

A CHINA ENVIRONMENTAL HEALTH PROJECT RESEARCH BRIEF

Management of Municipal Solid Waste in Hong Kong and Taiwan

March 13, 2008

This research brief was produced as part of the China Environment Forum's partnership with Western Kentucky University on the USAID-supported China Environmental Health Project

By Julia Ross

My Taipei landlord was the first to drive the point home: On a densely packed island of 23 million, trash matters. Though I had spent months planning my move from the United States to Taiwan in August 2006, waste disposal wasn't high on my list of concerns. That changed as soon as I signed my lease. Along with the keys to my flat, I received a crash course in how to take out the trash like a local. First, the landlord instructed that I buy city-approved trash bags at the corner 7-Eleven. Then, meet the garbage truck five nights a week at the mouth of a nearby alley. Finally, heave the bags onto the truck myself.

Once I figured out where to meet the truck, I turned my attention to deciphering the island's mandatory recycling system—no easy task. Taipei's recycling trucks trundle through neighborhoods behind the trash collectors, but accept only certain items on certain nights. According to the strictly enforced schedule, plastic bottles must be separated from plastic bags, and flat recyclables, such as newspapers and cardboard dumpling boxes, are collected only on Mondays and Fridays. If you are caught mixing any recyclables in with your trash, be prepared for a stiff fine. And feigning ignorance of Mandarin won't absolve you, either.

Though planning my evenings around the 7:30 pm trash pick-up was inconvenient, Taiwanese friends reminded me it was a small price to pay for a clean environment. "Ten years ago, there were piles of garbage everywhere and packs of dogs wandering the streets," my Chinese teacher recalled. "Things have really changed."

In the run-up to the 2008 Beijing Olympic Games, China's myriad environmental challenges are drawing more scrutiny than ever before. Yet the issue of municipal solid waste disposal and management has remained relatively under-the-radar. For residents of mainland China, Hong Kong and Taiwan, however, trash collection and health risks associated with illegal dumping, unsanitary landfills and incinerators emitting toxic chemicals are issues of no less concern than coal-induced smog.

In February 2007, the China Environment Forum published a research brief on environmental and health challenges related to municipal solid waste in mainland China. This brief summarizes municipal solid waste trends and policies in Taiwan and Hong Kong, each of which has followed a different—yet potentially insightful—path from their mainland counterpart.

TAIWAN

Reduce, Reuse, Recycle

In 2006, Taiwan—an island of 23 million equivalent in size to the states of Maryland and Delaware combined—reported a daily per capita garbage volume of 0.6 kg, down from 1.1 kg per capita in 1997. The island's waste rates are markedly lower than those of mainland China, where urban residents generate an average of 1.2 kg per day,¹ slightly more than half the average waste rate of U.S. urbanites (2.1 kg per day in 2006).²

The Taiwanese government credits its three “Rs” strategy—“reduce, reuse, recycle”—for the island’s drop in garbage volume, and has heavily emphasized the “recycle” component. According Taiwan’s Environmental Protection Administration (EPA), the island reported a recycling rate of 39 % in 2007, up from 6% in 1998. After a 15-year-period of sporadic efforts to educate the public and encourage recycling that began in 1990 the government launched a ten-county pilot project in 2005 requiring citizens to sort garbage into recyclables, food waste, and refuse. The policy became mandatory nationwide in 2006, and Taiwanese now face fines of up to NT\$6,000 (US\$181) if caught mixing recyclables with household trash.

The government’s list of mandatory recyclables has expanded to 33 items, including steel containers, aluminum containers, glass containers, paper containers, plastic containers, pesticide containers, dry cell batteries, motorcycles, tires, lead acid batteries, lubricants, electronic products, electric appliances and lamps. As mentioned above, recycling trucks stop at neighborhood pick-up points five nights a week. Food scraps and organic waste—a major source of refuse arising from Taiwan’s ubiquitous night markets—are also collected at these points and sorted for “pig rearing” and composting.

Taiwan’s EPA subsidizes local governments to promote recycling and reuse of kitchen and bulky waste, including furniture and small appliances. Subsidies cover public education, recycling equipment, and activities such as auctioning off refurbished furniture.

The “reduce” component of Taiwan’s waste management strategy includes a fee of NT\$1-3 (US\$.03 to .09) on plastic bags distributed at supermarkets, department stores and convenience stores. Such stores are prohibited from giving out plastic bags free of charge, but restaurants with storefronts are exempted. Retailers determine the tax amount within the required range and retain the levy themselves. Implemented in mid-2002, the policy resulted in an 80 percent reduction in plastic bag use over the first year. Before introduction of the tax, Taiwanese used 2.5 plastic bags per person per day, for a total of 20 billion bags per year.³

Taiwan is in the vanguard of a global movement to impose taxes or bans on plastic bags; other nations out front on the issue include Ireland, South Africa, Denmark, and Bangladesh. In an effort to decrease pressures on overflowing municipal landfills, mainland China recently announced a ban on the production, sale or use of plastic bags less than .025 mm in thickness, effective as of June 1, 2008.⁴ The policy prohibits department stores, supermarkets and shops from giving out free plastic bags.

Taiwan’s success in waste reduction can also be traced to Taipei’s per-bag trash collection fee, introduced in 2001. The fee has reduced daily domestic waste in the city by one-third and increased recyclable garbage collection three-fold.⁵ It is levied by requiring citizens to purchase government-issued trash bags at convenience stores and supermarkets. The bags are priced above generic brands to cover the cost of pickup and as an incentive to discard less garbage in favor of recycling. Local trash collectors will only accept waste in city-approved bags and can identify potential recyclables through the translucent plastic.

To achieve its long-term goal of “zero waste,” Taiwan’s EPA has set overall waste reduction targets at 25 percent, 40 percent, and 75 percent of the waste volume reported in 2001 (8.3 million tons) for the years 2007, 2011, and 2020, respectively. The target for 2007 was met at the end of 2006.⁶

From Landfill to Incinerator

As of 2006, 83 percent of domestic solid waste in Taiwan was incinerated; 17 percent was disposed of in landfills. The island currently employs 26 incineration plants, capable of burning 20,000 tons of garbage per day. Many of Taiwan’s incinerators are “waste-to-energy” models, in which the heat generated from burning trash is converted to electricity and released on the island’s grid. According to Taiwan’s EPA, 22 large incinerator plants sold 2.3 million kilowatt hours to Taiwan’s electric companies in 2007.

Taiwan began building landfills in the early 1980s. By 1991, the island had introduced incinerator technology as an alternative to landfills, which were reaching capacity with little space for new construction. In the early

2000s, a network of green groups, including the Taiwan Watch Institute and the Green Citizens' Action Alliance, turned their attention to protesting incinerators in response to reports of high dioxin emissions,⁷ as well as concerns about inadequate treatment and illegal dumping of incinerator residue.⁸ Before treatment, such residue (bottom ash and fly ash) may contain heavy metals, dioxins, benzene, and other chemicals linked to cancer. Environmental activists urged the government to pursue more comprehensive recycling policies rather than rely heavily on incineration.

In the late 1990's, civil society groups also pointed to the mountains of garbage dumped on streets throughout the island, which attracted rats and dogs, as a significant public health risk. At the time, residents often burned their own trash illegally.

Taiwan's government has responded to many of these concerns. In 1997, Taipei introduced a "trash won't touch the ground" policy to prevent dumping by requiring citizens to meet trash collectors nightly and throw their household waste directly into the truck.⁹ The mandatory recycling policy went into effect in 2006, and in 2007 the EPA set stricter regulatory standards for waste incineration ash treatment and established standards for proper packaging and labeling of incinerator ash to improve the safety of final disposal.¹⁰

HONG KONG

Trash Trends

In 2006, Hong Kong generated some 17,000 tons of municipal solid waste each day, up 30 percent from 10 years ago. The Environmental Protection Department reported a per capita municipal solid waste rate of 1.35 kg per day in 2006, and a per capita household waste rate—excluding commercial, industrial and construction wastes—of .97 kg per day. Construction waste accounted for 27 percent of all solid waste disposed of at landfills in 2006; domestic waste accounted for 44 percent.¹¹

Hong Kong's population has grown by more than one million people since the mid-1980s, creating new pressures on landfills and waste management systems. In 2007, the population reached an estimated 7 million, covering a total land area of 1,042 square kilometers, or about six times the size of Washington, D.C.

An estimated 2.8 million tons of municipal solid waste were recovered in Hong Kong in 2006, out of a total of 3.4 million tons of waste discarded, for a recovery rate of 45 percent. Of the amount recovered, however, only 4 percent was recycled locally; 96 percent was exported to the mainland and other countries for recycling, with export earnings of HK\$5.3 billion (US \$680 million) for Hong Kong.¹² Paper, plastics and ferrous metals constitute the major materials recovered for recycling.

According to Friends of the Earth in Hong Kong, most of the recyclables shipped to mainland China end up in industrial towns where there is great demand for second-hand materials on production lines.

The Four R's: A Framework

Hong Kong's *Policy Framework for the Management of Municipal Solid Waste (2005-2014)* promotes an overall waste management strategy of "Reduce, Reuse, Recycle and Responsibility" (the 4 R's) and lays out three targets to: (1) reduce the amount of municipal solid waste generated in Hong Kong by 1 percent per year up to 2014; (2) increase the overall recovery rate of municipal solid waste to 45 percent by 2009 and 50 percent by 2014; and (3) reduce the total municipal solid waste disposed of in landfills to less than 25 percent by 2014.¹³

The framework's proposed policy tools include imposing domestic waste fees on individuals (in keeping with the "polluter pays" principle); banning disposal of biodegradable waste at landfills; and introducing "producer responsibility schemes" to spur manufacturers and retailers to produce/sell products that generate less waste, or that can be reused or recycled.

Landfill Crisis

Hong Kong currently faces a potential trash crisis: Its three landfill sites—the territory’s sole means of waste disposal—are projected to be full by 2015 if waste rates continue unabated. In anticipation of this benchmark and to reduce the amount of waste sent to landfills, the government has introduced a voluntary “source separation of waste” recycling program and fees for disposal of construction waste.

The source separation of waste program was introduced in January 2005. As of August 2007, 650 housing estates had signed up for garbage sorting and recycling, covering a population of 2.5 million, or 36 percent of the territory’s total population. The Environmental Protection Department has set goals of increasing program participation to 80 percent of the population by 2010, and increasing the domestic waste recovery rate to 26 percent by 2012 (up from 16 percent in 2005).¹⁴

Hong Kong residents have been slow to embrace recycling, according to Angus Ho of the environmental group Greeners Action. He estimates that only half of housing estate residents covered by the program are actually recycling their trash, and notes that public recycling bins are hard to find and not widely used.

Another measure to promote local recycling, the Hong Kong EcoPark, provides recycling enterprises with long-term, affordable leases; tenancies have thus far been awarded to recyclers of plastics, electronic equipment, tires, wood, and cooking oil. Environmental activists have criticized the project as ineffective, however, in part because cheaper land and labor costs make recycling facilities in mainland China more attractive.¹⁵ And bureaucratic snafus have dogged the project. According to the *South China Morning Post*, as of January 2008, ten months after the first leases were signed, none of the tenants had moved into the park.¹⁶

Taking a cue from both Taiwan and mainland China, Hong Kong is also jumping on the anti-plastic bag bandwagon. A recent government survey found that Hong Kong residents dispose of more than three plastic bags per person per day, adding to the mounting pressure on landfills. In January 2008, the government introduced a bill in Hong Kong’s Legislative Council to impose an environmental levy of HK\$50 (US\$.06) on each plastic shopping bag distributed by retailers, with the first phase covering chain or large supermarkets, convenience stores and personal health and beauty stores. Pending enactment, the fee would take effect in the first half of 2009.¹⁷

Mixed Views on the “Super Incinerator”

Environmental groups such as Friends of the Earth and the Conservancy Association have had success in pushing for several waste management policies now being pursued by the Hong Kong government, including the plastic bag levy and the landfill charge for construction waste. These same groups are currently urging the territory to adopt stronger recycling efforts before moving forward with construction of a new “super incinerator.” Currently, Hong Kong’s Environmental Protection Department is planning to commission the territory’s first modern incinerator in the mid-2010s. Tuen Mun and Lantau Island are two sites being considered for locating this incinerator.

“We promote responsible consumption and producer responsibility legislation to control waste generation at source rather than many end-of-pipe solutions,” says Friends of the Earth’s Edwin Lau. Local citizens’ groups in Tuen Mun and Lantau Island have also rallied against proposed incinerator construction in their neighborhoods.¹⁸

Others see the incinerator as the best way to extend the life of Hong Kong’s limited landfill space. The *South China Morning Post* recently ran an editorial in support of building the incinerator upon completion of environmental impact studies. “Incineration is not a perfect solution, although it is the best approach in a city with limited land, like ours,” said the *Post*. “The heart of the scheme, however, must be to create a society that is more responsible about garbage. The 17,000 tons we produce each day—up 30 percent from 10 years ago—shows that we are not.”¹⁹

Lessons for Mainland China?

As mainland China struggles with poorly managed landfills; illegal dumping; lack of citywide recycling programs; and a likely need for 1,400 additional landfills over the next 25 years,²⁰ lessons from municipal waste management in Taiwan and Hong Kong may prove instructive. Taiwan's introduction of a mandatory island-wide recycling program and transition from a landfill- to incinerator-based waste disposal model have contributed to a noticeable improvement in quality of life over the last decade. Hong Kong's impending landfill crisis has forced the government to promulgate a ten-year waste management plan, promote residential recycling and move towards building a super incinerator. While each has contended with political and geographical factors different from the mainland, their experience in testing different incentives, responding to community concerns, and formulating policies to "reduce, reuse, recycle" may well be transferable.

Julia Ross is a freelance journalist in Washington, D.C., and former Fulbright Fellow in Taiwan. She can be reached at juliaross2002@yahoo.com.

¹ "Country Faces 'Great Wall' of Waste." *China Daily*. January 9, 2007.

http://english.sepa.gov.cn/zwx/hjyw/200701/t20070110_99435.htm

² "Municipal Solid Waste Generation, Recycling and Disposal in the United States: Facts and Figures for 2006."

<http://www.epa.gov/epaoswer/non-hw/muncpl/pubs/msw06.pdf>

³ "Overseas Experience on Plastic Shopping Bag Reduction." Hong Kong Legislative Council Panel on Environmental Affairs.

www.epd.gov.hk/epd/english/news_events/legco/files/OverseasExperienceonPlasticShoppingBagReduction.pdf

⁴ "China Bans Free Plastic Shopping Bags." *International Herald Tribune*. January 9, 2008.

<http://www.iht.com/articles/2008/01/09/asia/plastic.php>

⁵ "Solid Waste Disposal." Taiwan Government Information Office. January 2008.

<http://www.gio.gov.tw/ct.asp?xItem=35680&ctNode=2593>

⁶ "Taiwan's Recycling Efforts Pay Off."

⁷ "Residents protest excessive dioxin emission levels." *Taipei Times*, June 20, 2001.

<http://www.taipetimes.com/News/local/archives/2001/06/20/90757>

⁸ "Issue of New Incinerators Dogging the EPA." *Taipei Times*, July 23, 2002.

<http://www.taipetimes.com/News/taiwan/archives/2002/07/23/149324>

⁹ "Clearing A Way." Taiwan Review. December 2006.

<http://taiwanreview.nat.gov.tw/ct.asp?xItem=23574&CtNode=119>

¹⁰ "Garbage Sorting and Incinerator Ash Management Regulations Reinforced." Taiwan Environmental Protection Administration. August 2007. <http://www.epa.gov.tw/en/NewsContent.aspx?NewsID=66&list=426&path=426>.

¹¹ Hong Kong Waste Treatment and Disposal Statistics. Hong Kong Environmental Protection Department. June 2007.

http://www.epd.gov.hk/epd/english/environmentinhk/waste/data/stat_treat.html

¹² Waste Recycling Statistics. Hong Kong Environmental Protection Department. October 2007.

https://www.wastereduction.gov.hk/en/quickaccess/stat_recycle.htm

¹³ A Policy Framework for the Management of Municipal Solid Waste (2005-2014). Hong Kong Environmental Protection Department. 2004. http://www.epd.gov.hk/epd/msw/htm_en/executive/main.htm.

¹⁴ Forum on Source Separation of Waste Award Presentation Ceremony Held." Hong Kong Environmental Protection Department. August 2007. https://www.wastereduction.gov.hk/apps/show_eventpost.jsp?eventID=213.

¹⁵ "Tenders Sought for Tuen Mun EcoPark." *The Standard*. February 25, 2006.

http://www.thestandard.com.hk/news_detail.asp?we_cat=4&art_id=12868&sid=6821330&con_type=1&d_str=20060225

¹⁶ "Litany of Woes Hampers Recycling Projects at Eco Park." *South China Morning Post*. January 30, 2008.

¹⁷ "Product Eco-Responsibility Bill To Be Introduced." Hong Kong Environmental Protection Department. December 2007. http://www.epd.gov.hk/epd/english/news_events/press/press_071220a.html.

¹⁸ Two Sites Proposed for Incinerator." *South China Morning Post*. January 30, 2008.

¹⁹ Incinerator the Best Option for HK's Rubbish." *South China Morning Post*. January 30, 2008.

²⁰ "Environmental and Health Challenges of Municipal Solid Waste in China." A China Environmental Health Project Research Brief. China Environment Forum, Woodrow Wilson International Center for Scholars. February 2007.

http://www.wilsoncenter.org/topics/docs/muni_waste_Feb1.pdf