Ramping Up Recycling in Singapore

In 2014, the Singapore government introduced an ambitious vision: for the country to work towards becoming a "Zero Waste Nation". With Singapore's only landfill predicted to reach full capacity around 2035, the National Environment Agency (NEA) faced the task of reducing the country's waste disposal needs through the practice of the 3Rs — reduce, reuse, recycle — and incinerating all remaining incinerable waste to reduce waste volume and landfill needs. Though incineration was straightforward, getting the public to practise the 3Rs was not. Domestic recycling was far from a widespread practice in the country. Though the agency had introduced the National Recycling Programme in 2001, providing recycling services to HDBs, landed properties, and some private condominiums, it had been a challenge to make recycling a social norm in Singaporean society. Recycling was an active endeavour that required individuals to invest extra effort into getting rid of their trash, and the act brought few immediate or visible benefits to any one person. Furthermore, the public gains of recycling competed for attention with more immediate concerns, like convenience and economic growth. "It's very difficult to get people to recycle as a way of life," NEA Waste and Resource Management Department Deputy Director Vincent Teo said. It was unclear whether public education campaigns were sufficient for inculcating values that would truly incentivise the public to recycle, or whether a tougher stance was necessary. The NEA had to decide what to focus on to shift public behavioural norms and inculcate the personal values that would lead to more recycling in Singapore.

This case was written by Tara Thean under the guidance of Adrian Kuah, Lee Kuan Yew School of Public Policy (LKY School), National University of Singapore and has been funded by the LKY School. The case does not reflect the views of the sponsoring organisation nor is it intended to suggest correct or incorrect handling of the situation depicted. The case is not intended to serve as a primary source of data and is meant solely for class discussion.

Copyright 2016 by the Lee Kuan Yew School of Public Policy at the National University of Singapore. All rights reserved. This publication can only be used for teaching purposes.

1 Introduction

The new millennium arrived in the midst of what many scientists and conservationists called a global environmental crisis. Human activities, from deforestation to overfishing to fossil fuel burning, had brought about a myriad of serious problems worldwide. Biologists cautioned that the Earth was entering a "mass extinction" — the sixth in a series of five known sudden and significant losses of biodiversity to occur thus far in the planet's history,[1][2] and one for which human demands on the environment were largely responsible[3][4][5] as they had been in previous extinctions.[6] The threat of climate change, and the controversy surrounding it, loomed large.[7][8]

As environmental challenges made their way into the public conversation, so did solutions to those challenges. One of these was recycling — giving waste material a new lease of life by converting it into something usable, and in so doing conserving raw materials, lowering greenhouse gas emissions, and reducing waste disposal requirements, among other benefits. On an individual level, recycling typically involved placing unwanted items — items like magazines, water bottles, or Pepsi cans made out of paper, plastic, and metals such as aluminium or steel — into designated bins in public places after separating such items from other trash. Recycling could also involve sending still-usable items such as books to charity shops or making new items out of older items, like refashioning an old pair of jeans into a handbag (though these practices were also called "reusing" or "repurposing"). The fundamental premise was that it was desirable to make use of waste to make items that one might otherwise buy new, thus reducing the ecological footprint of creating consumer goods from scratch.

Singapore's recycling journey was part of a much larger government effort towards creating a "clean and green Singapore"[9][10] that had begun very early in Singapore's short history. Singapore's first Prime Minister Lee Kuan Yew's memoir *From Third World to First: The Singapore Story* described how he had wanted to make Singapore into "an oasis in Southeast Asia" to help the

[1] Norman Myers, "Mass extinctions: what can the past tell us about the present and the future?", Palaeogeography, Palaeoclimatology, Palaeoecology (Global and Planetary Change Section) 82 (1990): 175-185.

[2] David B. Wake and Vance T. Vredenburg, "Are we in the midst of the sixth mass extinction? A view from the world of amphibians," *Proceedings of the National Academy of Sciences* 105, no. Supplement 1 (2008): 11466-11473.

[3] Ibid., 11472.

[4] Chris D. Thomas et al., "Extinction Risk from Climate Change," Nature 427 (2004): 145-148.

[5] Norman Myers, "Mass extinctions: what can the past tell us about the present and the future?", Palaeogeography, Palaeoclimatology, Palaeoecology (Global and Planetary Change Section) 82 (1990): 175-185.

[6] Graham W. Prescott et al., "Quantitative global analysis of the role of climate and people in explaining late Quaternary megafaunal extinctions," *Proceedings of the National Academy of Sciences* 109, no. 12 (2012): 4527-4531.

[7] Christ D. Thomas et al., "Extinction risk from climate change," *Nature* 427, no. 6970 (2004): 145-148.

[8] Bill McKibben, "Global Warming's Terrifying New Math," *Rolling Stone*, July 19, 2012, `http://www.rollingstone.com/politics/news/global-warmings-terrifying-new-math-20120719#ixzz48zG8mPjt`.

[9] "Clean & Green Singapore," National Environment Agency, accessed August 3, 2016, `http://www.nea.gov.sg/events-programmes/campaigns/clean-green-singapore`.

[10] Lee Kuan Yew, *From Third World to First* (New York: HarperCollins Publishers, 2000), 173.

country stand out among other developing nations post-independence.[11] In its earliest stages, the initiative included moving streetside hawker stalls to hawker centers,[12] ensuring that livestock such as cattle and goats did not wander the streets,[13] and starting the Keep Singapore Clean campaign, which focused on preventing littering.[14] Meanwhile, the environment faced pressure from industrialisation efforts aimed at staving off the high unemployment that Singapore faced as a newly-independent nation. As such, the year 1972 saw the establishment of the Ministry of Environment (ENV) to address the environmental challenges that accompanied Singapore's rapid development.[15] ENV was later called the Ministry of the Environment and Water Resources (MEWR), under which the statutory boards Public Utilities Board (PUB) and National Environment Agency (NEA) operated.[16]

To help make Singapore into a "garden city" full of greenery, the Prime Minister introduced in 1971 a yearly Tree Planting Day.[17][18] The year 1990 saw the launch of Singapore's first Clean and Green Week, an awareness campaign to educate the public about environmental issues in addition to continuing the work of the Keep Singapore Clean campaign and Tree Planting Day.[19] The campaign changed its name to Clean and Green Singapore in 2007 to encourage year-round environmental consciousness and discipline.[20] Other significant milestones in creating the clean and green Singapore that Lee Kuan Yew envisioned included the successful cleanup of the Singapore River and Kallang Basin by the 1990s[21] as well as the 2002 creation of the Singapore Green Plan, an "environmental blueprint for the future" that outlined how Singapore would achieve its both its environment and development goals.[22] In 2014, Prime Minister Lee Hsien Loong introduced the Sustainable Singapore Blueprint,[23] a document outlining Singapore's environmental goals for the future.[24]

---

[11] Lee, *From Third World to First*, 174.

[12] Ibid.

[13] Ibid., 175.

[14] Lee Kuan Yew, "Speech by the Prime Minister Inaugurating the "Keep Singapore Clean" Campaign on Tuesday, 1st October, 1968" (speech, Singapore, October 1, 1968), National Archives of Singapore, http://www.nas.gov.sg/archivesonline/data/pdfdoc/lky19681001.pdf.

[15] Chew Gek Khim, "Community Engagement to Promote Environmental Ownership and Secure our Future," in *50 Years of Environment: Singapore's Journey Towards Environmental Sustainability*, ed. Tan Yong Soon (Singapore: World Scientific Publishing, 2016), 194.

[16] "Our Organisation History," Ministry of the Environment and Water Resources, accessed July 4, 2016, http://www.mewr.gov.sg/about-us/our-organisation/history.

[17] Lee, *From Third World to First*, 177.

[18] Jalelah Abu Baker, "Tree Planting Day in Singapore: 5 things about the 51-year-old tradition," *The Straits Times*, November 3, 2014, http://www.straitstimes.com/singapore/tree-planting-day-in-singapore-5-things-about-the-51-year-old-tradition.

[19] Tan Yong Soon, Lee Tung Jean, and Karen Tan, *50 Years of Environment*, 5.

[20] Ibid., 6.

[21] Lee, *From Third World to First*, 180.

[22] Valerie Chew, "Singapore Green Plan," National Library Board, accessed July 4, 2016, http://eresources.nlb.gov.sg/infopedia/articles/SIP_1370_2008-11-22.html.

[23] Lee Hsien Loong, "Transcript of Prime Minister Lee Hsien Loong's Speech at Clean & Green Singapore 2015 Launch on 8 November," (speech, Singapore, November 8, 2014), Prime Minister's Office Singapore, http://www.pmo.gov.sg/mediacentre/transcript-prime-minister-lee-hsien-loongs-speech-clean-green-singapore-2015-launch-8.

[24] Ministry of the Environment and Water Resources and Ministry of National Development, "Sustainable Singapore Blueprint 2015," Singapore, 2014, http://www.mewr.gov.sg/ssb/files/ssb2015.pdf.

2 Domestic Recycling in Singapore

The concept of recycling had already taken root in Singapore during the country's earliest years, though locals did not call the early incarnations of it "recycling". The early version of the practice took the form of *karang guni* men, who were "rag-and-bone dealers who went from door-to-door to buy discarded household items which were then resold".[25] These men typically bought items such as paper, electrical appliances, scrap metal, and used clothes, selling these items to recycling companies, exporting companies, flea markets, or secondhand shops.[26]

Household recycling officially became a part of Singapore's environmental efforts in April 2001 with the NEA's launch of the National Recycling Programme (NRP).[27] HDB and private landed properties received receptacles for their recyclable materials from Public Waste Collectors (PWCs), whom the NEA appointed through open tenders to provide waste collection and recycling services for residential and trade premises.[28][29] The PWCs were private companies that specialized in environmental services such as waste management and in some cases cleaning, conservancy, horticultural services, and water management.[30][31][32][33] Condominiums that had not opted out of their waste being collected by the PWCs also received recycling bins. In November 2008, the Environmental Public Health Act (Chapter 95) was amended to require recycling receptacles to be provided on the premises of all condominiums and private apartments.[34] HDB estates received one commingle recycling bin per block as of April 2013.[35] The PWCs typically emptied these bins three times a week, while private landed properties had their recycling collected weekly.[36] Residents living in HDB developments launched from 2014 were provided with recycling chutes, in addition to the existing garbage chutes, to make recycling more convenient.[37] A 2011 survey of the recycling chute-equipped HDB estate Treelodge@Punggol reported an approximately threefold increase in the amount of recycling mate-

[25] Naidu Ratnala Thulaja, "The karang guni man," National Library Board, accessed July 4, 2016, http://eresources.nlb.gov.sg/infopedia/articles/SIP_486_2005-01-03.html.

[26] Ibid.

[27] "National Recycling Programme," National Environment Agency, accessed July 4, 2016, http://www.nea.gov.sg/energy-waste/3rs/national-recycling-programme.

[28] National Environment Agency, "Guidebook on Setting Up Structured Waste Recycling Programme in Condominiums and Private Apartments," Singapore, 2008, http://www.nea.gov.sg/docs/default-source/energy-waste/guide-on-setting-up-structured-waste-recycling-programme-in-condos-and-apartments.pdf?sfvrsn=2, 2.

[29] "National Recycling Programme."

[30] "Veolia in Singapore," Veolia Environmental Services Singapore Private Limited, accessed July 4, 2016, http://www.veolia.com.sg/about-us/veolia-singapore.

[31] "Corporate Profile," Colex Holdings Limited, accessed July 4, 2016, http://www.colex.com.sg/profile.html.

[32] "About Sembcorp," Sembcorp Industries, accessed July 4, 2016, http://www.sembcorp.com/en/about.aspx.

[33] "Corporate Profile," 800 Super Holdings Limited, accessed July 4, 2016, http://800super.com.sg/about/corporate-profile.

[34] National Environment Agency, "Guidebook on Setting Up Structured Waste Recycling Programme in Condominiums and Private Apartments," 2.

[35] "National Recycling Programme," Colex Holdings Limited, accessed August 4, 2016, http://www.colex.com.sg/recycling.html.

[36] Ibid.

[37] http://www.straitstimes.com/forum/letters-in-print/recycling-infrastructure-nea-replies

Figure 1: Singapore's recycling pipeline. Figure from the NEA at http://www.nea.gov.sg/energy-waste/3rs/recycling-processes.

rials collected per block over that of estates of comparable size.[38][39]

PWCs attempted to further incentivize recycling by launching "Cash for Trash" programmes. The PWC Veolia Environmental Services Singapore Private Limited set up Cash for Trash recycling stations that allowed residents in their designated sectors to exchange recyclables such as paper, used clothing, and aluminium drink cans for cash.[40] Colex Environmental Private Limited had a similar programme.[41]

The NEA described the general recycling process in Figure 1.

Using a combination of incineration and one offshore landfill, the NEA also managed the trash that didn't make it into the recycling bins. Landfills were the primary means of disposal in the 1960s and 1970s, but the country's land scarcity led the NEA to start using a waste-to-energy (WTE) incineration plant in Ulu Pandan for some of Singapore's trash beginning in 1979.[42][43] In 2016, the NEA operated four WTE plants: Tuas, Senoko, Tuas South and Keppel Seghers, with the Ulu Pandan plant having closed in 2009.[44] Incineration reduced waste to just 10 percent of its former volume.[45] Some recycling occurred along the way — heat from incineration helped generate electricity, and recovered ferrous metal went to recycling mills.[46] Ash from waste incineration at one of the

[38] National Environment Agency, "Factsheet on Recycling Chutes for New Private Residential Developments," Singapore, 2015, 1

[39] Samantha Boh, "Sorting out the recycling blues of Singapore," *The Straits Times*, June 30, 2016, `http://www.straitstimes.com/opinion/sorting-out-the-recycling-blues-of-singapore`.

[40] "Cash-For-Trash Programme," Veolia Environmental Services Singapore Private Limited, accessed July 4, 2016, `http://www.veolia.com.sg/our-services/residents/cash-for-trash`.

[41] "Recycling Program," Colex Holdings Limited, accessed July 4, 2016, `http://www.colex.com.sg/recycling.html#nrp`.

[42] "Overview: Waste Management," National Environment Agency, accessed July 4, 2016, `http://www.nea.gov.sg/energy-waste/waste-management/overview`.

[43] "Solid Waste Management Infrastructure", National Environment Agency, accessed July 4, 2016, `http://www.nea.gov.sg/energy-waste/waste-management/solid-waste-management-infrastructure`.

[44] "Solid Waste Management Infrastructure."

[45] Ibid.

[46] "Waste-to-energy (WTE) / Incineration Plants ", National Environment Agency, accessed July 4, 2016, `http://www.nea.gov.sg/energy-waste/waste-management/waste-to-energy-\`

four WTE plants was sent to the Tuas Marine Transfer Station where it was unloaded onto barges before being transported via sea to the final stop, Semakau landfill.[47] Semakau landfill, which was located 8 kilometres from the south of Singapore,[48] was a 350-hectare swathe of sea space enclosed by a sand bund with a 7 kilometre perimeter. At the time of writing, it served as Singapore's only landfill.[49] Its capacity was meant to be sufficient for the ash and non-incinerable waste generated in Singapore from the year 1999, when the landfill first opened, until at least 2035.[50] The waste eventually ended up in landfill cells.[51]

A well-oiled waste management system didn't stop waste disposal quantities from ticking upwards. Singapore disposed of six times more solid waste per day in 2015 than in 1970, and refuse disposal data suggested an upward trend over the previous decade (Figure 2).[52][53] Recycling helped to trim that amount. The recycling rates of waste such as construction debris, ferrous metal, and wood were high, at 99 percent for the first two and 79 percent for wood, and indeed the one percent recycling rate increase from 2014 to 2015 came mostly from the higher recycling rates of materials like wood, metals, and horticultural waste.[54] Domestic recycling didn't fare as well, however. Domestic recycling rates fell by 3 percent between 2010 and 2014,[55] and NEA data showed that recycling rates of materials that residents can typically recycle such as plastics and glass were comparatively low (7 and 19 percent respectively).[56] Singapore does not export its waste to other countries, the NEA's Waste and Resource Management Department Deputy Director Vincent Teo said.

3 Spreading the word

The NEA hoped to see a 30 percent domestic recycling rate by 2030.[57] The agency tried hard to encourage recycling by raising public awareness. Calls to recycle typically fell under the "3R" slogan: *Reduce, Reuse, Recycle.* The NEA described the three prongs of the 3R approach as follows:

> "Reduce: Use only what you need
>
> Reuse: Re-use things for the same or new purpose

%28wte\%29-incineration-plants.

[47] "Solid Waste Management Infrastructure."

[48] "Semakau Landfill," National Environment Agency, accessed July 4, 2016, http://www.nea.gov.sg/energy-waste/waste-management/semakau-landfill.

[49] "Solid Waste Management Infrastructure."

[50] Ibid.

[51] "Semakau Landfill."

[52] "Refuse Disposal Figures," National Environment Agency, accessed July 4, 2016, http://www.nea.gov.sg/energy-waste/waste-management/refuse-disposal-figures.

[53] "Overview: Waste Management."

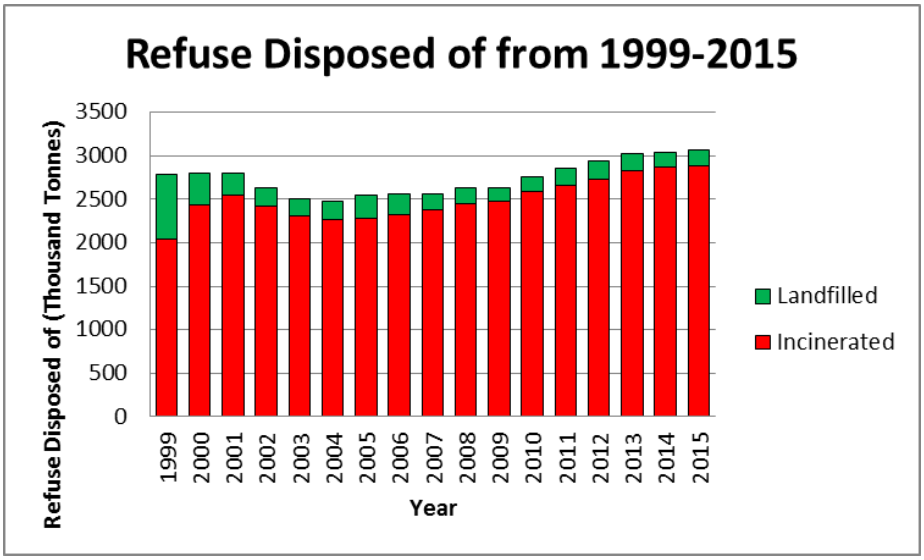
[54] "Waste Statistics and Overall Recycling", National Environment Agency, accessed July 4, 2016, http://www.nea.gov.sg/energy-waste/waste-management/waste-statistics-and-overall-recycling.

[55] Audrey Tan, "askST: Does waste in recycling bins actually get recycled?" *The Straits Times*, April 27, 2016, http://www.straitstimes.com/askst/askst-does-waste-in-recycling-bins-actually-get-recycled.

[56] "Waste Statistics and Overall Recycling."

[57] Ministry of the Environment and Water Resources and Ministry of National Development, "Sustainable Singapore Blueprint 2015," 109.

Figure 2: Waste disposed of via landfills and WTE plants from 1999 to 2015. Data to create chart obtained from the NEA at http://www.nea.gov.sg/energy-waste/waste-management/refuse-disposal-figures.



Recycle: Convert waste into useful products"[58]

Labels on commingled recycling bins in HDBs provided basic instructions on what could and could not be recycled (Figure 3). The labels generally noted that food and liquid waste were not welcome in the bins. Some of the drop in domestic recycling between 2010 and 2014 came from contamination of recyclable material with contaminants such as food waste, according to the NEA.[59] If too much contamination made its way into the recycling bin, all recyclable materials within the bin became unusable and had to be discarded entirely. In addition to the existing recycling bin labels, posters with more detail on appropriate recycling practices were sometimes available in HDB estates (Figure 4). HDB residents in certain areas could attend recycling events where volunteers gathered to teach residents about good recycling practices (Figure 5). An October 2015 launch of a new recycling point in Nee Soon drew 100 residents who brought recyclables and learned about sorting them, for example.[60]

The NEA website provided various resources for educating the public about recycling. These resources included printable flyers in English, Mandarin, Malay, and Tamil detailing what common home items could and could not go into recycling bins (Exhibit 1), a poster about how to recycle and the post-collection recycling process (Exhibit 2), and a 12-page "Guide to 3R practices for house-

[58] "Waste Minimisation and Recycling", National Environment Agency, accessed July 4, 2016, `http://www.nea.gov.sg/energy-waste/3rs/waste-minimisation-and-recycling`.

[59] Tan, "askST: Does waste in recycling bins actually get recycled?"

[60] Carolyn Khew, "Sorting out what can be recycled," *The Straits Times*, October 12, 2015, `http://www.straitstimes.com/singapore/environment/sorting-out-what-can-be-recycled`.

(a)

(b)

Figure 3: Recycling bins and their labels at a Holland Close HDB estate.

Figure 4: A poster in an HDB estate detailing appropriate recycling practices.

Figure 5: A poster in an HDB estate inviting residents to attend a recycling event.

holds" filled with recycling tips,[61] among others. The website also provided a link to a two-minute YouTube video that demonstrated good practices such as emptying bottles or packaging of food waste before placing them into recycling receptacles.[62]

Schools played their part as well. Singaporean schools collaborated with the NEA to participate in the School Recycling Corner Programme, putting together "recycling corners" that featured recycling bins and informational materials about recycling.[63] Certain schools also initiated their own activities to encourage students to recycle. The Sengkang district's Anchor Green Primary School, for example, held competitions to see which "house" could collect the most recyclables, with the results represented by stickers on proud display in front of the school. The more recyclables, the more stickers. The school also had students and parents collaborate to make a quilt out of unsold fabric items from Ikea. CHIJ St Nicholas Girls' School in the Ang Mo Kio district had students in its Green Club — a club focused on environmental activities — collect reusable bags and distribute them in Singapore's City Square Mall to help educate the public about the carbon footprint of producing plastic bags. The

[61] "Guide to 3R practices for households", guidebook, National Environment Agency, accessed July 4, 2016, `http://www.nea.gov.sg/docs/default-source/energy-waste/a-guide-to-3r-practices-for-households.pdf?sfvrsn=2`

[62] "3R (Reduce, Reuse, Recycle) Video for Households 2015," YouTube video, 0:38, posted by "CleanGreenSingapore," July 27, 2015, `https://www.youtube.com/watch?v=zp-Uw7L0sTw&feature=youtu.be`.

[63] Ong, "Recycling infrastructure."

Green Club's teachers-in-charge conducted various "upcyling" activities with their students, such as making stools and rugs out of plastic bottles and old t-shirts. Schools also celebrated "days" devoted to the environment, such as Earth Day and Youth for the Environment Day, with various activities.

To incentivise a lively spread of recycling activities in schools, the NEA and several non-governmental organizations (NGOs) established recycling-themed awards that schools could aim to achieve. The NEA began giving out the 3R Awards in 2003 — in 2013, the NGO Singapore Environment Council (SEC) took over — to schools to recognize those that had done particularly well in promoting recycling.[64] The 3R Awards became part of the SEC's School Green Awards, yearly awards that schools received based on a self-reported accounting of their efforts in areas such as energy and water conservation, greenery and biodiversity, green transport, and waste management, among others. Meanwhile, the NGO World Wide Fund for Nature (WWF) distributed the Eco-Schools Awards, which rewarded schools for their implementation of a "seven-step process" that largely involved conducting a school environment audit and carrying out a plan to tackle environmental issues raised by audit.[65][66]

Some schools put a lot of emphasis on putting their students in direct contact with the natural world. For example, staff at Commonwealth Secondary School in central Singapore believed that such contact was a necessary precursor to any environmental engagement. "When a relationship is built, it would be easier to develop the sense of duty to love and protect the environment," they wrote.[67] As such, the school's administration had built "eco-habitats" — a rainforest, a wetland, and a stream — on campus grounds to enable their students to interact with the environment every day (Figure 6, Figure 7). For one lesson per semester, all academic departments were required to use these outdoor habitats as a setting for their classroom activities. The school also had an active biodiversity-related Instagram presence, using the #cwssbiodiversity "hashtag" to enable students to easily upload and search for photos they had taken of nature sightings around the school. At the time of writing, there were 2,435 posts under the hastag.[68]

4 Making it count

In addition to public awareness as it pertained to the *mechanics* of recycling — what was recyclable, where the bins were — and the waste disposal process, a key facet of recycling messaging was the issue of *why* the public should recycle at all. What were the perceived consequences of failing to recycle? Why did the call to action exist?

[64] "3R Awards," School Green Awards, accessed July 4, 2016, `http://www.sec.org.sg/sga/3r-awards.php`.

[65] "Seven-step Process in Detail," World Wide Fund for Nature Singapore, accessed July 4, 2016, `http://www.wwf.sg/for_schools/eco_schools_programme/seven_step_process/seven_step_process_details/`.

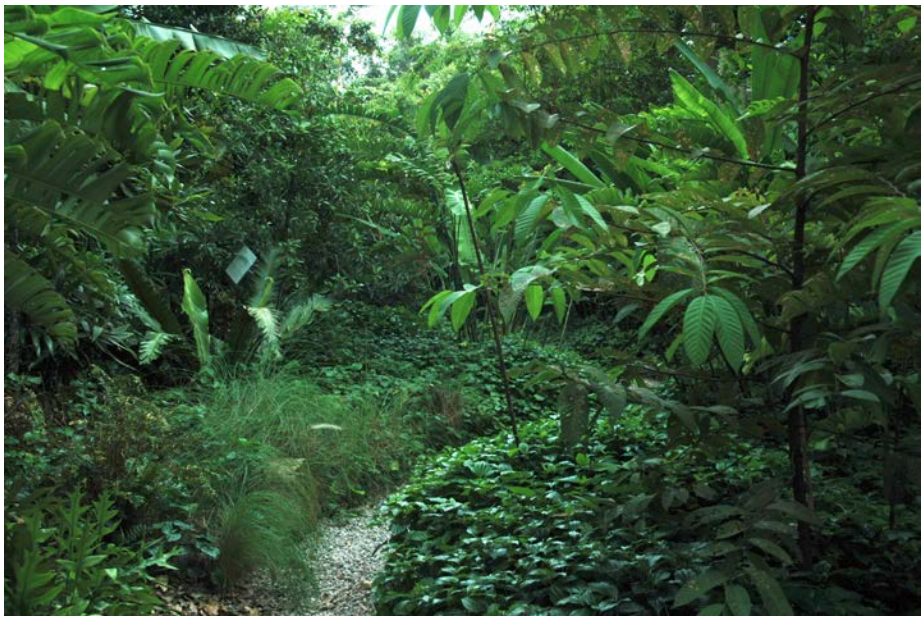
[66] "Eco-Schools Awards," World Wide Fund for Nature Singapore, accessed July 4, 2016, `http://www.wwf.sg/for_schools/eco_schools_programme/eco_schools_awards/`.

[67] "Write-up on Environmental Education in Commonwealth Secondary School," writeup, Commonwealth Secondary School.

[68] #cwssbiodiversity, Instagram hashtag, July 5, 2013, `https://www.instagram.com/explore/tags/cwssbiodiversity/`.

Figure 6: The Wetlands at Commonwealth Secondary School, located in front of a block of classrooms.

Figure 7: The Rainforest at Commonwealth Secondary School, located in front of two blocks of classrooms.



Previous research had suggested that values were important for galvanizing action. A 2010 NEA study had shown that "cultural and personal value systems" had an effect on the prevalence of other actions such as littering, for example.[69] In addressing the question of "Why recycle?", public communications typically made reference to two broad themes.

1. **Land scarcity.** Space for waste was far from infinite due to Singapore's small size. Official documents and websites touted land scarcity as one of the fundamental reasons to practice recycling — indeed, the MEWR website described the issue of recycling and waste management as "space for waste will run out".[70] Land scarcity also made an appearance in the Sustainable Singapore Blueprint 2015: "Given our limited space for landfill, we must do our best to reuse, reduce and recycle our materials".[71] The November 2008 edition of the NEA's Guidebook on Setting Up Structured Waste Recycling Programmes in Condominiums and Private Apartments began by noting that Singapore would "need to build a new incineration plant every 5-7 years and a new landfill the size of Sentosa Island every 25-30 years" if solid waste levels continued to increase at the same rates as they were doing at the time.[72]

   Calls for prudent land use were also part of public sustainability-themed events. At the January 2016 launch of the EcoBank initiative, a collection drive and charity sale of second-hand goods, Senior Minister of State for Environment and Water Resources and Health Dr. Amy Khor mentioned Singapore's swelling waste generation problem. "If we continue at this rate, Semakau Landfill will run out of space by 2035," she said.[73] Schools such as the Anchor Green Primary School talked about the issue of the Semakau landfill filling up too quickly during assembly programmes aimed at encouraging students to think about waste generation and management.

2. **Resource Conservation.** The website of Veolia, one of the PWCs that carried out recycling collection and waste management, detailed how recycling reduced the resources consumed along the production line.

   > "Recycling means that used packaging can be returned into the manufacturing process to make new packaging or other materials. This means that the manufacturing plants reduce the amount of inputs they need to source from new sources — less trees cut down for cardboard and paper, less sand mined to make glass, less oil refined to make plastics and less ore processed to make metals. It also means less energy is needed to

[69] Chew, *50 Years of Environment*, 204.

[70] "Managing Our Waste: Recycling", Ministry of the Environment and Water Resources, accessed July 5, 2016, `http://www.mewr.gov.sg/topic/recycling`.

[71] Ministry of the Environment and Water Resources and Ministry of National Development, "Sustainable Singapore Blueprint 2015," 10.

[72] National Environment Agency, "Guidebook on Setting Up Structured Waste Recycling Programme," 1.

[73] Kok Xing Hui, "Charity sale of used items aims to promote recycling," *The Straits Times*, January 17, 2016, `www.straitstimes.com/singapore/charity-sale-of-used-items-aims-to-promote-recycling`.

extract and refine new materials ready for manufacturing."[74]

> The NEA's webpage listed "Conserve limited resources" in their list titled "Why practise the 3Rs", alongside "Protect the environment", "Reduce space needed for waste disposal facilities", and "Extend the lifespan of Semakau Landfill".[75] The website also described how recycling e-waste meant less mining of raw materials.[76]
>
> Local schools also promoted the idea of resource conservation. For example, CHIJ St Nicholas Girls' School teacher Kuah Ee Qiang placed stickers on the school's canteen tables with reminders about how much forest fell victim to paper production and how human consumption levels were exceeding the earth's natural resource capacity.

Several other benefits of recycling featured occasionally, such as lower pollution and fewer threats to human health.[77] But for Teo, the prospect of the Semakau landfill reaching its full capacity prematurely was top priority. "That is really the main driver that keeps us going," he said. "We have no choice."

Encouragement to look after the environment more broadly than just recycling had also appealed to a sense of national pride. At the launch of the 1968 Keep Singapore Clean campaign, then Prime Minister Lee Kuan Yew stressed the importance of making Singapore "the cleanest and greenest city in South Asia":[78]

> "For, only a people with high social and educational standards can maintain a clean and green city. It requires organisation to keep the community cleaned and trimmed particularly when the population has a density of 8,500 persons per square mile. And it requires a people conscious of their responsibilities, not just to their own families, but also to their neighbours and all others in the community who will be affected by their thoughtless anti-social behaviour. Only a people proud of their community performance, feeling for the well-being of their fellow citizens, can keep up high personal and public standards of hygiene".

[79]

Lee Kuan Yew had stressed the importance of ensuring that Singapore was an attractive place to tourists and investors because of its greenery[80] and indeed actively encouraged competition between the region's countries to be the most environmentally friendly place in Asia.[81] Meanwhile, the Sustainable Singapore Blueprint 2015 described Singapore's strategy for maintaining Singapore's status as "a model liveable and sustainable city".[82] The focus on national pride

[74] "Recycling @ Home," Veolia Environmental Services Singapore Private Limited, accessed July 5, 2016, `http://www.veolia.com.sg/our-services/residents/recycling-home`.

[75] "Waste Minimisation and Recycling."

[76] "E-Waste Recycling," National Environment Agency, accessed July 5, 2016, `http://www.nea.gov.sg/energy-waste/3rs/e-waste-lamp-battery-recycling/e-waste-recycling`.

[77] "E-Waste Recycling."

[78] Lee, "Speech by the Prime Minister Inaugurating the "Keep Singapore Clean" Campaign."

[79] Lee, "Speech by the Prime Minister Inaugurating the "Keep Singapore Clean" Campaign."

[80] Lee, *From Third World to First*, 174.

[81] Ibid., 177.

[82] Ministry of the Environment and Water Resources and Ministry of National Development, "Sustainable Singapore Blueprint 2015," 10.

and image was not specific to recycling so much as a narrative that appeared in more general discussions of environmental action in Singapore.

Singapore's strategy for encouraging community participation in recycling had a number of distinctive traits. First, underlying many of the reasons put forth as motivation for people to recycle was a pragmatic outlook that took stock of available resources and immediate goals. Recycle, because Singapore's land is precious and the country has little space for incineration plants and landfills; recycle, because otherwise there will be no more resources for us to use. *Channel News Asia* described initiatives such as Cash for Trash as "appealing to people's pragmatism".[83] A grounding in practical reality was not unique to recycling, of course — many viewed pragmatism as having been a fundamental presence in Singapore's public policy throughout the country's history, and one of the country's most widely-circulated newspapers, The Straits Times,[84] had called pragmatism a "trustworthy compass". [85] Indeed, previous campaigns for environmental awareness had a distinctly pragmatic flavour to them. In his opening speech at the launch of the 1968 Keep Singapore Clean campaign, then Prime Minister Lee Kuan Yew said that cleaner surroundings would beget strong economic growth, for example.[86]

Second, the country's approach to recycling fell predominantly (though not entirely) in line with what the scholar Patrick Curry called a "light green" ethic, one in which environment-related behaviours mostly considered the value of nature to humans[87] — for instance, conserving resources that were useful to humans, or preserving green and blue spaces that would help humans enjoy beautiful surroundings (as opposed to "mid-green ethics", which posited that non-human animals had moral agency and so were entitled to protection whether or not humans needed them,[88]; or "dark green ethics", which required that human *and* nonhuman nature — not just animals, but also seabeds, mountains, and forests — be afforded protection because of their intrinsic value, with nonhuman naure sometimes even receiving support at the expense of human interests[89]). A "light green" ethic was evident in many of the stated goals of recycling as well as in broader communications about the environment, such as the Singapore Green Plan's stated objective: "...to ensure that Singapore, through sound environmental management, achieves economic development that meets the needs of the present generation without compromising the needs of future generations."[90]

Citizen attitudes towards recycling reflected some of the principles put forth in the public communications. A 2013 MEWR study reported that participants in the study's focus groups raised the practicalities of Singapore's landfills as a reason to recycle.[91] Focus group participants also believed that recycling was

[83]Linette Lim, "Why is Singapore's household recycling rate stagnant?", *Channel News Asia*, June 27, 2016, `http://www.channelnewsasia.com/news/singapore/why-is-singapore-s/2898850.html`.

[84]Singapore Press Holdings, 2015 Annual Report, August 2015, `http://www.sph.com.sg/system/misc/annualreport/2015/SPH_AR2015_DailyAverageNewspaperCirculation.pdf`.

[85]Editorial, "Keep pragmatism as guiding principle," *The Straits Times*, March 30, 2015, `http://www.straitstimes.com/opinion/keep-pragmatism-as-guiding-principle`.

[86]Lee, "Speech by the Prime Minister Inaugurating the "Keep Singapore Clean" Campaign."

[87]Patrick Curry, *Ecological Ethics* (Cambridge: Polity Press, 2011), 61.

[88]Ibid., 72.

[89]Ibid., 92.

[90]Chew, "Singapore Green Plan."

[91]Ministry of the Environment and Water Resources, "Household Recycling Study," Jan-

"an act that was inherently 'good"'.[92] Meanwhile, the majority (64.2 percent) of the study's survey respondents said they had started recycling to "do [their] part to save the environment".[93] It was unclear to what most respondents were specifically referring with the term "save the environment". Other oft-cited reasons included "I believe it is the right thing to do" (38.6 percent) and "It is more convenient than throwing my rubbish away" (12.3 percent),[94] but it was similarly unclear *why* respondents believed recycling was morally right.

But the 2013 MEWR research report suggested that the public may not have viewed public communications about recycling as particularly effective because of a lack of a cohesive "why" message. "While participants were supportive of current promotional efforts, most said that the recycling messages lacked impact as there was no clear call-to-action and that there was little communication of the consequences of not recycling...In other words, participants felt that the reason of why they should recycle had not been communicated effectively in current recycling messages," according to the study. [95]

5 No Easy Feat

The NEA had made the 3R message a mainstay in the official national vision for environmental sustainability, ensuring the message was present in public housing and other public places as well as in the education system. Still, the general public was not recycling very much. In 2015, the nation had a 19 percent domestic recycling rate, just over half the 2030 target of 30 percent.[96]

"A quick straw poll among my friends found that more than half of them do not reuse or recycle anything apart from newspapers," Jessica Cheam, editor of the online publication Eco-Business, wrote in *The Straits Times*.[97]

Even when recycling did happen, it wasn't always done correctly. A 2015 condominium resident's letter to *The Straits Times* described how the letter-writer saw rubbish, including diapers and food, in her condominium's recycling bins. "Many Singaporeans, including some youngsters I spoke to, either are not aware of how to recycle or just do not care," she wrote.[98] In 2016, the NEA told *The Straits Times* that contamination rendered up to half of HDB recycling bin contents unusable.[99] The contamination of recyclables created even more resource waste than if nothing had been recycled at all. "First, you are bringing in waste into a recycling plant, which should not be the case, and this waste will have to be reloaded onto a truck and sent to the incineration plant," Sembcorp Environment senior vice-president of asset management Lim Chin Kuang told

---

uary, 2013, `http://www.mewr.gov.sg/docs/default-source/default-document-library/grab-our-research/mewr_rc_report.pdf`, 22.

[92] Ibid.

[93] Ibid., 12.

[94] Ibid.

[95] Ibid., 24

[96] Audrey Tan, "askST: Does waste in recycling bins actually get recycled?"

[97] Jessica Cheam, "Aiming for a zero-waste Singapore," *The Straits Times*, June 17, 2016, `http://www.straitstimes.com/opinion/aiming-for-a-zero-waste-singapore`.

[98] Shamim Moledina, "Not many people care enough to recycle," *The Straits Times*, July 29, 2015, `http://www.straitstimes.com/forum/letters-on-the-web/not-many-people-care-enough-to-recycle`.

[99] Samantha Boh, "Food waste raises a stink for recycling," *The Straits Times*, May 20, 2016, `http://www.straitstimes.com/singapore/food-waste-raises-a-stink-for-recycling`.

The Straits Times.[100]

The NEA faced great challenges with providing enough of a reward to households for recycling through the common recycling bin provided for each block of flats. Teo explained that the average public housing monthly refuse collection fee was rather low at $7.00. Of this, about 65 percent ($4.55) of that amount went towards the gate fee of the WTE plant. Reducing trash quantities via recycling in the average household would translate to lower costs which could potentially be passed back to the households, but costs would only decrease to a minimum of $4.55 — and households were unlikely to be able to reuse or recycle 100 percent of their trash. Furthermore, all recyclables were deposited into a common recycling bin, which meant that those who recycled more than others would still receive the same amount of cash back from the lowered costs as everyone else.

The Cash for Trash system, which rewarded residents in proportion to the amount they recycle, had made some headway. But while Cash for Trash was one of the better-performing incentive systems for recycling, the cash incentives were still small. For example, an individual would have to collect approximately 67 drink cans to make the $0.50 that the PWC Veolia offered for 1 kilogramme of aluminium drink cans,[101] assuming a can weight of 15 grams.[102]

These rewards could hardly compete for attention in a country that reported some of the longest working hours in the world.[103][104][105] Many Singaporean households found it time-consuming to segregate their recyclables, Teo said. In a society that former NEA Waste & Resource Management Department director Ong Seng Eng described as having "high standards and expectations and [demanding] efficient and convenient services",[106] convenience was crucial. The NEA had made many efforts in this regard, such as increasing the provision of recycling bins in HDB estates to ensure no one had to walk very far to dispose of their recyclables.[107] But focus group participants in a 2013 MEWR study still raised the issue of a lack convenience for recycling:

> "Some participants said that recycling bins were hard to locate or inconveniently located. There was also feedback from participants about how some recycling bins tended to "change locations". This, they said, made recycling more difficult as they had to carry their

[100] Ibid.

[101] "Cash-For-Trash Programme."

[102] "How much does an average aluminium can weigh today?", Australian Aluminium Council Ltd, accessed July 5, 2016, `http://aluminium.org.au/FAQRetrieve.aspx?ID=45688`.

[103] Dickson Li, "Survey finds that workers in Singapore put in longest hours," *The China Post*, January 12, 2010, `http://www.chinapost.com.tw/business/asia/singapore/2010/01/12/240437/Survey-finds.htm`.

[104] Jarryl Goh, "Singapore workers put in long hours," *The Straits Times*, July 19, 2015, `http://www.straitstimes.com/forum/letters-on-the-web/singapore-workers-put-in-long-hours`.

[105] admin, "Singapore maintains its no 1 ranking in longest working hours in the world", *States Times Review*, June 16, 2015, `http://statestimesreview.com/2015/06/16/singapore-maintains-its-no-1-ranking-in-longest-working-hours-in-the-world/`.

[106] Jessica Cheam, *Forging a Greener Tomorrow: Singapore's environmental journey from slum to eco-city* (Singapore: Straits Times Press, 2012), Ministry of the Environment and Water Resources, `https://www.mewr.gov.sg/docs/default-source/default-document-library/grab-our-research/forging-a-greener-tomorrow.pdf`, 182.

[107] Ibid.

recyclables around in search of the bins."[108]

Industry recycling fared far better than domestic recycling. Industrial recyclables tended to be more homogenous than domestic recyclables, so they required less sorting and commanded higher sale prices, Teo said. Construction debris, for example, had a 99 percent recycling rate.[109]

It didn't help that the existing domestic waste disposal process was immensely efficient on many counts. For consumers, dealing with waste was as simple as throwing it down the rubbish chute right within their own homes, after which they would never have to see it again — and could even feel at ease with the knowledge that most of their trash would "disappear" via incineration."Out of sight, out of mind," Cheam wrote in *The Straits Times*.[110] Meanwhile, for the waste managers, the WTE plants helpfully created a 90 percent reduction in trash volume and even generated electricity, which the NEA could then sell to recover the costs of incineration.[111] The NEA even dealt with negative externalities from incineration, using equipment to remove pollutants from the gas that resulted from the incineration process.[112] And the landfills, though they would fill up eventually with trash that could not be incinerated, lasted a long time.

"We are in some ways a victim of our own success," former MEWR Deputy Secretary Rosa Daniel said. Former MEWR Permanent Secretary Tan Yong Soon and former City Developments Limited Deputy Chairman Kwek Leng Joo (deceased at the time of writing) had said something similar. "Perhaps Singaporeans do not see much practical benefit in recycling, paradoxically because of the country's success in resource conservation and waste management," they wrote.[113] For land- and manpower-scarce Singapore, there was no existing solution to waste management that could top incineration for efficiency — including recycling. Much of the processing work for recycling involved manual labour that might not be easy to come by in Singapore, not to mention the manual labour that individuals had to do to sort their trash at home. Also, contamination of recyclables reduced the quality of recycled outputs such as recycled plastic. Indeed, others had argued that the usefulness of recycling was questionable. A 1996 *New York Times Magazine* article had detailed John Tierney's opinion that recycling had become a "rite of atonement for the sin of excess" that was not as effective as many believed:

> "A ceramic mug may seem a more virtuous choice than a cup made of polystyrene, the foam banned by ecologically conscious local governments. But it takes much more energy to manufacture the mug, and then each washing consumes more energy (not to mention water). According to calculations by Martin Hocking, a chemist at the University of Victoria in British Columbia, you would have to use the mug 1,000 times before its energy-consumption-per-use is equal

[108] Ministry of the Environment and Water Resources, "Household Recycling Study", 23.
[109] "Waste Statistics and Overall Recycling."
[110] Cheam, "Aiming for a zero-waste Singapore."
[111] "Solid Waste Management Infrastructure."
[112] "Waste-to-energy (WTE) / Incineration Plants."
[113] Tan Yong Soon and Kwek Leng Joo, "Environmental Sustainability and Sustainable Development," in *50 Years of Environment*, 256.

to the cup. (If the mug breaks after your 900th coffee, you would have been better off using 900 polystyrene cups.)"[114]

The rewards of recycling that the NEA promoted, like resource conservation or a longer life for the Semakau landfill, did not seem enough to convince many to recycle rather than throw their waste away. The idea of a landfill reaching its full capacity was perhaps too remote to create a sense of urgency that could galvanize action, Teo said. Participants in the 2013 MEWR report also mentioned the reality that the general public did not encounter the effects of poor environmental habits.[115] These effects were frequently projections set to occur far into the future, often when many of those being asked to practice environmental consciousness would no longer be alive.

There existed some calls for a more personal tone to environmental messaging.[116] But Teo was unsure that a less pragmatic recycling narrative that appealed to causes such as an appreciation of nature's intrinsic value and beauty, or an ethical imperative to preserve the diversity of life that existed on Earth, would work. There was no simple way to package such a message, he said.

Daniel pointed out that communicating the message of recycling was challenging. "The reality on the ground is, Singapore is made up of different sectors," she said. Appealing to a "higher" sense of responsibility such as a bond with nature may resonate with the younger generation, but such an approach could be less effective for connecting with the pragmatic among the older generation who were more used to prioritizing basic needs. And even if a more emotional take on recycling significantly incentivized the younger generation to recycle, would that be enough? "Whether we can achieve the scale to make a difference, I don't know," Daniel said.

Also, even the most emotive messages could quickly be forgotten in the throes of hectic city life — not to mention the need to coordinate the numerous other messages from other government agencies. Adding to the many messages that competed for attention with that of recycling was the encouragement to consume more — a message in opposition with that of 3R, which called for the public to "use only what you need" and "re-use things for the same or new purpose".[117] Shopping malls were ubiquitous in Singapore, as was encouragement to buy more material goods.[118] Consumer demand was a huge part of the nation's growth. Retail was a key provider of employment and was "the second-biggest contributor by industry to the nation's gross domestic product" along with wholesale trade, according to *The Straits Times* in June 2016,[119] and Singapore was one of the world's top cities for international retail brand presence.[120]

[114] John Tierney, "Recycling Is Garbage," *New York Times*, June 30, 1996, `http/06/30://www.nytimes.com/1996/magazine/recycling-is-garbage.html?pagewanted=8&pagewanted=all`.

[115] Ministry of the Environment and Water Resources, "Household Recycling Study," 22.

[116] Ibid., 24.

[117] "Waste Minimisation and Recycling."

[118] For example, see Alyssa Woo, "Good buys at the Great Singapore Sale, *The Straits Times*, June 9, 2016, `http://www.straitstimes.com/lifestyle/fashion/good-buys-at-the-great-singapore-sale`.

[119] The Sunday Times, "Offer shoppers great Singapore experience," *The Straits Times*, June 12, 2016, `http://www.straitstimes.com/opinion/st-editorial/offer-shoppers-great-singapore-experience`.

[120] "Retail," SPRING Singapore, accessed July 6, 2016, `http://www.spring.gov.sg/`

Daniel also pointed out that it was a challenge to ask a country that had so recently become affluent to reduce consumption. "Whether or not [the 3R] slogan has any traction or meaning depends on the state of development of an economy or society," she said. "One that is newly rich is difficult — the previous generations have made sacrifices, and now the current generation enjoys a higher standard of living where consumption levels would increase and correspondingly wastage levels."

Further, both Teo and former Ministry of Environment Permanent Secretary Lam Chuan Leong noted that goods were generally no longer built to last. The strategy of "planned obsolescence", which *The Economist* defined as "a business strategy in which the obsolescence (the process of becoming obsolete — that is, unfashionable or no longer usable) of a product is planned and built into it from its conception...so that in future the consumer feels a need to purchase new products and services that the manufacturer brings out as replacements for the old ones"[121] was thriving. A column in *The Guardian* described planned obsolescence practices such as the production of laptops with average lifespans of three to four years as "standard practice".[122] The fashion industry, which operated on the premise of constantly evolving trends, had little incentive to make clothes for the long haul.

These practices were not entirely producer-driven. "The manufacturers are responding to consumers," Lam said, noting that the disposable nature of many goods meant consumers could enjoy them at low prices. Also, planned obsolescence was actually a pragmatic approach to retail in some cases — children's clothes, for example, typically could not be useful for long because of children's rapid growth.[123] And the mass marketing of products previously only available in more expensive markets such as car air bags had obvious positive consequences.[124] The writer Giles Slade told the *BBC*: "There's no doubt about it, more people have had a better quality of life as a result of our consumer model than at any other time in history. Unfortunately, it's also responsible for global warming and toxic waste."[125]

Despite the presence of planned obsolescence, a culture of reusing — distinct from recycling — did exist to some extent in Singapore. Websites such as Carousell, an online marketplace in which users could sell their unwanted used or new items, were growing rapidly.[126] Such websites incentivised the practice of reusing because users could receive compensation for used items, though the environment-conscious aspect of reusing was not a significant part of Carousell. *Karang guni* workers also still engaged in their trade. Tensions arose between *karang gunis* and more formal recycling programmes, however[127]

`Developing-Industries/RT/Pages/retail.aspx`.

[121] Tim Hindle, "Planned obsolescence," *The Economist* (online extra), March 23, 2009, `http://www.economist.com/node/13354332`.

[122] Rosie Spinks, "We're all losers to a gadget industry built on planned obsolescence," *TheGuardian.com*, March 23, 2015, `http://www.theguardian.com/sustainable-business/2015/mar/23/were-are-all-losers-to-gadget-industry-built-on-planned-obsolescence`.

[123] Adam Hadhazy, "Here's the truth about the 'planned obsolescence' of tech," *BBC.com*, June 12, 2016, `http://www.bbc.com/future/story/20160612-heres-the-truth-about-the-planned-obsolescence-of-tech`.

[124] Ibid.

[125] Ibid.

[126] Angela Teng, "Carousell raises another S$47m to broaden horizons", *TODAYonline*, August 2, 2016, `http://www.todayonline.com/business/carousell-raises-another`.

[127] Low Zhang Quan, "Blood shed over bag of old newspapers," *AsiaOne*, February 11, 2013,

Meanwhile, some Singaporeans also saw disposables as necessary amenities in their busy lives. Disposable takeway containers were prominent lunchtime fixtures, for example. "Our observations and our peers tell us that although people believe saving the environment is important, they feel they have no choice but to use disposables in unavoidable situations such as rushing for lessons or going for project meetings," said Elaine Sam Hui Xian, President of The National University of Singapore Students Against Violation of the Earth (SAVE) 23rd Management Committee.[128]

Many placed hope for environmental consciousness and action in the young. This included the NEA, which collaborated with schools to create initiatives aimed at fostering environmental responsibility in the younger generation (see Spreading the Word). Schools faced their own hurdles, however, in creating a bona fide culture of environmental awareness — one in which, in the words of WWF Education Manager Chitra Venkatesh, "everything you do, you think about sustainability, whether it's environmentally friendly." Recycling initiatives were among the most common "green" activities that teachers introduced in schools. But similar to the participants in the 2013 MEWR study, teachers said they felt that students were not necessarily taking from their education a good understanding of why recycling was important, and seemed to just be going through the motions, according to Venkatesh. Reducing the number of short-lived recycling initiatives — campaigns in which students competed to see who could bring in the most newspapers for recycling in one week were an example — in favour of ones that spanned a longer period might help to make recycling more meaningful to students, Venkatesh suggested.

"It happens for this one week," Venkatesh said of the short-term projects. "It's not a lifestyle change."

Venkatesh explained that having a large supply of environment-related awards for schools to strive for could take the focus away from the process of environmental action, concentrating it instead on the end product. In the same vein, Teo noted that a pragmatic and results-oriented culture made implementing environmental initiatives in schools difficult, especially since environmental education was not an examined subject. Teachers had so much to do already. "They have their own KPIs and things they need to meet curriculum-wise," Venkatesh said. Singapore Environment Council Environmental Outreach Executive Esther Wee explained that teachers had provided feedback to the SEC that time and resource constraints limited their ability to participate in too many environment projects, though there were many projects that interested them.

Meanwhile, Singapore Environment Council Environmental Outreach Manager Siti Farhana Mahadi said that while students were usually enthusiastic about environmental programs, it was not necessarily easy to ensure that they retained and applied what they learned. "Sometimes it goes in one ear and doesn't translate to anything beyond that," she explained.

Similar to the situation outside of schools, a significant challenge in encour-

---

`http://news.asiaone.com/News/Latest+News/Singapore/Story/A1Story20130208-401081.html`.

[128]Elaine Sam Hui Xian, "Awareness of plastic waste is insufficient to bring change", *TODAYonline*, March 31, 2016, `http://www.todayonline.com/voices/awareness-plastic-waste-insufficient-bring-change?cx_tag=rec4u&cid=tg:recos:rec4u:standard#cxrecs_s`.

aging recycling in schools was ensuring that both staff and students knew how to recycle correctly, Wee said. NEA Environmental Engineer Leanne Lim said that some of the gaps in knowing what could and could not be recycled were a result of confusion about the role of recycling bins and the 3R message. Intentions were good, if misguided. "There are some people who mistake 'recycle' for 'reuse'," she said, of those who placed non-recyclable, but still usable, items such as pillows into the recycling bins. Such people mistook PWCs for something like the "Salvation Army", Teo said, and hoped to find a needier home for their used items.

6 Going Forward

It had been many years since the launch of the National Recycling Programme. Despite the hurdles, Teo said he felt that many Singaporeans were at least aware of recycling as a practice. "The awareness is very high," Teo said. "The practice part is the issue."

The NEA was working on further public communications about recycling, Lim said, such as fridge magnets with pictures that would demonstrate what was and was not recyclable. Senior Minister of State for the MEWR and the Ministry of Health Dr Amy Khor also told Parliament in April 2016 that public education initiatives would continue.[129] For Teo, Cash for Trash was one of the more promising options for promoting recycling, though he was unsure to what extent the initiative would lead to large-scale recycling.

For Waterways Watch Society founder and chairman Eugene Heng, education was a key facet of encouraging the public to recycle. "Education is a slow process — if people are not aware of the benefits of recycling, there is no incentive for them to do so," he told *The Straits Times*.[130] Venkatesh said that the most successful school programmes in her experience had been the ones in which students had autonomy over how and why they were carrying out a given project, rather than explicit instructions.

Singapore Environment Council Environmental Outreach Senior Executive Sharmine Tan said that having individuals watch videos about trash causing the death of marine animals had seemed to have an impact. Attendees to these viewings seemed to gain a greater determination and sense of purpose to separate their recyclables and bin correctly after watching the videos. "I can see a difference in the expressions of the attendees," she said.

Meanwhile, Daniel said she felt that the NEA's recycling messages had been appealing to Singaporeans' sense of environmental responsibility and positioning recycling as the correct, ethical thing to do. But there was perhaps a limit to which the government could change the public's environmental behaviour. "This is an area where there is only so much public messaging can do," she said.

To Daniel, big shifts in recycling behaviour were likely to come from fully addressing the logistical concerns of recycling — collection, segregation, and whether or not there were buyers in Singapore who could actually make good use of recycling outputs so that the outputs would not need to be shipped overseas. Also important was creating a great enough volume of recyclables such that the private sector had an economic incentive to process recyclable

[129] Lim, "Why is Singapore's household recycling rate stagnant?"
[130] Tan, "Domestic recycling rate dips to 19 per cent."

materials. If not, then the government could address the gap using means such as providing cash rewards for the desired behaviour, or enforce recycling rules. But then, Daniel said, recycling would have to be sufficiently cost-effective and environmentally impactful to justify such measures.

For now, legislation or other punitive deterrents related to recycling seemed mostly out of the question. Though Singapore's anti-littering laws, with the NEA issuing fines for littering offences,[131] were well-known, recycling was different. Enforcement would be challenging in public housing flats as each block of flats shared one recycling bin.

Some recycling-related legislation had caught on in countries such as South Korea and Japan. South Korea's government had made it mandatory for residents to separate food waste and recyclables from general waste, with fines for non-compliance of "up to 1 million won"[132] (about $1,100 at the time of writing). Residents were also required to use designated bags to dispose of different kinds of waste.[133] Meanwhile, Japan's Home Appliance Recycling Law had incentivised the recycling of appliances among consumers, retailers, manufacturers and importers, the designated body Association for Electric Home Appliances, and municipalities since 2001.[134] In *The Guardian*, writer Leon Kaye wrote:

> "Consumers must pay a recycling fee when they drop off their used appliances at either a retail outlet or collection centre...Recycling fees, which are supposed to cover the costs of collecting, transporting and recycling the appliances, are eventually transferred to the manufacturers. Retailers continue their roles as the middleman as they are tasked with collecting and distributing unwanted machines to the appropriate recycling facilities."[135]

At the time of writing, condominiums in Singapore were required by law to provide recycling receptacles within their estate grounds. Consultations between the NEA, MEWR and private developers on the mandatory provision of recycling chutes in new developments showed that there were concerns about the chutes causing a loss of Gross Floor Area. Meanwhile, National University of Singapore Associate Professor Tong Yen Wah proposed targeting waste minimisation via a "pay-per-opening system for common central refuse chutes" similar to certain systems in Europe and the United States.[136] Under this system, individuals would either pay lower waste management costs or receive tax rebates if they reduced the number of times they opened their refuse chutes. Radio frequency identification tags would provide the data about refuse chute use. Tong acknowledged that the tags would come with high costs, however.[137]

[131]Samantha Boh, "Number of littering fines at 6-year high," *The Straits Times*, January 26, 2016, `http://www.straitstimes.com/singapore/courts-crime/number-of-littering-fines-at-6-year-high`.

[132]Chang May Choon, "Culture shock over South Korea's mandatory recycling of food waste," *The Straits Times*, April 23, 2016, `http://www.straitstimes.com/asia/east-asia/culture-shock-over-south-koreas-mandatory-recycling-of-food-waste`.

[133]Lucy Williamson, "South Korea's enthusiasm for recycling," emphBBC, June 9, 2011, `http://news.bbc.co.uk/2/hi/programmes/from_our_own_correspondent/9508181.stm`.

[134]"Home Appliance Recycling Law," Japan Ministry of Economy, Trade and Industry, accessed July 5, 2016, `http://www.meti.go.jp/policy/recycle/main/english/law/home.html`.

[135]Leon Kaye, "Japan's holistic approach to recycling," *TheGuardian.com*, January 17, 2012, `https://www.theguardian.com/sustainable-business/japan-recycling-waste-recovery`.

[136]Boh, "Sorting out the recycling blues of Singapore."

[137]Ibid.

Waste Management and Recycling Association of Singapore Secretary Juergen Militz told *The Straits Times* also advocated the use of sensors, suggesting that waste audits that helped determine the recycling rates of HDB estates would assist authorities in understanding each community on a more individual level — which communities were simply not recycling at all, and which ones were recycling but using poor recycling practices. He argued that this approach would additionally serve as social pressure to recycle. "Just knowing that someone is watching how much you throw or recycle makes you more mindful," he said, noting that the strategy had been effective in Venice and Florence in Italy.[138] Meanwhile, Tan saw potential in the commingle recycling bins available at all HDB blocks. Similar to Tong, she envisioned linking measurable recycling behaviour to some form of reward — for example, a simple mechanism to weigh the overall recycling mass, with "points" or supermarket credits awarded for specific masses.

"We are good at technological solutions for environmental problems," Singapore Environment Council Executive Director Edwin Seah said. He noted that technology could be useful for transferring much of the work involved in recycling to the back-end to avoid inconveniencing the public, such as a more automated system of sorting and cleaning recyclable items at collection points so that individuals would not need to sort and clean the recyclables themselves.

Daniel also did not see legislation as an option for encouraging recycling at this point in time. "This is not an area where Singaporeans will take kindly to legislation as yet," she said. "My sense is business will not react well for now, and certainly older Singaporeans will not. We are not ready yet." The public was unlikely to view the need to recycle as a sufficiently urgent one to warrant a strong legislative and enforcement approach, she explained.

[138] Boh, "Sorting out the recycling blues of Singapore."

7 Exhibits

1. **Exhibit 1:** The NEA's flyer on recycling at home. Source:"Recycling At Home," flyer, National Environment Agency, accessed July 5, 2016, http://www.nea.gov.sg/docs/default-source/energy-waste/recycling/recycling-at-home-flyer.pdf?sfvrsn=2.

2. **Exhibit 2:** The NEA's "3R" poster. Source:"3R," poster, National Environment Agency, accessed July 4, 2016, http://www.nea.gov.sg/docs/default-source/energy-waste/recycling/3r-poster.pdf?sfvrsn=2.

3. **Exhibit 3:** Key household income trends in Singapore. Source: "Infographics," Singapore Department of Statistics, accessed July 5, 2016, http://www.singstat.gov.sg/statistics/visualising-data/infographics.

RECYCLING AT HOME
家居中的再循环

WHY should we recycle? 为什么需要再循环?

- Conserve limited resources
- Save energy
- Reduce space needed for waste disposal facilities
- Protect the environment

- 节约善用有限资源
- 节省能源
- 减少废物处理设施所需要的空间
- 保护环境

WHAT can we put into the recycling bin?
什么物品可以放入再循环桶内?

Papers 纸类 | Plastics 塑料 | Metal Cans 金属罐 (包括铁罐、铝罐) | Glass Containers 玻璃容器 | Old Clothing 旧衣服

COMMON recyclables found at home
家居中一般可再循环物品

Papers 纸类

Plastics 塑料

Metal Cans 金属罐

Glass Containers 玻璃容器

HOW do we recycle? 如何再循环?

1. Put aside paper, plastics, metal, glass and old clothing for recycling instead of throwing them away.
1. 别将纸、塑料、金属、玻璃和旧衣服丢弃。请把它们放入再循环桶内。

2. Empty recyclable containers of any content. Rinse them if necessary.
2. 倒空瓶罐里的残余物。如有必要，将它们清洗干净。

3. Deposit your recyclables into the recycling bin. Leave nothing outside.
3. 将可再循环物品放入再循环桶内，别放置在桶外。

4. Do not put any food and liquid waste, tissue, ceramics, porcelain, light bulbs or batteries into the recycling bin. Do not leave furniture or bulky items beside the recycling bin.
4. 请勿把食物、饮料、纸巾、陶瓷器、灯泡或电池放入再循环桶内。别把家具或大件物品放置在再循环桶旁。

Brought to you by:

National Environment Agency
Safeguard · Nurture · Cherish

KITAR SEMULA DI RUMAH

வீட்டில் மறுபயனீட்டு செய்வது

MENGAPA kita harus mengitar semula?

எதற்காக நாம் மறுபயனீடு செய்ய வேண்டும்?

- Pelihara sumber yang terhad
- Jimat Tenaga
- Mengurangkan ruang yang diperlukan untuk kemudahan pelupusan sisa
- Lindungi alam sekitar

- அரிய வளங்களைப் பேணவும்
- எரிவாயுவைச் சேமிக்கவும்
- கழிவு அகற்றல் வசதிகள் தேவைப்படும் இடங்களைக் குறைக்கவும்
- சுற்றுப்புறத்தைப் பாதுகாக்கவும்

APAKAH yang boleh kita masukkan ke dalam tong kitar semula?

நாம் மறுபயனீட்டு குப்பைத்தொட்டிமில் எதையெல்லாம் போடலாம்?

Kertas காகிதங்கள் | Plastik பிளாஸ்டிக் பொருட்கள் | Tin தகரம் கேன் | Bekas Kaca கண்ணாடி கொள்கலன் | Pakaian lama துணிகள்

BARANGAN KITAR SEMULA

yang sering terdapat dalam rumah

வீட்டில் காணப்படும் மறுபயனீட்டு பொருட்கள்

Kertas
காகிதங்கள்

Plastik
பிளாஸ்டிக் பொருட்கள்

Tin
தகரம் கேன்

Bekas Kaca
கண்ணாடி கொள்கலன்

BAGAIMANAKAH kita mengitar semula?

நாம் எவ்வாறு மறுபயனீடு செய்வது?

1. Mengasingkan kertas, plastik, logam, kaca dan pakaian lama untuk kitar semula.

1. காகிதங்கள், பிளாஸ்டிக் பொருட்கள், உலோகம், கண்ணாடி மற்றும் பழைய துணிகளை தூக்கி எறிவதற்குப் பதிலாக மறுபயனீடு செய்ய ஒரு பக்கமாக வைத்திடலாம்.

2. Kosongkan bekas yang boleh dikitar semula. Bilas jika perlu.

2. மறுபயனீடு செய்யக்கூடிய கொள்கலன், பெட்டிகளில் உள்ளவற்றை காலி செய்துவிடவும். தேவைப்பட்டால் அப்புட்டிகளை தண்ணீரில் அலசவும்.

3. Buang bahan kitar semula anda ke dalam tong kitar semula. Jangan tinggalkan apa-apa di luar.

3. மறுபயனீடு செய்யக்கூடிய பொருட்களை மறுபயனீட்டு தொட்டிகளில் போடவும். எதையும் தொட்டிக்கு வெளியே போடாதீர்கள்.

4. Jangan masukkan sisa makanan dan cecair, tisu, seramik, porselin, mentol lampu atau bateri ke dalam tong kitar semula. Jangan tinggalkan perabot atau barang yang besar di sebelah tong kitar semula.

4. மறுபயனீட்டு தொட்டிகளில் எந்த உணவு மற்றும் திரவ கழிவு, திசு, பீங்கான், குமிழ்விளக்கு மற்றும் மின்கலங்கள் எறிய வேண்டாம். மறுபயனீட்டு தொட்டிகளுக்கு பக்கத்தில் பெரிய பொருட்களையோ, மேசை நாற்காலிப் போன்ற பொருட்களை வைக்காதீர்கள்.

Brought to you by:

National Environment Agency

Safeguard · Nurture · Cherish

3R

Reduce-Reuse-Recycle

Care For Our Environment

WHY PRACTISE THE 3Rs?

- Protect the environment
- Conserve limited resources
- Save energy
- Reduce space needed for waste disposal facilities

WHAT CAN BE RECYCLED?

PAPERS

GLASS CONTAINERS

METAL CANS

PLASTICS

STEPS TO RECYCLING

1. Put aside a bin at home/workplace/ school to collect paper, plastics, metal, glass for recycling.

2. Empty recyclable containers of content. Rinse them if necessary. Place them into the bin.

3. Deposit the recyclables into the recycling chutes or recycling bins. Leave nothing outside.

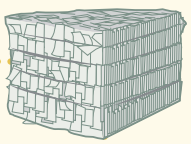
4. Do not put any food and liquid waste, tissue, ceramics, porcelain, light bulbs or batteries into the recycling bin. Do not leave furniture or bulky items beside the recycling bin.

WHAT HAPPENS AFTER COLLECTION?

Recyclables are deposited into the commingled recycling bin.

Collection by a recycling truck which goes to a Material Recovery Facility.

Mixed waste is sorted into paper, plastic, metal and glass at a Material Recovery Facility.



Each type of waste is packed into a bundle and sent to a recycling plant.

New products are made.

www.nea.gov.sg/3R

Printed on Recycled Paper

National Environment Agency

Safeguard · Nurture · Cherish

KEY HOUSEHOLD INCOME TRENDS 2015

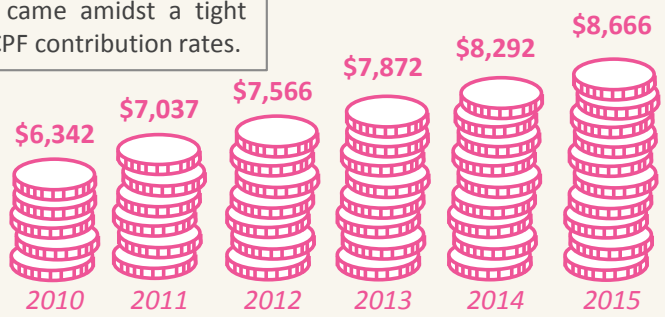
Among Resident Employed Households,

Median Monthly Household Income from Work

GREW

The rise in median household income in 2015 came amidst a tight labour market as well as an increase in employer CPF contribution rates.

	2015	From 2010 to 2015
… in ***nominal*** terms	4.5%	36.6% or 6.4% p.a.
… in ***real*** terms	4.9%	20.4% or 3.8% p.a.



Taking Household Size Into Account,

Median Monthly Household Income from Work Per Household Member

GREW

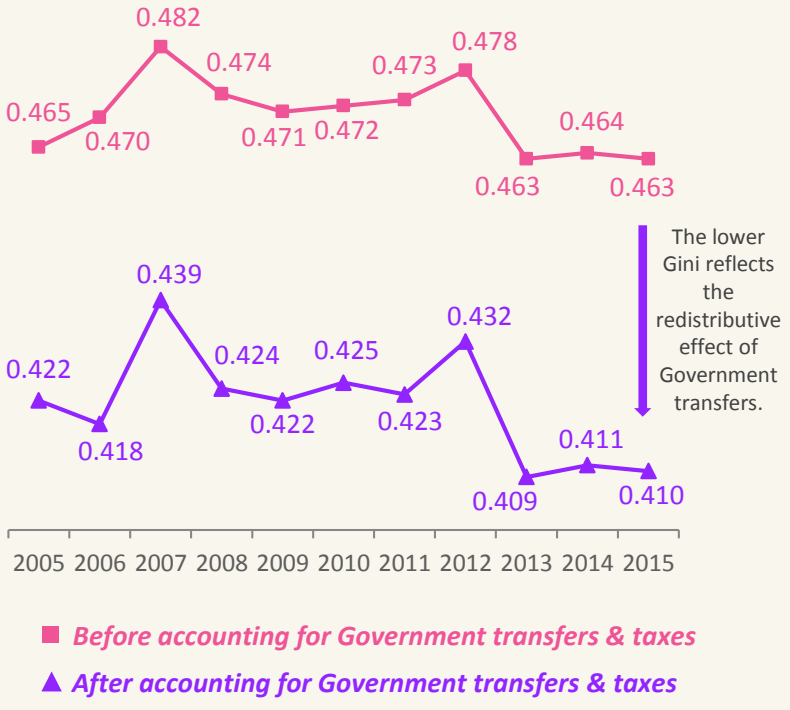
	2015	From 2010 to 2015
… in ***nominal*** terms	5.0%	35.3% or 6.2% p.a.
… in ***real*** terms	5.4%	19.2% or 3.6% p.a.

Real Growth in Average Household Income from Work Per Household Member for All Deciles*

Deciles*	2015	Cumulatively from 2010 to 2015
1st – 10th	10.7%	24.6%
11th – 20th	8.3%	23.6%
21st – 30th	7.2%	22.9%
31st – 40th	6.7%	22.0%
41st – 50th	5.9%	20.1%
51st – 60th	6.2%	19.4%
61st – 70th	6.3%	18.2%
71st – 80th	5.7%	16.5%
81st – 90th	5.8%	16.3%
91st – 100th	7.2%	17.7%

Income growth among the lowest 20% households is in part due to on-going initiatives to raise the wages of low-wage workers.

Gini Coefficient Remained Relatively Stable in 2015



* It is notable, for example, that some resident employed households in the lowest 10% owned a car (16.0%), employed a maid (7.8%), lived in private property (6.5%) or were headed by persons aged 60 years and over (39.9%) in 2015. It is important to recognise that not all households are consistently in the same decile group from one year to the next. For example, a household may move down from a higher decile in a particular year due to temporary unemployment of a household member, before moving up the deciles when the member resumes work in the subsequent year. In comparing the performance of any particular decile group over time, it is therefore relevant to note that they may not pertain to the same group of households.