Waste Management in Developing Asia
Can Trade and Cooperation Help?
Amit Ray
Indian Economic Service, New Delhi

The problems relating to mounting solid waste are fast acquiring gigantic proportions in the developing countries of Asia. Most of the countries, nevertheless, continue to primarily focus on achieving high economic growth and pay scant attention to waste management. This article takes a detailed look at the inadequacies of waste management in Asia and underscores the need for greater international engagement in tackling the menace. In this context, the article critically examines the factors behind increasing trade in recyclable wastes involving Asian nations and finds that the adverse economic and environmental impacts resulting from such trade far outweigh the proclaimed benefits. The article concludes by saying that a high degree of bilateral, regional, or multilateral cooperation, rather than trade in wastes, may be a better option for these countries, as it may enable them to develop appropriate capacities, expertise, and techniques required for establishing a modern and environmentally sound waste-management model.

Keywords: waste hierarchy; international engagement; waste trading; recycling; solid waste; waste management; international trade

More than two decades of sustained economic growth has exacerbated the problem of solid waste in most Asian countries. As per the estimate provided by the Ministry of Environment, Government of Japan (2006), Asia generated more than 3 billion tons of solid waste in 2000, which may go up to nearly 9 billion tons by 2050. The United Nations Environment Programme (UNEP; 2005) similarly estimates that the municipal solid waste (MSW) generation in the East Asia and Pacific region is increasing at a rate of 3% to 7% every year. South Asian countries are also witnessing similar trends.

With large economies such as China and India continuing to witness unabated growth and urbanization, the situation may worsen even further. The rising volume of waste poses a distinct threat to future growth and welfare of the Asian nations, and it may overwhelm the capacity of many governments to treat them. This article...
revisits some key issues concerning rising wastes (municipal and industrial) in Asia and addresses the growing debate whether increased trade in wastes and recyclables can be a part of the solution for Asia’s increasingly urgent waste problems. Policy makers in Asia are now waking up to the complexities of many these issues, which, however, are yet to receive due attention in academic circles outside of Japan.

The method in this article involves examination of actual and projected per capita waste load at two points of time (1995 and 2025) for a cross-section of growing economies of Asia comprising India, China, Thailand, Vietnam, Pakistan, Bangladesh, Laos, Burma, Singapore, Malaysia, Japan, Hong Kong, South Korea, and Sri Lanka. Trends in import and export of recyclable wastes of some of these countries are also analyzed, and evidence of negative environmental consequences of trade in some of them (e.g., India, China) is presented. Based on the evidence, the article argues that there is little sense, economic or otherwise, in waste trading involving Asian countries, as it can be detrimental to their economic growth, besides creating a host of other externalities. In general, this article tries to reason that Asian countries should get back to basics and focus on developing their domestic waste-management and recycling capacities and should not look at international trade in wastes as a cost-effective way for meeting growth requirements. The article concludes by saying that the efforts underway in Asia to enhance international cooperation in this area should focus more on developing domestic waste-management capacity instead of cooperation on enhancing trade in wastes and recyclables.

The article is organized as follows. The next section examines in some detail the waste scenario in select Asian countries and the efforts underway to tackle the situation. The section also highlights the rudimentary waste-management techniques that these countries follow and the need for greater international involvement and assistance. The second section examines the factors behind increasing trend in waste trading involving developing nations and tries to establish the futility of trade in wastes as a form of international involvement for waste management. The third section underscores the potential benefits for the Asian countries that can be realized from enhanced international cooperation in waste management, and the final section concludes the article.

**Managing Wastes—A Challenge**

Analysis of the data obtained from the Basel Convention Secretariat (Table 1) shows that Malaysia, Indonesia, Vietnam, India, Bangladesh, Mongolia, China, Philippines, and Thailand are likely to see a significant rise in per capita waste generation, although Hong Kong, South Korea, and Japan are expected to see a relative decline (mainly because of a high base). It may be mentioned here that although per capita solid waste generation in China or India appears less than that in countries such as Thailand or Sri Lanka, the absolute amount of waste could be much higher because of high populations in those countries.
Of these countries, China and India deserve special mention. China has now earned the distinction of being the world’s largest MSW generator, ahead of even the United States. In 2004, Chinese cities generated about 190 million tons of solid waste, and by 2030 this amount is projected to increase to about 480 million tons. No country has ever experienced as large, and as rapid, an increase in waste generation (World Bank, 2005). Moreover, the composition of waste is shifting toward plastic and paper, reflecting an improved standard of living (Daniel & Laura, 1999).

In India, too, the volume of waste is on the rise, as economic growth drives more and more people from the rural hinterland to the urban areas, spawning newer consumption patterns and social linkages. The large metropolises of India now generate more than 6,000 tons of solid waste per day, and Delhi alone generates more than 3,500 tons. By 2030, India will probably generate more than 125,000 metric tons of waste every year (Gupta, 2004). The trend is more or less similar in countries such as Bangladesh, Afghanistan, Pakistan, Nepal, and Sri Lanka (Visvanathan & Glawe, 2006).

E-waste is a relatively newer, but deadlier, addition to the waste flock. It is now considered to be the fastest growing component of the MSW, making up 5% of all waste streams. Although its proportion in the total waste volume is not very large,
e-waste is indeed dangerous. The toxic elements (e.g., lead, cadmium, mercury, etc.) in e-waste can leach into the land over time and affect nearby communities. If e-waste is burnt in incinerators, highly toxic dioxins and furans that are harmful for the environment are released.

In Europe, e-waste is increasing at the rate of 3% to 5% each year, almost 3 times faster than the total waste stream. Asian nations with dominant IT sectors are also staring at a similar fate. In India, for example, the total waste generated by obsolete or broken-down electronic and electrical equipment (EEE) has been estimated to be 146,180 tons per year based on selected EEE tracer items, not including the imported waste from EEE shipments (Jain, 2006). In Delhi alone, there are about 25,000 workers employed at scrap yards, where 10,000 to 20,000 tons of e-waste are handled every year, with computers accounting for 25% (Vinutha, 2005). Sher Shah in Karachi is another major market for secondhand and scrap materials in Pakistan, where all sorts of electronic and electrical goods, spare parts, computers, and smuggled goods arrive by sea and land for sale or further distribution to other cities in Pakistan (Visvanathan & Norbu, 2006).

It is thus no wonder that developing Asia now counts among the fastest “waste creators” globally. But initiatives to address this massive problem at the regional and global levels have somehow remained muted. The first multilateral effort in waste management started only in June 1992, when the Agenda 21 of the Rio Declaration on Environment and Development Declaration called for controlling the generation of wastes through recycling, reducing wasteful packaging of products, and encouraging the introduction of more environmentally sound waste disposal and treatment. In September 2002, 10 years after the Earth Summit, the Plan of Implementation, adopted at the World Summit on Sustainable Development in Johannesburg, South Africa, encouraged all countries to develop a 10-year framework of programs to accelerate the shift toward sustainable consumption and production.

The recent push for a global multilateral initiative has come from Japan. At the G8 Summit held at Sea Island, Georgia, in June 2004, Japanese Prime Minister Koizumi proposed the “reduce–reuse–recycle” (commonly called the 3R) line of action as guiding principle for sustainable waste management. The summit adopted the “Science and Technology for Sustainable Development: ‘3R’ Action Plan and Progress on Implementation” as a part of G8 Action Plan. The suggestions were eventually formalized at the G8 Summit meeting at Gleneagles in the United Kingdom in July 2005, in what is known as “Gleneagles Plan of Action—Climate Change, Clean Energy and Sustainable Development” (Institute of Global Environmental Strategies & Asia-Pacific Forum for Environment and Development [IGES-APFED], 2006).

In practice, the 3R approach essentially revolves round the concept of waste hierarchy, which is basically a precautionary principle that prioritizes the prevention and reduction of waste, then its reuse and recycling, and last the optimization of its final disposal. The 3R approach aims to establish a sound material cycle society on a global
scale. It reflects the spirit of *mottainai*, a Japanese term conveying a sense of regret for something becoming waste without reaching its full utility (IGES-APFED, 2006). To achieve its aim, the 3R approach envisages a much freer international trade in recyclable wastes and reduction of tariff and nontariff barriers that currently inhibit the trade (United Nations Center for Regional Development [UNCRD], 2006).

At national levels, waste-management practices vary widely between the developed and developing countries. Developed countries have a fairly efficient system of waste management, established over the years and marked by considerable industry and private participation in the entire process of waste collection up to disposal and treatment. In these countries, “resource recovery is mostly undertaken by the formal sector, driven by law, and a general public concern for the environment, and often at considerable expense” (Zurbrugg, 2002). The system is fairly efficient, if not foolproof.

On the contrary, in most Asian countries, such as Bangladesh, Bhutan, Nepal, Sri Lanka, India, China, Thailand, Vietnam, Pakistan, Afghanistan, and so on, the management of wastes (including hazardous wastes) is largely done by the informal sector, comprising a vast number of underprivileged waste pickers and middlemen. Dumping of wastes in open fields, rivers, and canals by industries and households is also common in many countries. Apart from this, scientific disposal of wastes in engineered landfills is rare, the legislative support for waste-management system is mostly lacking, the information flow is often slack, and the implementation is almost universally tardy (International Solid Waste Association & UNEP, 2002).

Before the early 1990s, most Asian countries had no laws in their books regarding waste generation, disposal, and treatment (Carolina & Dewitt, 2003). However, some national governments (e.g., India, Pakistan, Bangladesh, etc.) are now beginning to take small steps aimed at regulating management and disposal of waste. Waste-management legislations are also being established and strengthened.4 Some countries are now entrusting local governments and municipalities with the task of managing and disposing solid waste. But lack of resources and inadequate institutional facilities are proving to be major hurdles. At times, even limited efforts are hindered by social problems. Sometimes, public awareness of potential threats from waste generation, along with the virtual absence of public trust in the abilities and motives of government agencies, leads to a high level of opposition to the setting up of new landfill sites (Visvanathan & Glawe, 2006). For instance, the Municipal Commission of Delhi had identified new landfill sites at Jaitpur, Bawana, and Bhatti Mines, near Delhi last year, but the effort was stalled because of opposition from the local population, who feared environmental degradation in their area (“MCD Sits,” 2006). Sites far away from an urban area can prevent public opposition, but they raise the transfer costs of waste and additional investments for building roads, and so on. This exacerbates the financial woes of the cash-starved municipalities.

From a larger perspective, the criticality of a robust waste-management and disposal mechanism remains relatively unappreciated in Asia. It is time that growing Asian nations adopt urgent steps to establish an integrated waste-management
system for their own sake. Domestically, this involves strengthening and enforcing environmental standards, legislating environmental laws, and creating a supportive policy framework. Modern waste management also requires development of necessary expertise, technology, and resources. This is a tall order for most developing countries, which lack the experience, technologies, and funds required for capacity building. There is thus an urgent need for close coordination between developing countries and international agencies, as individual and scattered actions are not going to solve the problem.

**International Trade in Wastes and Asian Countries**

Import of recyclable wastes by developing nations has always remained a hot topic of discussion among the economists and environmentalists alike. Why should developing countries import wastes? Does trade in wastes help in waste management in developing countries? Is it a necessary instrument for successful global engagement? These are pertinent questions that have eluded definite answers. New concepts such as the Japan-inspired 3R approach envisage free international trade in recyclable wastes and call for the reduction of tariff and nontariff barriers that currently inhibit the trade. They largely follow the line taken by mainstream economics that free trade is generally beneficial for all.

Obviously, there are several issues involved in the trade of wastes, and it is necessary to discuss the issues guiding trade in wastes and analyze its usefulness for growth-hungry nations such as China, India, and so on.

**Trade–Environment Linkages—The Economist View**

As waste is a major negative attribute of growth, trade in wastes is best understood within the overall framework of trade–environment linkages. The literature on trade and its effect on the environment is considerable, although it is markedly incomplete (McAusland, 2003). Economists, on their part, appear divided on the likely impacts of international trade on the environment. Economists such as Grossman and Krueger (1994), Bhagwati (1993), Panayotou (1993), Ferrantino and Linkins (1999), and others are of the opinion that trade liberalization may generate improved environmental consequences. Birdsall and Wheeler (1992), in their empirical study of Latin American countries, showed that trade enables higher the environmental standards of the industrialized countries to be imported by the developing countries; more open-economy countries experienced faster growth in clean industries.

On the other hand, Rauscher (1994), Barrett (1994), and Kennedy (1994) have tried to show that unrestricted trade aggravates damage to the environment through increases in production and consumption activities and relaxation of stringent
environmental norms by national governments to extend the benefits to the domestic firms facing rising competition. Chichilnisky (1994), in her pathbreaking study, showed that two countries with identical technologies, endowments, and preferences will trade with one another if one has ill-defined property rights on environmental resources. The country with ill-defined property rights (normally developing countries) already overuses the environment as a factor of production; trade with a country with well-defined property rights (normally developed countries) will exacerbate the overuse of resources in the former and make the present misallocation worse.

There are writers, such as Esty (2001), who have taken a more balanced line by arguing that the many benefits of trade cannot be wished away on environmental consideration, but the putative gains from trade would be meaningless if the traded goods do not incorporate the costs of any potential damage to the environment.

The discourse on trade in waste products follows similar pattern, although the volume of the literature appears surprisingly small compared to that on trade and the environment in general. Kojima (2005a, 2005b) discussed the issues concerning trade in hazardous wastes with respect to Asian countries. He concluded that if certain safeguards are in place, international trade in wastes can serve as an effective means to create a vibrant, global market of recyclable commodities and ensure efficient allocation of such goods across countries. Baukering (2001) also analyzed the reasons for the growth in trade volumes of “secondary products” during the past decade. Using the international material product cycle approach, he showed that there are potential welfare effects of the internalization of the recycling market, primarily through bridging the gap between the supply of and demand for recyclable goods.5

The Environmentalist–Activist View

Environmentalists and groups such as Greenpeace and Toxics Link are opposed to international trade on the grounds that it will have adverse consequences on the environment. They point out that international trade under World Trade Organization (WTO) regulations provides an incentive to lower domestic environmental regulations, so that domestic producers will be on a “level playing field” with foreign competitors. These groups firmly believe that growth in general brings more pollution and misery and that trade simply exacerbates the environmental problems by encouraging more specialization within countries. They, therefore, strongly advocate regulation and restriction of trade to correct the “market failure” to provide enough environmental amenities to the people. No wonder these organizations consider trade in wastes to be nothing but ecological dumping.6

Although it is tempting to dismiss the activist position as ideological, in the interest of objective analysis it is necessary to put the issues raised by these individuals and groups in perspective and to explore the economic costs and benefits of trade in wastes based on evidence.
Opposition to international trade in wastes has grown ever since evidence of widespread dumping of toxic wastes on African shores by the developed countries (mainly the United States and members of the European Union) during the 1980s and early 1990s came to light. It resulted in the signing of the historic Basel Convention. The Basel Convention, which entered into force in May 1992, strictly regulates transboundary movements of unrecoverable waste and hazardous recyclable waste and their disposal. The convention requires exporters of hazardous wastes to give prior notification to obtain their approval (Pearson, 2000). In many ways, the Basel Convention represents an important effort to protect developing countries from the adverse fallout of waste trading. Accordingly, many developing countries, including those in Asia (e.g., India, China, Thailand, South Korea, Singapore, Vietnam, Pakistan, Sri Lanka, Malaysia, Japan, Bangladesh, the Philippines, Mongolia, etc.), have ratified the convention.

But in spite of the Basel Convention regulations, international trade in wastes has sharply increased since the 90s. Analysis of data shows that the trade of recyclable wastes has grown not only between the developed and the developing countries but also among the developing countries themselves, reflecting a growing tolerance for cross-border movement of wastes. We use a couple of tables here to examine the trend in import and export of wastes in the Asian countries under study. Table 2 shows the net export volumes (export volume minus import volume) for major recyclable waste in 2003 for select Asian countries. Table 3 gives a comparison of renewable resource imports by these countries in 1990 and 2003. It can be seen from the tables that India and China have emerged as significant importers of all major waste forms, such as plastics, iron and copper scrap, lead, aluminum, and waste paper. During 2003, these countries remained net importers of all key waste materials. South Korea was also a net importer, except for waste plastics. Some countries, such as Thailand, the Philippines, and Indonesia, were net exporters of certain wastes such as plastics, aluminum, copper, and so on. All the countries of Southeast Asia under review remained net importers of waste paper.

India’s import of plastics, paper, lead, and aluminum showed a considerable increase from 1990 to 2003 (Table 4). But import of iron scraps fell during this period. China’s imports of recyclable waste showed a spectacular increase and remained far higher than in any of the other nations in 2003. Specifically, imports of waste plastics and copper scrap exceed 3 million tons, much higher than the figures of many other nations. Indonesia’s import of paper wastes has shown a remarkable increase, like that in China, India, and Thailand. But its import of plastics and lead showed a decline during the period 1990 to 2003. Thailand has showed an increase in import of iron, copper, paper, and aluminum wastes during the same period. However, although it imported 7,000 tons of lead in 1990, it stopped importing it in 2003.
# Table 2

**Gross and Net Exports of Recyclable Wastes by Major Asian Nations in 2003**

<table>
<thead>
<tr>
<th>Washes</th>
<th>China Gross Export</th>
<th>China Net Export</th>
<th>Philippines Gross Export</th>
<th>Philippines Net Export</th>
<th>Thailand Gross Export</th>
<th>Thailand Net Export</th>
<th>Indonesia Gross Export</th>
<th>Indonesia Net Export</th>
<th>India Gross Export</th>
<th>India Net Export</th>
<th>Japan Gross Export</th>
<th>Japan Net Export</th>
<th>Malaysia Gross Export</th>
<th>Malaysia Net Export</th>
<th>South Korea Gross Export</th>
<th>South Korea Net Export</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastics</td>
<td>30</td>
<td>-2,996</td>
<td>25</td>
<td>17</td>
<td>59</td>
<td>58</td>
<td>19</td>
<td>15</td>
<td>3</td>
<td>-50</td>
<td>681</td>
<td>678</td>
<td>60</td>
<td>33</td>
<td>82</td>
<td>76</td>
</tr>
<tr>
<td>Paper</td>
<td>1</td>
<td>-9,381</td>
<td>7</td>
<td>-367</td>
<td>3</td>
<td>-1,095</td>
<td>17</td>
<td>-1,997</td>
<td>0.7</td>
<td>-1,437</td>
<td>1,970</td>
<td>1,853</td>
<td>1</td>
<td>-228</td>
<td>158</td>
<td>-1,128</td>
</tr>
<tr>
<td>Iron</td>
<td>3</td>
<td>-9,290</td>
<td>497</td>
<td>475</td>
<td>117</td>
<td>-1,162</td>
<td>37</td>
<td>-927</td>
<td>30</td>
<td>-2,337</td>
<td>5,719</td>
<td>5,479</td>
<td>294</td>
<td>-4,824</td>
<td>307</td>
<td>-5,006</td>
</tr>
<tr>
<td>Copper</td>
<td>7</td>
<td>-3,157</td>
<td>20</td>
<td>11</td>
<td>54</td>
<td>50</td>
<td>22</td>
<td>19</td>
<td>5</td>
<td>-82</td>
<td>307</td>
<td>186</td>
<td>471</td>
<td>253</td>
<td>94</td>
<td>-59</td>
</tr>
<tr>
<td>Aluminum</td>
<td>11</td>
<td>-647</td>
<td>20</td>
<td>18</td>
<td>17</td>
<td>5</td>
<td>13</td>
<td>8</td>
<td>0.5</td>
<td>-101</td>
<td>69</td>
<td>-44</td>
<td>31</td>
<td>NR</td>
<td>1</td>
<td>-174</td>
</tr>
<tr>
<td>Lead</td>
<td>0.1</td>
<td>0.1</td>
<td>0.5</td>
<td>0.5</td>
<td>0.6</td>
<td>0.6</td>
<td>0</td>
<td>0.7</td>
<td>0.3</td>
<td>-37</td>
<td>12</td>
<td>10</td>
<td>0.3</td>
<td>0.3</td>
<td>0</td>
<td>-0.4</td>
</tr>
</tbody>
</table>

Source: Kojima (2005a).

Note: Unit is thousand tons. NR = data not reported.
Table 3
Import of Recyclable Wasters by Major Asian Nations in 2003

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastics</td>
<td>24</td>
<td>3,024</td>
<td>23</td>
<td>8</td>
<td>13</td>
<td>53</td>
<td>28</td>
<td>4</td>
<td>0.8</td>
<td>0.8</td>
<td>3</td>
<td>2</td>
<td>17</td>
<td>27</td>
</tr>
<tr>
<td>Paper</td>
<td>423</td>
<td>9,382</td>
<td>252</td>
<td>374</td>
<td>385</td>
<td>1,438</td>
<td>462</td>
<td>2,014</td>
<td>214</td>
<td>1,098</td>
<td>634</td>
<td>117</td>
<td>10</td>
<td>229</td>
</tr>
<tr>
<td>Iron</td>
<td>183</td>
<td>9,293</td>
<td>64</td>
<td>19</td>
<td>3,152</td>
<td>2,367</td>
<td>946</td>
<td>964</td>
<td>1,101</td>
<td>1,279</td>
<td>1,047</td>
<td>240</td>
<td>734</td>
<td>5,136</td>
</tr>
<tr>
<td>Aluminum</td>
<td>5</td>
<td>653</td>
<td>0.6</td>
<td>2</td>
<td>7</td>
<td>101</td>
<td>0.1</td>
<td>5</td>
<td>2</td>
<td>22</td>
<td>340</td>
<td>113</td>
<td>4</td>
<td>NR</td>
</tr>
<tr>
<td>Lead</td>
<td>5</td>
<td>0</td>
<td>15</td>
<td>0</td>
<td>7</td>
<td>37</td>
<td>35</td>
<td>0.7</td>
<td>7</td>
<td>0</td>
<td>1.1</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Kojima (2005a).
Note: Unit is thousand tons. NR = data not reported.
Table 4
Trade in Hazardous Wastes Reported to the Basel Convention Secretariat

<table>
<thead>
<tr>
<th>Country</th>
<th>Exports Total</th>
<th>Exports For Recycling</th>
<th>Imports Total</th>
<th>Imports For Recycling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>1,515</td>
<td>1,515</td>
<td>4,326</td>
<td>4,320</td>
</tr>
<tr>
<td>China</td>
<td>2,841</td>
<td>1,241</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Thailand</td>
<td>142</td>
<td>N/A</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Malaysia</td>
<td>2,675</td>
<td>2,075</td>
<td>69,942</td>
<td>69,942</td>
</tr>
<tr>
<td>Singapore</td>
<td>14,354</td>
<td>13,754</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Indonesia</td>
<td>2,100</td>
<td>2,100</td>
<td>240,220</td>
<td>240,220</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>24,000</td>
<td>24,000</td>
<td>N/A</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Compiled from the Basel Convention Web site (http://www.basel.int/).
Note: Unit is tons. NR = data not reported; N/A = not available.

Even the import and export of hazardous wastes (as reported by countries) classified under the Basel Convention is still taking place. In fact, the total trade in hazardous wastes increased from 3 million tons in 1993 to 16 million tons in 2001, although the volumes are considerably lower than those for the recyclable wastes (Table 4).

Factors Influencing Trade in Wastes

Reasons for rising import of wastes by the Asian countries are many, the most important being the soaring consumption activities by households and industries, which generated massive demand for resources, both virgin and recyclable. Some analysts have explained the phenomenon in terms of price deferential of the recyclables. Diaz, Savage, and Eggerth (1997) found that in the past couple of decades, markets for recyclable materials in the north have been characterized by oversupply, but a shortage of these goods existed in developing countries that have attempted to widen their industrial base. This has led to relatively low prices of materials in the north and high prices in the south, resulting in increasing trade flows.

Stricter environmental protection in the West may also have contributed to increased waste export from the developed to the developing countries. This was corroborated by Rauscher (1997), who found that countries with higher degrees of environmental concern have lower producer prices for dirty goods and so have an advantage in export markets.

Gradual declines in transaction and transport costs all over the world have also facilitated trade in secondary goods. Countries initially tended to discriminate against the import of secondary materials to prevent a spike in waste disposal, but negotiations in the content of WTO have gradually reduced these trade barriers (Baukering, 2001). Improvements in information technology and the establishment
of networks have also made it much easier for buyers and sellers to meet and negotiate export–import deals (Buggeln, 1998).

Monetary considerations have also aided north–south flow of waste. Imported waste disposal and recycling is a lucrative business in most developing countries, where thousands of people earn their livelihood by working in the recycling and disposal sites of imported wastes. The Alang ship-breaking yard in the state of Gujarat in India is a case in point. The yard is now recognized as the largest of its kind on the world.

Hundreds of ships from all over the world find their final resting place in Alang every year. There are 173 plots to carry out ship recycling activities. This activity by itself supports a huge chain of local business, and it provides around 30,000 jobs in Alang itself, besides millions of tons of recyclable steel every year.

Such linkages provide a classic win–win situation for both parties in monetary terms. Developing countries earn a lot by importing wastes from developed countries, which in turn saves a lot by outsourcing hazardous waste management.

One of the characteristics of the global economic expansion witnessed during the past decade has been large-scale relocation of manufacturing industry from the developed world to the newly industrialized nations of Asia (e.g., China), from where a lot of the finished goods again head back to the developed world. These consumables, at the end of their useful life, return to the developing countries as recyclable resources. This has been an important factor affecting global trade in recyclables.

Environmental Impacts of Trade in Wastes—An Assessment

Trade in wastes entails several social, environmental, health, and economic concerns, some of which have been highlighted by environmentalists and activist organizations and groups.

Improper recycling is one of the foremost concerns. Most developing countries in Asia (and elsewhere) lack high-quality recycling facilities and follow relatively lax environmental standards; in this situation, transboundary movement of recyclable wastes (including hazardous and e-wastes) increases the risk of improper recycling practices that may cause pollution and long-term health hazards. The domestic recycling efforts may also suffer as a result. Thus, international trade in wastes may ultimately end up hurting the domestic recycling capacities of the developing countries. Moreover, the imported waste products, even if they are nonhazardous, ultimately become waste in importing countries, thereby greatly increasing the pollution load and costs of waste management.

Illegal trafficking of hazardous wastes is another major concern. Many writers have criticized the Basel Convention itself for not being effective in this regard. The convention’s requirement of prior informed consent from waste recipient countries for waste exported for final disposal has only encouraged imports destined for recycling.
operations through subterfuge (Carolina & Dewitt, 2003). Instances of hazardous wastes being exported (and imported) under the tag of “mixed metal” or “second-hand goods” are fairly common. A recent case of malpractice associated with the trade involving the Dutch firm Trafigura was reported by the British Broadcasting Corporation (“Ivorians to Sue,” 2006). As per the report, Trafigura first attempted to unload its cargo of chemical slops, which contains mercaptan, from one of its tankers (the Probo Koala) in the Dutch port of Amsterdam in early August 2006. But the company that was to dispose of the waste suddenly increased its charges dramatically, asking for 40 times more to treat the waste. Trafigura refused, and the tanker proceeded to Nigeria, where it tried to offload the waste, but again it failed to reach an agreement with two local firms. It was only in Ivory Coast that it managed to find a company to handle the waste at a cost the company would accept. On August 19, 2006, the waste was discharged near Abidjan. Ten people died and many thousands more needed treatment after the dumping. About 40,000 people were treated in the hospital for nausea, breathing problems, and nosebleeds.

Most of the developing countries are ill equipped to track the illegal and clandestine import of wastes. Many times exporters of hazardous wastes try to confound the authorities by port hopping—a practice of sending a consignment from one port to the other, leaving a trail of documents that are impossible to check. In one instance, a shipment of British single-use cameras complete with batteries was sent to Germany, where it was twice repacked before being shipped to China for recycling (“Poisonous Detritus,” 2004).

Import of e-wastes also further complicates the problem. The Financial Express (“A Wiser Approach,” 2005) reported that about 80% of the e-waste generated in the United States is exported to India, China, and Pakistan. A Basel Action Network report (Selra, 2006) said that many companies in the United Kingdom (which generates almost 2 million tons of e-waste each year) sell secondhand computer items to middle merchants who promise the computers can be reused in Africa, India, and China. The report also mentions that each month about 500 containers, containing about 400,000 discarded computers, arrive in Nigeria to be processed. But 75% of the units cannot be resold in Nigeria. So they sit on landfills, and children sift through them barefoot for scraps of copper wire or nail.

In developing countries, electronic waste is highly sought after by scavengers and local recyclers, as this waste contains some valuable material such as copper, aluminum, gold, and so on. These scavengers handle the pile of e-wastes completely unprotected, unmindful of the dangers involved in their actions. To recover the copper and other metals, they burn the electrical components (including electrical wires), releasing deadly cocktails of toxins. The other electronic and electric wastes are often dismantled and sorted manually for obtaining materials such as batteries, liquid crystal displays, or wood (Visvanathan & Norbu, 2006). The consequences for human health can be grave. In China, Taizhou, in Zhejiang Province, and Guiyu, in Guangdong Province, have especially come under intense scrutiny amid reports of
widespread e-waste contamination that rendered even the groundwater of these areas unfit for drinking (Wong, 2006).10

Of course, there are reasons for e-wastes finding their way in Asia and Africa. A study commissioned by the U.S. Environmental Protection Agency that showed that it was 10 times cheaper to export electronic waste to Asia than it was to process it in the United States. With that kind of financial differential, the incentives for e-waste movement—legally or illegally—is enormous.

Apart from e-wastes, wastes (e.g., iron scraps) imported from “war zone” countries may pose unforeseen security problems. A report on the Internet portal Rediff.com (“An Explosive Pile,” 2004) said that rockets and missiles—labeled as heavy metal scrap—are imported by some countries from war-ravaged Iraq and central Asian countries. They are shipped from ports in the United Arab Emirates, Iran, Somalia, and Ethiopia and are recycled into low-cost iron and steel sheets and finished goods such as utensils. In October 2004, 10 factory workers at the Bhusan Steel Plant in Ghaziabad (India) were killed when live tank shells in imported iron machinery scrap went off. Subsequent searches by the police led to a massive haul of mortar, tank, and rocket shells from several containers of iron scrap (“More Bombs,” 2004).

Some writers, such as Kojima (2005a), have acknowledged these dangers and suggested measures to address the issues. The measures include (a) strict enforcement of robust pollution-control methods in the developing countries, (b) tighter checking by the customs authorities for unauthorized wastes, (c) effective exchange of information between the exporting and the importing entities about the exact nature of the waste consignment, (d) penalties for entities found guilty of illegal trafficking, and so on.

However, such tight monitoring requires a massive deployment of technology, manpower, and resources, which most developing nations often lack. And even after imposition of stricter norms relating to waste classification, import–export norms, on-site checking, and so on, dangerous wastes may still flow from the developed to developing countries, given the huge financial incentive. Second, as of now, waste-management efforts in developing countries are scattered and fairly dispersed across municipalities and local bodies. Following principal–agent theory, the more decentralized a system is, the less likely the principals (national governments) are to be able to monitor and affect the behavior of the agents (firms importing wastes; O’Neill, 2000). And last, these prescriptions do not adequately address the concern that trade in wastes imposes a future economic burden by transferring the onus of final disposal on the developing countries, already reeling under their own wastes, nor do they assuage the colossal unease over the clandestine or open shipment of e-wastes to the developing countries, with grave consequences for human life, property, and the environment.

Mainstream environmental economists have highlighted the welfare effects of trade in secondary products (including wastes) on developing countries in Asia, mostly in terms of increased supply of recyclable wastes needed for growth and income generated from the recycling chain. But they have largely ignored future
costs of waste imports. Often, the volume of waste happens to be much bigger than
most people assume, which, besides damaging health and fragile ecosystems,
imposes an economic cost in the form of reduced fitness of workers, damaged
resources, and diversion of scarce funds from other sources to treat water, air, and
foodstuffs. Because these costs occur at some future date, the present policy makers
often choose to ignore them and literally pass the buck to future generations. But this
strategy can be fatal, as cleaning up hazardous waste disposal sites can be many
times more costly than what would have been the cost of prevention. The high future
costs can literally choke off growth much sooner than anticipated.

The future social and economic costs associated with waste trading can be miti-
gated only if wastes are removed from the international trading system. However,
entirely cutting out wastes and recyclables from the system is neither feasible nor
necessary. Officially, about 1 million tons, or 5% to 10% of the hazardous wastes
produced by the rich countries, are traded, and more than 80% of the trade is trans-
acted among the industrialized countries themselves, which is legal by domestic and
international standards (Awaji & Kaigi, 2005). Developed countries do generally
have efficient systems for treating wastes, which diminishes their vulnerability to
imported wastes. Thus, a complete ban on the cross-border flow of all recyclables
may not lead to a commensurate welfare gain by developing countries.

A more appropriate step would be to restrict the (trade) flow of wastes from the
north to the south. Even here, a comprehensive ban on flows on recyclables may not
be advisable. Some secondary items such as waste paper, used wood furniture, and
so on are imported in large quantities by several countries in Asia for recycling and
reuse. Extended use of these products helps to ease the pressure on forests, which
are the primary source of paper and household furniture. Therefore, the economic
costs of eventual disposal of these wastes are much less than the wider environmen-
tal benefits they provide. The problem actually lies with the huge mass of non-
biodegradable, discarded household, medical, and industrial items that ultimately sit
in landfills and open fields in many high-growth countries in Asia and elsewhere.
This author argues that there is a strong case for severely restricting export of such
difficult wastes to the developing countries, either for recycling or for disposal. The
process has to be a gradual one, though, as countries would need time to adjust to a
new level of restrictions.

Restrictions to trade in wastes can initially be effected by raising tariff and non-
tariff barriers to such imports. It is useful to note that tariff reduction for imports of
wastes is a part of the Non Agricultural Market Access agenda in the WTO talks.
Paragraph 31(iii) of the WTO Rules and Trade Obligations instructs members to
negotiate the reduction, or, as appropriate, elimination of tariff and nontariff barriers
to environmental goods and services. These instructions indirectly imply that efforts
to raise (or even maintain) tariffs on wastes go against the spirit of WTO principles
and principle of national treatment. But it is also a fact that many developed
countries also subsidize their recycling industries, which serves to facilitate cheap
exports of recyclable wastes. Such subsidized exports represent a greater infringement of WTO principles (Kojima, 2005b). At present, after several rounds of negotiations, customs duties on recyclable wastes in many Asian countries are not particularly high. The further reduction of tariffs would be a recipe for disaster for many of them.

Nontariff barriers largely include the quantitative restrictions and bans imposed by countries on the import of wastes they consider unnecessary. For example, Vietnam has imposed a comprehensive ban on both the import and export of wastes, except the import of a few recyclable wastes. China, India, and Indonesia have also banned the import of hazardous wastes. Hong Kong has banned the import of such waste from developed countries. But rising instances of clandestine waste trafficking suggest that there may be ample scope for enlarging the geographical spread and material coverage of such quantitative restrictions.

The argument presented here may easily be termed as protectionist if analyzed in the context of the traditional trade versus environment debate. However, the idea here is not to repudiate the well-argued benefits of free trade but to highlight the inappropriateness of uniting trade in difficult wastes with the conventional trade in goods and services. Although free trade in goods and services boosts global growth, income, and employment, trade in wastes exacerbates improper recycling, pollution loads, and health problems in developing countries. Therefore, it can hardly be justified on the grounds of optimality, as trade in other commodities is justified.

It is said that as developing countries import recyclable and recycled wastes to meet their growth requirements, excessive restrictions would result in inefficient allocation of recyclable resources by hampering trade in recyclable wastes that can be appropriately recycled (Kojima, 2005a). This line of thinking heavily draws from the perceived benefits of waste recycling for the developing countries: more resources at less cost, less pressure on virgin resources, more income, and so on. Recycling is also said to prevent depletion of resources, especially mineral resources.

This author feels that it is impossible not to acknowledge the environmental and economic benefits of recycling. However, such benefits must not be cited to justify export of wastes from the developed countries to the developing ones. Where genuine benefits are foreseen, countries should set up indigenous recycling capabilities appropriate to their own waste volumes rather than looking at imports as a cost-effective option to gain resources. In other words, country-specific recycling efforts must reflect the size and diversity of domestic, and not international, waste streams.

Recyclable goods are indeed used as cheap resources by developing countries, as the cost of recycling and recovery is considered less than the exploration of the virgin resource. However, one should note that recyclable raw materials appear cheap in developing countries because the recycling is mostly done in the informal sector and rarely in modern recycling plants employing state-of-the-art technologies. In other words, these goods are cheap because the importing countries have inefficient and suboptimal recycling systems that endanger the health of the recycling workers,
the neighboring communities, and the environment. In developed countries, electronics recycling takes place in purpose-built recycling plants under controlled conditions. In many EU states, for example, plastics from e-waste are not recycled to avoid brominated furans and dioxins being released into the atmosphere. If Asian countries were to establish comparable technologies and standards, their costs of recycling would increase, making the recycled goods costlier. This may effectively remove the “cheap resource” tag on waste products.

**Advantages of Controlling Trade in Wastes**

In the long run, absence of waste trading should guide developing countries to develop an internal recovery and recycling mechanism without depending too much on harmful imports. And with strict enforcement of environmental standards in the economy, it could eventually lead to setting up of an integrated, environmentally sound waste-management system. It may also induce economic agents to discard their profligate production and consumption behavior. Producers would no longer have access to cheap recyclables and may be forced to bring in better products using less-harmful substances. And in the absence of large-scale supply of “traditional” products, the consumers may be motivated to embrace more environment friendly goods and services.

At the end of the day, tradability of wastes must be determined from their long-term social, environmental, and economic impacts and not merely in terms of inputs for economic growth. It may be possible to assign an index value on each waste item computed on the basis on such long-term and short-term factors. Such unique value may then determine the actual usefulness of any waste type for humankind. But that is a matter for further research.

**International Cooperation**

Rather than international trade, global involvement in waste management in Asia must reflect better international cooperation. Asian countries should work with partner countries and international agencies at the bilateral, regional, and multilateral levels to achieve better environmental standards and facilities. It would enable developing Asian countries to obtain good practices and technologies and the resources for waste management, rather than waste, from the developed world.

International cooperation has the potential to address all aspects of modern waste management, including advanced treatment technology; biological treatment of waste; clean technologies; community involvement and education; disposal and incineration; resource recovery; soil and groundwater cleanup; waste pretreatment, separation, and transformation; waste reduction and recycling; strategies and planning; landfill design, construction, and monitoring; and so on. Enhanced cooperation may also confer direct
income benefits on the socially marginalized in developing nations. It may streamline the role of the informal sector and develop a legitimate business model of the collection and recycling of materials through the involvement of multiple stakeholders and help mitigate poverty in the major urban areas of some countries.

Development and transfer of relevant technologies are probably the most important aspects of international cooperation in waste management. As of now, environmentally sound designs are mostly promoted by the private sector and subject to patent protection. Costs of R&D and the dissemination of technological know-how are also estimated to be high. As both developed and developing countries have a common interest in promoting environmentally sound and cleaner production, a wide-ranging partnership on collaborative R&D spanning various industries, research institutions, universities, and the public sector would benefit the developing nations considerably.

The 3R approach, even with its appeal for free trade in recyclables, nevertheless incorporates several elements in cooperation involving Asian nations, especially in the fields of technology transfer, stakeholder cooperation, and developed–developing country linkages. If the intentions are properly carried through, Asia can set up a well-knit waste cooperation regime, and the basic objectives of 3R can be achieved even without trade in wastes.

Some of the key points emphasizing cooperation aspects in the 3R Action Plan may be stated as follows:

- Promote “joint research,” “capacity development,” and “technology transfer”
- Link with the UN’s Millennium Development Goals
- Link with climate change issues
- Importance of regionwide corporation
- More use of market-based policy instruments
- Multistakeholder approach to partnerships
- Information sharing, including education, product information, waste-management systems, and technology
- International network of civil society groups
- Step-by-step technology transfer, bearing in mind its suitability and economic viability
- Develop appropriate social systems to enhance the impact of technology
- Promote virtual knowledge transfer with a network hub and an information clearinghouse
- Promotion of various means of knowledge and technology sharing should be promoted, such as pilot projects, business and technology exhibitions, and expert group meetings

There are several international agencies and bodies that are supporting programs and activities conducive to promoting the sound waste-management practices (including the 3Rs) in many developing nations. The Basel Convention Secretariat is contributing to the promotion of environmentally sound management of hazardous and other wastes through partnership programs focusing on integrated management and the life cycle approach. The UNCRD of Japan is also assisting selected countries.
in Asia in developing national strategies and implementing pilot projects in collaboration with national and international partners. The United Nations Economic and Social Commission for Asia and the Pacific is trying to promote green growth through improvement of eco-efficiency of economic-development patterns.

Among international banks, the Asian Development Bank supports dialogues, a knowledge hub, pilot projects on the 3Rs, and environment investment for projects such as urban solid waste management including sanitary landfills, cleaner production, efficient water management, energy efficiency, and Clean Development Mechanisms, enabling the generation of carbon credits (UNCRD, 2006).

There are several examples of successful international cooperation efforts at waste management. In one instance, 31 Regional Centers for Cleaner Production have been established in many countries, including China and Vietnam, under the leadership of the United Nations Industrial Development Organization and UNEP, mainly to promote the reduction mechanism. The centers aim to enhance environmental and social responsibility of corporations while maintaining their competitiveness and export potential.

In 1987, the Industrial Waste Exchange Programs (IWEP) was started in Philippines as a pilot project assisted by the Canadian International Development Research Center and conducted by the Department of Environment and Natural Resources (DENR). In 1998, DENR transferred the IWEP to the Philippine Business for the Environment (PBE), and PBE disseminated the information regarding the activities of IWEP. IWEP maintains a database of waste generators and waste buyers or recyclers and releases the information (volume of waste, frequency of generation, industrial process that generated the waste, classification of waste, physical state and current handling of waste, etc.) through the PBE publication Business and Environment Magazine and IEM Knowledge Network. More than 130 companies have registered in IWEP, and 1,153 recyclable materials and wastes that either are for sale or are wanted have been registered.

For providing economic incentives, the Canadian International Development Agency and the International Center for Sustainable Cities have initiated the Solid Waste Bank Project in Udon Thani, Thailand, where the locals bring their recyclable goods to the bank, after which they are issued a passbook to record the amount of recyclable waste deposited in the Solid Waste Bank. When recyclable materials are sold to a community broker, the community members receive a share of the proceeds. The Solid Waste Bank keeps 15% of the money to cover its maintenance and operating costs. In this way, the Solid Waste Bank creates income generation, especially for the poor.

Examples of successful cooperation may be comforting, but they need to be replicated on a much larger scale and spread to newer areas. Composting, for instance, is a preferred method of treatment of solid wastes in developing countries (e.g., India, Bangladesh, Pakistan, etc.) because of the high degree of organic material in the wastes. But these countries have failed to install centralized, large-scale composting
plants because of high operating costs, incomplete separation, and lack of effective marketing. International cooperation involving resource tie-ups, easy loan facilities, and training of personnel would go a long way in setting up well-organized composting facilities in several developing countries. International cooperation implies a mix of initiatives, and countries must decide on the level of engagement appropriate to their waste profile and treatment potential. Unfortunately, many cooperation efforts involving Asian countries flounder because of different factors, including (a) too much emphasis (mainly by the local governments) on waste disposal rather than waste reduction and minimization, (b) lack of public awareness, (c) resource constraints and inadequate capability of local governments in introducing and implementing sound waste-management policies, (d) lack of effective follow-up of pilot projects, and (e) absence of clear national strategies. Thus, the desired result will be seen only when countries identify their weak spots in the waste-management chain and work to forge cross-border relationships to plug those loopholes.

However, one must remember that international cooperation in any area is difficult, as it is subservient to several geopolitical factors. In the absence of any prospect of exporting wastes to Asia, developed nations may be reluctant to pursue cooperation efforts with developing countries in the field of waste management with sufficient enthusiasm. But such inactions, if they were to happen, would be self-defeating because if wastes choke off growth in the Asian growth centers, no part of the world will be immune from the turmoil that will follow.

**Conclusion**

This article has argued against the large-scale import of recyclable wastes by developing Asian nations based on the proposition that they provide cheap resources required for economic growth. This is mainly because international trade in wastes, although promising resources for the developing countries, also endogenizes in its model the inefficient waste treatment in these countries, which keeps the international prices of recyclables cheap compared to the virgin material. Once developing countries implement strict environmental standards and set up advanced recycling and treatment facilities, the recyclable resources would cease to be cheap and the waste trade model would look vulnerable. The article instead reasoned that there is no alternative to robust international cooperation for dissemination of knowledge and technology and building of capacity and institutions in the developing countries as per the principles of “waste hierarchy.” The 3R concept proposed by Japan envisages all these but also unnecessarily stresses transboundary movement (or trade) in wastes. This is a major drawback of an otherwise useful proposition.
Notes

1. Since 1980, most of East Asia has grown fast (including China at an impressive 6% to 9% per year). The postcolonial Indian subcontinent has also witnessed a good growth rate, with India itself clocking a growth of 6% per year on an average (Berry & Serieux, 2006).

2. The Chinese economy expanded by 10.5% in 2006 and per International Monetary Fund predictions will grow by at least by 9.0% in 2007. India grew by more than 9.0% in fiscal year 2006-2007 and is expected to repeat the performance in the coming fiscal year as well. Pakistan and Bangladesh are also performing well on the economic front and are likely to do so in the future.

3. This is because people are constantly upgrading their mobile phones, computers, televisions, music systems, and so on.

4. India, for example, has the Municipal Solid Waste Management Rules 2000 for controlling and guiding activities relating to recycling and disposal of municipal wastes. India has also put in place the Hazardous Waste (Management and Handling) Rules 2003, under the Environmental Protection Act 1986. Schedule 2 of the Hazardous Waste Management and Handling Rules lists waste substances that should be considered hazardous unless their concentration is less than the limit indicated in the said schedule (Ministry of Environment and Forests, Government of India, 2006-2007). In Pakistan, Hazardous Substances Rules and Hospital Waste Management Rules 2000 provide substantial parts of the skeleton framework supporting environmental Laws.

5. According to Baukering (2001), material product cycle (MPC) is defined as a set of linked flows of materials and products so as to fulfill a certain service. MPC covers the complete life cycle of a material or a product, including extraction, production, consumption, waste management, and transport.

6. An example of the environmentalist viewpoint can be seen in the Greenpeace Report titled “Toxics Trade,” found on the Greenpeace Web site: http://www.greenpeace.org/international/campaigns/toxics/toxic-trade.

7. The rise in volume of import of paper waste is a direct outcome of the shrinking supplies of raw materials used for paper manufacture, which is associated with dwindling forest resources.

8. The foreign currency available in the waste trade can be very tempting for developing countries. In Papua New Guinea, for example, the government of the province of Oro negotiated a deal with a California firm to build a $38 million detoxification plant to process 600,000 metric tons of toxic waste per month. The deal, had it gone through, would have generated an income nearly 6 times the annual budget.

9. A good account of Alang Ship Breaking Yard in Gujarat can be found at the Web Site http://www.globalsecurity.org/military/world/India/alang-sby.htm

10. After a nationwide and international outcry, China banned all importation of hazardous e-wastes beginning in 2000. But this ban has merely diverted much of the cargo to Bangladesh and other neighboring countries because of cheap labor and good recycling businesses.

11. The roadmap was spelled out in the 3R South Asia Expert Workshop held in Japan on August 31, 2006, and the 3R South Asia Expert Workshop held in Katmandu, Nepal, from August 30 to September 1, 2006. These meetings were attended by most of the developing nations of Asia, including China, India, Indonesia, Malaysia, Philippines, Republic of Korea, Singapore, Thailand, Vietnam, Pakistan, Nepal, Bhutan, Sri Lanka, and Bangladesh.

12. Philippine Business for the Environment (PBE) is a nonprofit organization that assists Philippine businesses in addressing environmental issues and concerns. United States–Asia Environmental Partnership had also supported PBE’s projects.

13. International Centre for Sustainable Cities (ICSC) is a Canadian organization whose role is to facilitate a collaborative process to increase both project management abilities and solid waste management expertise and to provide funding for demonstration projects related to municipal solid waste management. ICSC also provides technical assistance to the stakeholder groups.

References


Amit Ray is an Indian Economic Service officer working for the government of India. A postgraduate in economics, he has written several articles in journals covering economic and environmental issues such as market solution for automobile pollution, road financing, public transport, climate change, and so on.