAORLC-41001WorldFoodConference.doc. A summary of discussions is provided at http://archives-trim.un.org/webdrawer/rec/425712/view/Items-in-World%20Food%20Conference%201974.PDF.

[30] Governing Council Resolution. Report of the Governing Council on the Work of its Fifth Session, UN Doc. A/35/25 (1977).

[31] General Assembly Resolution 37/137 of 17 Dec. 1982. Text available via http://www.un.org/Depts/dhl/resguide/r32.htm

[32] Marc Pallemaerts. 1987. "Export Notification," *European Environmental Review* 1 (2): 29.

[33] OECD 2001, p. 10.

[34]Summarized in "OECD Council adopts recommendation on exports of banned, restricted chemicals," *International Environment Reporter*, 11 April 1984, p. 100.

exports. The logjam broke at the third meeting of the UNEP working group in February 1987. The OECD had accepted prior informed consent in guidelines on hazardous waste in late 1985,[35] the Dutch were beginning to implement their unilateral prior informed consent scheme, and the Group of 77 made clear it was going to use its majority on the Governing Council to insist on including PIC in the proposed UNEP guidelines. Sensing the momentum, officials in the United States Environmental Protection Agency first persuaded the US chemical industry to accept PIC and then persuaded a reluctant Reagan administration to allow EPA to participate in designing and implementing it.[36] The UNEP Governing Council adopted the already-written Guidelines (which became known as the London Guidelines) and to instruct the working group to develop rules on prior informed consent in time for adoption at its next meeting in May 1989. With this endorsement in hand, advocates of PIC were able to overcome resistance in other intergovernmental organizations. Thus, in the November 1987 FAO Conference, that agency's highest decision-making body agreed by consensus to add PIC to the already-developed FAO Code of Conduct on pesticides.
In 1987, there was real prospect that two competing global PIC regimes for chemicals, one run by FAO and the other by UNEP, would emerge. The agrochemical industry and developing country agricultural ministries would have been much happier cooperating with FAO, and industry actively distrusted UNEP. Conversely, the environmental and development NGOs leading the advocacy campaigns distrusted FAO and much preferred having UNEP take the leading role. Although each organization had advantages in different areas -- UNEP had been dealing with a wider range of chemicals but FAO had a much stronger network of regional and country level contacts particularly with developing country agricultural ministries that had more influence than their environment counterparts. UNEP was aware PIC schemes would focus initially on pesticides since pesticide hazards were the most visible issue at the time and that PIC schemes for pesticides would require active cooperation from agricultural ministries. Yet, developing country agricultural ministries were strongly interested in maintaining access to pesticides, and not always as diligent as local environmental and rural development advocates would have liked in distinguishing between the more and less hazardous ones. More generally, Dutch experience with its unilateral PIC scheme was not promising: most of the requests for permission to ship a listed chemical elicited no response, leaving chemical firms even more frustrated by the rules. Thus, there was a real danger that having two separate PIC schemes with chemical manufacturers preferring one and environmentalist and development advocacy coalitions preferring the other would condemn both to failure.

The UNEP and FAO secretariats were aware of the danger and were anxious to secure cooperation from both industry and advocates. While industry had chosen to pursue partial accommodation by accepting voluntary codes of conduct and voluntary notification, industry leaders had made clear their opposition to mandatory PIC. Both secretariats were also aware an earlier WHO-ILO effort to develop an International Program on Chemical Safety had failed because of failure to secure industry cooperation. Working together, UNEP and FAO were able to avoid this. FAO involvement plus active participation in the expert groups by members of the US Environmental Protection Agency helped keep industry at the table. Meanwhile, the NGO advocacy coalitions were heartened by involvement of UNEP. Thus by cooperating, the two UN agencies were able to get industry and NGOs into the same room and develop a PIC scheme

[35]OECD Council. 1985. International Cooperation Concerning Transfrontier Movements of Hazardous Wastes, 20th June 1985, Resolution C(85)100.

[36] Robert L. Paarlberg. 1993. "Managing pesticide use in developing countries," in Peter M. Haas, Robert O. Keohane, and Marc A, Levy, eds. *Institutions for the Earth* (Cambridge: MIT Press), p. 324.

which, although not as restrictive as the NGOs would have liked nor as unrestrictive as the chemical industry would have liked, was accepted by both.

UN discussions of hazardous waste issues featured competing proposals for bans and PIC regimes. Many environmentalists supported a global ban on cross-border waste trade. Industrial country governments rejected a global ban. This sentiment was particularly strong in the European Community because waste-handling firms in a number of member countries had developed specialized hazardous processing facilities waste whose profitability depended on access to larger waste stream than produced in the particular country where it is located. This resistance led some ban advocates to shift to the "fallback position" of pressing for a ban on shipments from industrial to developing countries. The only clear exception to this pattern involved radioactive waste. A combination of fears that "the oceans are dying" and broader anti-nuclear sentiments helped propel governments to adopt a moratorium on dumping low-level radioactive wastes at sea in 1985 and then a comprehensive ban in a 1993 amendment to the London Dumping Convention. Though most scientific reviews indicated the wastes involved would have added only a minute amount to the naturally occurring levels of radiation, public dread of anything radioactive – promoted by referring to the wastes involved as "radwastes" – prevailed.[37]

The UN Environmental Programme took the lead on hazardous waste issues in 1982 when its Governing Council created a working group to develop policy recommendations for improving hazardous waste management. It recommended international shipments of hazardous waste occur only when a) the government of the importing country had been informed of the contents and agreed to the shipment, and b) facilities for processing the waste in the importing country were at least as good as those in the exporting country. These recommendations formed the basis of the Cairo Guidelines and Principles for the Environmentally Sound Management of Hazardous Wastes adopted by the UNEP Governing Council in 1987. Though guidelines, and hence voluntary, support for requiring use of PIC rules was strong enough that the Governing Council also initiated discussion of a global treaty to regulate cross-border transport of hazardous wastes.

The hazardous wastes discussions were complicated by the continuing vacillation between bans and prior informed consent. Greenpeace led the environmentalist advocacy of a complete ban. A complete ban could be supported by ecological claims that it would encourage better waste management everywhere by forcing countries to deal with their own problems ("become self-sufficient in waste" as some put it). However, many of the arguments in the late 1980s highlighted the South-North dimension instead in claims that a complete ban was the only way to stop "toxic imperialism." Yet, the OECD had addressed concern in 1985 by recommending that members ban transfers of hazardous wastes to developing countries. In the UNEP negotiations industrial state governments argued for adopting a PIC as the general global rule instead of a ban, on grounds that regulated waste trade was not only economically desirable but could help protect the environment by permitting countries (particularly communities or companies in border regions) to share specialized facilities.[38]

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[37] Lasse Ringius. 2001. *Radioactive Waste Disposal at Sea* (Cambridge: MIT Press).

[38] Willy Kempel. 1993. "Transboundary Movements in Hazardous Wastes" in G. Sjöstedt, ed., *International Environmental Negotiations*. Newbury Park: SAGE Publications, pp. 48-62.

The Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal did include provisions banning shipments of hazardous wastes to Antarctica and to any state that had adopted national laws banning such imports. All other cross-border shipments were covered by a mandatory PIC procedure. Nor could waste handlers in a state that became a party to the Basel Convention evade the PIC requirements by shipping hazardous wastes to importers in a state that is not a party; governments agreed to prohibit shipments of wastes to non-participating states unless the exporters and importers involved followed rules about notification of shipments and information about hazards as stringent as those in the Basel Convention.

Negotiators dealt with the different ways to define hazardous wastes by deferring to national definitions, and covered all the possible reasons for shipping wastes elsewhere by defining the term "disposal" to include not only incineration or delivery to a disposal site but also activity resulting in "resource recovery, recycling, reclamation, direct re-use or alternative uses" of the wastes. In the 2000s, this provision became the basis for multilateral discussions of worker safety regulations in waste recovery industries.

Advocates of bans were more successful in Africa, where governments were persuaded to adopt a ban on shipments of hazardous wastes from outside Africa and minimization of shipments within Africa. Both ideas were incorporated into the Bamako Convention on the Ban of the Import Into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa in 1991. Though the Bamako Convention came into effect in 1998, the impetus to organize the institutions needed to implement it has been weak since governments began taking advantage of the Basel Convention provisions allowing governments to declare they would not accept imports of hazardous wastes.

## Experience with PIC Regimes

The "voluntary PIC" schemes on chemicals adopted in 1989 – the amendments to the FAO International Code of Conduct on the Distribution and Use of Pesticides[39] and the UNEP Amended London Guidelines[40] on hazardous chemicals – applied to three sets of substances: pesticides, industrial chemicals (chemicals used in manufacturing and other commercial activities), and consumer chemicals (chemicals used in households). They did not apply to fertilizers, which do not create hazards when applied properly, or to drugs, which were already covered by other legal regimes. UNEP and FAO agreed to collaborate in managing them through a series of Joint Meetings on Prior Informed Consent. FAO drew on its established practices in pesticide assessment to propose that the meetings include an expert forum, the Joint Group of Experts on Prior Informed Consent. The 10 members of the Joint Group of Experts, 5 appointed by UNEP and 5 by FAO, were selected to serve as individual experts even though most of them were employees of a particular government's regulatory or safety agency. Though each appointed a separate set of experts, the two agencies collaborated to ensure a rough balance between experts from developing and from industrial countries. The experts maintained close contact with both environmental groups and industry, but also avoided being overwhelmed by developing rules limiting the number of nongovernmental participants to 2 representatives of environmental groups and 2 representatives of industry.

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[39]FAO Conference Resolution 10/85, Annex, 28 Nov. 1985 in *Report of the 23rd FAO Conference* 1985 amended by FAO Conference Resolution 6/89 in *Report of the 25th FAO Conference* 1989.

[40]UNEP Council Decision 14127 of 17 June 1987; PIC amendment adopted by UNEP Council Decision 15/30 of June 1989.

The Joint Group of Experts had two tasks: selecting the chemicals and pesticides that would be subjected to PIC requirements, and preparing the Decision Guidance Documents (DGDs) outlining their characteristics and risks that governments would use in deciding whether to allow or refuse imports of particular chemicals. In performance of both tasks, the Joint Group consulted with experts in the FAO and UNEP secretariats, as well as, private expert consultants. It also secured information about chemicals proposed for addition to the PIC list from government regulatory agencies, chemical firms making the products, and NGOs possessing relevant information about hazards. This work began slowly, however, because the Joint Expert Group was strongly committed to basing DGDs on strong scientific evidence so that the controversies about accuracy of the IRPTC information would not affect the PIC scheme.

Initial efforts to select pesticides and other chemicals for inclusion were guided by elements of the Code of Conduct and the Revised London Guidelines. The Revised London Guidelines specified that chemicals (including pesticides) subject to ban or severe restriction in at least five countries would be the priority candidates for inclusion in the PIC scheme. The report of the FAO conference that revised the Code in 1989 specified that pesticides denied registration for sale in a single country or withdrawn from sale by their manufacturer because of health or environmental hazard concerns could also be considered for inclusion in the PIC scheme. However, when the Joint Group began work in 1990, it had little information about national regulations. Few governments had notified the PIC Secretariat of the bans or restrictions ("national control actions") they had adopted. The IRPTC's databases were regarded as unreliable, not only by industry whose opinions were discounted to some extent by other actors, but also by experts in government regulatory agencies because the reporting was unsystematic and inconsistent.

The European Community provided a path out of the confusion by communicating the list of chemicals restricted by EC regulation 1734/88[41] to the PIC secretariat. Since the Regulation applied to all 12 EC members, the Expert Group suddenly had a list of substances that had been controlled in at least five. Though having better scientific basis than the IRTCP lists, the EC list included a larger number of chemicals that could be added to the PIC scheme at once. The primary bottleneck in preparation of the Decision Guidance Documents (DGDs) that would include the information about toxicity, risks, and safety measures was needing to make good decisions about whether to permit imports.

The Joint Meetings provided the Joint Expert Group with a favorable work environment by deferring to its judgments regarding which chemicals, and in what order should they be added into the PIC scheme. This gave the experts time to improve considerably on prior international efforts to regulate trade in toxic chemicals. It developed a more precise categorization of "control measures" and designed a new reporting form that allowed national regulatory agencies to describe the basis of their decisions to ban or limit sales of a particular chemical in a more consistent fashion. It also secured better data on actual production and use of particular chemicals, allowing it to identify which chemicals on national lists were still in production and focus attention on them. On a few occasions this data indicated that chemicals no longer produced in leading industrial countries because they had been superseded by others, were still being produced in developing countries because of different market conditions.

[41] Council Regulation (EEC) No 1734/88 of 16 June 1988 concerning export from and import into the Community of certain dangerous chemicals *Official Journal* L 155, 22 June 1988, pp. 2–6 (available via Eur-lex at http:eur-lex.europa.eu).

The Joint Expert Group's insistence on solid scientific evidence slowed the pace of regulation, but also provided a basis for credible, evidence-based recommendations to remove chemicals from the PIC list.[42] This process helps maintain industry confidence in the process by demonstrating that it is responsive not only to new data showing that hazards are greater than initially anticipated but also to new data showing that hazards are less than initially anticipated. The Joint Committee contributed to maintaining this process by following Joint Expert Group recommendations on de-listing as well as on listing chemicals.

The Joint Meeting also promoted better use of expertise by taking up one of the more politically and economically sensitive issues in chemical regulation. This is whether PIC requirements should also cover pesticides or chemicals that are not severely hazardous when used in industrial countries but pose serious hazards when used under conditions typically prevailing in developing countries. The question is complicated by economic and physical considerations. The economic considerations arise because chemical firms believe inclusion of a particular product or chemical ingredient on the PIC list reduces its sales and demand strong evidence of significant hazard before listing occurs. The physical considerations arise because the conditions making a chemical more hazardous in developing countries can range from climatic differences between temperate and tropical zones, high illiteracy rates among rural workers, unavailability of protective clothing and other gear, or even local aversion to certain protective measures (such as wearing rubberized coveralls or respirators) because they are very uncomfortable in hot weather. This means estimating the risks to workers applying or using the chemicals and to others nearby is more complicated than in industrial countries where one may assume workers are literate, have adequate supplies of protective clothing and gear, and comply with safety recommendations.[43]

Though environmental and development NGOs had been campaigning to raise public awareness of risks to rural workers in developing countries, the claims rested on anecdotal evidence until publication of David Bull's more systematic survey of use in 1982.[44] Yet, Joint Meeting action was delayed because Joint Expert Group efforts to develop sufficiently deep technical background were hobbled by the fragmentary data available. Only about one third of the developing countries participating in the voluntary PIC scheme replied to a request for information. Many of these responses did not include information on the numbers of poisonings, the number of deaths from poisoning, or on the equally important question of what proportion of deaths were suicides rather than accidents.[45]

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[42] This was inspired by experience with cyhexatin, a pesticide developed in the late 1980s. It was subject to PIC rules between 1990 and 1995 because early studies indicated that it caused birth defects in rabbits. It was removed when later studies disproved those initial findings.

[43] The exceptions tend to be localized rather than countrywide.

[44] David Bull. 1982. *A Growing Problem: Pesticides and the Third World Poor*. Birmingham, UK: OXFAM.

[45] The distinction is important because no amount of labeling or protective measures can prevent a suicide. Studies undertaken in Panama, Brazil, and Nicaragua suggested that in some areas suicides accounted for 90 to 100% of the deaths. See David Victor. 1998. "Learning by doing in the chemicals and pesticides trade regime," in David G Victor, Kal Raustiala, and Eugene B. Skolnikoff, eds *The Implementation and Effectiveness of International Environmental Commitments*, p. 268, n. 18.

## Hazardous Substance Issues Today

Hazardous Substances remain a significant portion of the world's chemicals and wastes. National reports submitted to the Basel Convention secretariat in 2001 indicate that approximately 8.5 million metric tonnes of hazardous waste were shipped across national borders, and that figure does not include illegal trade.[46]

Though the "voluntary PIC" regimes were replaced by treaty-based "mandatory PIC" when the Basel and Rotterdam Conventions took effect, the new PIC systems incorporated methods of identifying chemicals to be included and of preparing guidance documents summarizing the nature and extent of hazards posed by a particular hazardous chemical, pesticide, or waste. The Rotterdam Convention's Chemical Review Committee is very similar to the UNEP-FAO Joint Expert Group, except that it includes 31 government-named experts and operates under a more explicit distribution of members among the seven "PIC regions".[47] The Chemical Review Committee is also enjoined to work by consensus whenever possible, though may adopt a recommendation by a two-thirds vote if efforts to reach consensus fail.[48] This rule can make progress slow, particularly in the eyes of activists, if one or a few members hold out.[49]

The Basel Convention uses a different system, in which individual countries volunteer to act as leader in creating a set of technical guidelines regarding safe handling of a particular type of hazardous waste and submit these to the Open-Ended Working Group for consideration and recommendation to the Conference of the Parties.[50]

Pressures for developing substitutes or otherwise avoiding use of hazardous substances and for reclaiming or recycling hazardous wastes have been increasing. The 2002 Johannesburg Plan of Implementation strongly endorsed eliminating as many hazardous substances as possible and minimizing use when avoidance is not feasible. The Johannesburg Summit also endorsed proposals to adopt a more integrated global approach to dealing with hazardous chemicals, which would include increasing developing country capacity to deal with hazardous chemicals, disposal of leftover chemicals and pesticides, improving publicly-available information about hazardous chemicals, and possibly phasing out certain chemicals. This endorsement supported efforts that had begun in the mid-1990s. In 1994, UNEP, WHO and ILO had begun co-sponsoring triennial meetings of the Intergovernmental Forum on Chemical Safety, an expert

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[46] UNEP. 2006. "Basel Convention at a Glance" available at http://www.basel.int/convention/bc_glance.pdf (accessed 22 February 2010).

[47] Rotterdam Convention, Article 18, Paragraph 6. The first Conference of the Parties defined the regions as Africa, Asia, Europe, Latin America & Caribbean, Near East (includes North Africa and Central Asian states), North America (USA and Canada), and Western Pacific (Australia, New Zealand, and Pacific island states).

[48]The working papers on procedure that guide Chemical Review Committee work are available on the Rotterdam Convention website at http://www.pic.int/home.php?type=t&id=209&sid=18 (accessed 24 February 2010).

[49] 9 African countries banned use of endosulfan in early 2009, triggering its addition to the list of chemicals to be considered for inclusion in PIC requirements. PAN was vocally accusing the government of India of using various unfair tactics to keep the scientific committee from recommending a listing. See *PAN News Updates*, 26 March 2009 at http://www.panna.org/resources/panups/panup_20090326 (accessed 27 Aug 2010).

[50] Basel Technical Guidelines available at http://www.basel.int/meetings/sbc/workdoc/techdocs.html (accessed 26 February 2010).

group including industry participants as well as officials from government regulatory agencies. UNEP convened a separate expert group of its own to recommend measures for reducing the risks posed by certain hazardous chemicals. The result was adoption of a global Strategic Approach to International Chemicals Management (SAICM) in 2006. It provides a framework for discussions and exchanges of information on best practices among governments, chemical manufacturers, and chemical users.[51]

Supporters of banning all international trade in hazardous wastes have won significant victories. At least 100 governments have used the Basel provision allowing states to prohibit imports to keep anyone from exporting hazardous wastes to them.[52] Adoption and spreading ratification of the "Ban Amendment," which would prohibit exports of hazardous wastes from industrial countries to developing states has received more publicity. Adopting the amendment required securing support from a majority of the governments represented in the Basel Conference of the Parties, entry into force required at least three-fourths of those who voted in favor to formally ratify it, a process which requires approval by the national legislature in many countries.[53] Although the ban amendment was adopted in 1995, disagreements about how to calculate whether there are sufficient ratifications to bring it into force currently cloud the situation; ban proponents claim it is in effect and ban opponents maintain it is not.[54] However, environmental groups strongly support it and the EU has adopted it into EU Regulations.

Persistent Organic Pollutants (POPs) became the subject of two international agreements, a protocol to the Convention on Longrange Transboundary Air Pollution among countries in Europe and North America (negotiated in 1998; became effective in 2003), and the globally applicable Stockholm Convention on Persistent Organic Pollutants (negotiated in 2001 and became effective in 2004). The POPs Protocol to the LRTAP Convention defined three sets of controls: elimination of domestic use and production (Annex I), restrictions on use (Annex II), and by-products subject to emission limits (Annex III).

The particular substances regulated have been placed in the annexes as follows:[55]

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[51]The statement of SAICM organization and goals is available at http://www.saicm.org/documents/saicm%20texts/SAICM_publication_ENG.pdf (accessed 26 February 2010).

[52] Pamela S. Chasek, David L. Downie, and Janet Welsh Brown. 2006. Global Environmental Politics, 4th edition (Boulder: Westview Press), p. 131.

[53] Basel Convention, Article 17(5). Ratification is simpler in parliamentary countries where the executive has majority support in the legislature; it may be more difficult in presidential countries where the executive and legislative branches are elected separately and may be controlled by different parties at a particular moment.

[54]The dispute turns on counting. If the 3/4 refers to the current number of parties to the Convention, that would mean 3/4 of today's 174 parties, or 131. If the 3/4 refers to the number of parties on the date the amendment was adopted, there were 83, and 3/4s would be 62. There are currently 65 ratifications, but about a third of those have came from states that were not parties in 1995. If only states parties in 1995 are counted, 44 have ratified. See discussion in Henrik Selin. 2010. *Global Governance of Hazardous Chemicals* (Cambridge, MA: MIT Press) 76.

[55] As listed on the LRTAP Convention site, http://www.unece.org/env/lrtap/pops_h1.htm (accessed 19 August 2010).

| | Annex I | Annex II | Annex III |
|---|---|---|---|
| | aldrin<br>chlordane<br>chlordecone<br>DDT<br>dieldrin<br>endrin<br>heptachlor<br>hexachlorobenzene<br>*hexachlorobenzene*<br>*hexabromobiphynl*<br>mirex<br>*polychlorinated biphenyls (PCBs)*<br>toxaphene | DDT<br>HCH<br>lindane<br>PCBs | dioxins<br>furans<br>hexachlorobenzene<br>polycyclic aromatic hydrocarbons (PAHs) |

Key to chemical type: pesticide *industrial chemical* by-product

The Stockholm Convention addresses what are regarded as the nastiest of hazardous chemicals, designating some for elimination (Annex A), others for severe restriction (Annex B) and others appearing as by-products of production for minimization (or elimination when feasible) (Annex C). The evolution of the annexes provides a tracer of global consensus about what are the worst substances:[56]

| | Annex A | Annex B | Annex C |
|---|---|---|---|
| original list | aldrin<br>chlordane<br>dieldrin<br>endrin<br>heptachlor<br>hexachlorobenzene<br>mirex<br>*polychlorinated biphenyls*<br>toxaphene | DDT | polychlorinated dibenzo-p-dioxins (PCDDs)<br>polychlorinated dibnzofurans (PCDFs)<br>polychlorinated biphenyls (PCBs)<br>hexachlorobenzene (HCB) |
| additions 2009 | chlordecone<br>*hexabromopiphenyl*<br>*hexabromodiphenyl ether*<br>*heptabromodiphenyl* | *perfluorooctane sufonic acid, its salts*<br>*perfluorooctane sufonyl fluoride* | pentachlorobenzene |

[56] Annex lists as given by the Stockholm Convention Secretariat. See http://chm.pops.int/Convention/ThePOPs/tabid/673/language/en-US/Default.aspx (accessed 19 August 2010)

| | | | |
|---|---|---|---|
| | *ether*<br>alpha- and beta-hexachlorocyclohexane<br>lindane<br>pentachlorobenzene<br>*tetrabromodiphenyl ether*<br>*pantabromodiphenyl ether* | | |

Key to chemical type: pesticide *industrial chemical* by-product

The enlarged European Union, which in 2006 had 27 member states with a population of 485 million and a combined economy about the size of the United States', emerged as the global leader on limiting hazardous wastes after adoption of a Sustainable Development Strategy in 2001 that committed EU members to ensuring by 2020 "that chemicals are only produced and used in ways that do not pose significant threats to human health and the environment." The EU also adopted an Integrated Product Policy calling on member countries to reduce resource use and the environmental impact of all types of waste. These broad commitments were converted into specific policy measures in 2003 when the Waste Electric and Electronic Equipment Directive (WEEE),[57] and the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)[58] Directive came into effect. WEEE requires producers to take responsibility for recycling, reprocessing, or safely disposing of all regulated equipment and components they make; EU policymakers expect the system to provide strong incentives for designing the equipment for more effective disassembly and reprocessing. It also backstops the Basel Convention by banning export of hazardous wastes. RoHS currently restricts use of four heavy metals (lead, mercury, cadmium, and hexavalent chromium [Cr-VI]) and two classes of chemicals (polybrominated biphenyls [PBBs] and polybrominated diphenyl ethers [PBDEs]. The maximum allowed concentrations of all these substances except cadmium is 0.1% by weight; the maximum allowed cadmium content is 0.01% by weight. The concentration limits pertain to each "ingredient" – every distinct component of a product that can be taken apart mechanically (by unbolting, cutting, grinding, etc). Thus, an appliance covered by a plastic case that contains 1,500 parts per million (0.15%) of the flame-retardant PBB violates the RoHS standards whatever the size or weight is of the whole appliance.

WEEE and RoHS stirred some opposition from industry, but this was mild compared to the barrage of negative comment greeting the 2007 Registration, Evaluation, and Authorization of Chemicals (REACH) Directive.[59] REACH was designed to remove inconsistencies from EU rules regarding risk assessment, production, and use of chemicals. It abolished the distinction between "new" and "existing" (pre-1981) chemicals that had been maintained in EU regulations since the mid-1980s by requiring that any chemical

[57] Council Directive 2002/96/EC as amended by Council Directive 2003/108/EC.

[58] Council Directive 2002/95/EC.

[59]Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). Corrected version published in February 2007 and available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:136:0003:0280:en:PDF (accessed 20 Aug. 2010).

produced in or imported to EU member states in quantities greater than 1 metric ton be included in the reporting and risk assessment system. Since even the EU could not assess all chemicals simultaneously, the REACH Directive established a phased registration system in which the most hazardous chemicals and then the chemicals produced in the largest volumes would be assessed before others. Estimates of the cost of this effort varied widely, with the EU Commission estimating €2.1 billion over 11 years and industry estimating up to €7.8 billion. Environmentalists favor the lower figure and also maintain that most costs beyond the minimum estimate would be outweighed by the gain from better health and less need to clean up contaminated sites or manage hazardous wastes that would be inspired by the pressure from better informed consumers against use of hazardous chemicals.[60]

Though segments of industry, the Bush administration in the United States, and some governments elsewhere strongly oppose REACH, all three Directives have shifted the global regulatory landscape. Chemical firms on other continents who desire to keep their European customers, or who are urged by consulting firms ready to provide assistance, acknowledge that they will have to comply. Consumer groups have been spreading the word that consumers elsewhere need not settle for weak regulations, but should be using the European example to show their own governments that tighter regulation is feasible.

## Lessons for Scientists and Engineers

Efforts to develop effective global cooperation in reducing exposure to hazardous substances and wastes reveal the possibilities and the limits of expert participation in transnational campaigns to affect the extent and terms of globally identical environmental policy. It is clear in a field like regulation of hazardous chemicals and wastes that expert advice about what is and is not hazardous under what conditions is necessary for good policy. Maintaining a ban on trade requires identifying what may not be traded and noticing it when it leaves one country or arrives in another. Maintaining a prior informed consent system requires officials in states where the exporters operate, in states where the importers operate, or in states through which the shipments will pass, to be familiar with the chemicals or wastes, make informed decisions, relay them, and make sure shipments departing, arriving, or passing through contain only those items authorized.

Professional credentials and knowledge are only part of the qualification to serve on an international expert committee. The members must also have credibility vis-à-vis the national governments and other stakeholders involved. Governments prefer the experts be drawn from a broadly representative group of countries. This manifests an argument about "geographical representation," with some insisting that the scientific advisory group should be large enough that each region of the world is represented in proportion to the number of countries in the region.[61] Though expert committees should not get so large that they are unwieldy, it is important to have experts from different places because governments will listen more to "their" experts than to foreign ones no matter how well qualified and evenhanded the latter is.[62]

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[60] Henrik Selin and Stacy D. VanDeveer. 2006 "Raising global standards: Hazardous substances and e-waste management in the European Union," *Environment* 48(10): 7-18.

[61] Following this suggestion means creating a committee of about 54 members. It also means "over-representing" Africa and Latin America as compared to their proportions of world population.

[62] As Wilbert Chapman put it in 1950 when explaining the need to draw the experts from all around the hemisphere into assessment of tuna stocks, "we need to gain the facts in conjunction with the Latinos so they will believe them." Letter to the

However, good expert advice is not sufficient because decisions about what chemicals or wastes to define as hazardous and what hazardous substances to accept or reject depend on social perceptions, political preferences, and economic considerations as well as physical hazard. This is recognized most explicitly in the LRTAP Convention process for adding other POPs to the Annexes listing regulated chemicals. A government proposing to add another POP must submit a "risk profile" including three sets of information:

1.) data on atmospheric transport, toxicity, persistence, and bioaccumulation,

2.) data on production, uses, emissions, environmental levels in areas distant from sources, and environmental degradation attributable to it, and

3.) alternatives to existing uses and their efficacy, adverse health or environmental effects of the alternatives, pollution prevention or control technology that may reduce emissions of the POP, and costs and benefits of shifting to the alternatives.

The largest determinant of the breadth and stringency of regulations is the decisions adopted by major regional entities or national governments: the EU, the USA, China, India, and Japan. These five have the largest markets, so are most able to trigger the possibility of "trading up" to tighter regulation to work because companies anxious to have access to those markets will be willing to adapt production or distribution practices to their requirements.[63] Recent comments on WEEE, RoHS and REACH have found such effects.[64] Yet, such dynamics can stall if the cost of complying becomes too great or if regulations appear to lack good grounding in documented hazards of the chemical involved.

However, the hazardous wastes case shows that transnational advocacy coalitions or smaller states banding together can also drive global cooperation in certain directions. Transnational groups helped mobilize African governments to support bans on hazardous waste shipments from industrial to developing states, and the governments on that continent have remained staunch supporters of the Basel Ban Amendment even though some developing countries elsewhere show some interest in developing reprocessing, recycling, or destruction industries.

Both scientists and engineers figure in the process. Some chemists develop new hazardous chemicals; others seek to develop benign substitutes. Others apply their expertise to regulating chemicals while yet others provide expert knowledge to advocacy groups. Some engineers design products or production processes that use or avoid hazardous chemicals; generate, minimize, or capture hazardous wastes; and make recycling or reusing harder or easier. Others work in government regulatory agencies or waste-handling or provide expertise to advocacy groups.

Determining the right level of policy ambition requires identifying the correct substances as hazardous, selecting regulatory measures that address real threats in cost-effective ways, and providing sufficient

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American Tuna Boat Association dated 25 August 1950, quoted in Harry N. Scheiber. 1986. "Pacific Ocean resources, science, and the law of the sea," *Ecology Law Quarterly* 13: 465.

[63] This possibility was first analyzed in David Vogel. 1995. *Trading Up: Consumer and Environmental Regulation in a Global Economy*. Berkeley: University of California Press.

[64] K. Betts. 2003. "China tackles toxic electronics," *Environmental Science and Technology* 1 Oct. 2003 351A; Jack Waggoner. 2010. "New EU chemical regulations will significantly impact USA and global businesses." *Ceramic Transactions*, v 211, p 71-76,

transparency and accountability in the policy process so that policy can be improved as new information or new possibilities appear. This is not easy, and is complicated by the temptation to use “junk science” to underplay or to overplay the risks of using some substance, or the cost of shifting to some substitute.

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