Taking up space: waste and waste labor in developing South Korea

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Chapter 1. THE FORMATION OF WASTE MANAGEMENT IN SEOUL

This chapter examines Seoul's municipal solid waste management from the postwar period to the early 1990s, a time when the city was rapidly expanding and industrializing. I provide a historical overview of how Seoul managed its waste, tracing how a largely informal and labor-intensive practice evolved into a public service and a civic duty—a process that revolved around the institutionalization of waste management, the professionalization of disposal practice, and the domestication of household recycling.

The consolidation of municipal solid waste management entailed contested claims over understandings of waste, eligibility for waste work, and what constituted a modern waste management system. The transition from manual collection and open dumping to a more mechanized and automated process gradually detached waste from its handlers, removing the physical connection between material waste and its workers (sanitation workers or waste pickers). At the same time, the changing ontological status of waste - from a threat to the human environment to a resource - lifted stereotypes about handling waste and framed recycling as a civic duty to protect the environment as opposed to a subsistence activity of the urban poor. These changes to waste management redefined waste labor at the ground level: the work of separating recyclable materials from waste, which was stigmatized and primarily undertaken by waste pickers, was brought into the realm of everyday life. I argue that this shifting perception of waste and waste labor is what allowed the state to domesticate recycling practices.

This chapter relies on a range of archival materials: cleaning administration documents, waste management legislation, research reports on disposal methods, waste management systems, and environmental plans, as well as newspaper articles. Because different administrative authorities dealt with waste until the early 1980s, combining different kinds of sources—postwar welfare and social policy, urban land reclamation, the Oil Crisis and its attendant measures—helps to consider how the social, environmental, and administrative dimension of waste has been managed and emerged as an issue

in its own right during the second-half of the twentieth century. It starts with an overview of Seoul's urbanization and growing waste issues. It then moves on to waste generation patterns and collection processes, followed by waste disposal and recycling solutions that emerged in the 1970s and 1980s. Each strategy reveals different understandings of waste, reflecting the changes in the waste materials themselves, available technology for disposal and treatment, and what was perceived to be the most pressing concern in waste management.

URBANIZATION AND THE NEED TO MANAGE WASTE

Throughout twentieth century South Korea, the growth of cities, such as Seoul, introduced street cleaning and garbage collection as immediate urban problems. In early colonial Seoul, sanitary conditions, combined with rising population density, posed a direct health threat to the urban population due to dangers such as outbreaks of contagious or water-borne diseases. It was these public health concerns that propelled the pressing need to manage waste.[81]

The first organization that carried out sanitary reforms in early colonial Seoul was the Seoul Sanitation Association (SSA, Hansŏng wisaenghoe), established shortly after the 1907 cholera epidemic with an imperial donation from Crown Prince Yoshihito (1879–1926). The SSA carried out projects to improve the city's sanitary conditions and instill notions of public health and hygienic practice in the urban population. The SSA imposed sanitary regulations, with military-trained hygiene police inspecting the compliance of the colonized masses and intruding into the everyday lives of Koreans. It installed relevant infrastructure such as public toilets and sewage, organized waste collection and the disposal of human excrement, and campaigned and

[81] Cholera epidemic in the late 1880s and the early 1990s, combined with the introduction of Miasma Theory as its etiology, came to see waste as the cause of infectious diseases and a threat to the human environment. Pak Yun-jae [Yun-jae Park], "Wisaeng esŏ ch'ŏnggyŏl ro: Sŏul ŭi kŭndaejŏk punnyo ch'ŏri," *Yŏksa pip'yŏng* 126 (2019): 260-494.

inspected personal and household hygiene.[82] The SSA's new fee-based collection system interfered with existing collection systems and caused resistance - at times even refusal - from city dwellers.[83] However, lacking an adequate infrastructure or budget, and with inequitably distributed resources, the coercive, pseudo-military sanitary reform garnered little popular support."[84]

After the citywide municipal reorganization in 1914, the Metropolitan Government of Seoul (Keijo fucho) took over the sanitary responsibilities from the SSA. The city assumed responsibility for garbage collection and disposal, and the cleaning of streets and public lavatories. It directly hired excrement collectors, garbage collectors, and street cleaners either on temporary contracts or as day laborers.[85] The city's sanitary infrastructure required further improvement: there was a urgent need for additional public toilets and sewage systems, and for improved toilet facilities that did not contaminate the soil and groundwater. However, sanitary infrastructure was frequently neglected in favor of more essential urban needs such as road construction. Due to the lack of suitable disposal facilities, the collection system's labor-intensity, labor scarcity, and a growing population and its household waste, rubbish accumulated on the city's outskirts for 2-30 days.[86] While the city slightly

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[82] Ki Ch'ang-dŏk, "Chosŏnsidae mal kaemyŏnggi ŭi ŭiryo (1)," *Uĭsahak* 5, no. 2 (1995): 169-196; Todd Henry, "Sanitizing Empire: Japanese Articulations of Korean Otherness and the Construction of Early Colonial Seoul, 1905-1919," *The Journal of Asian Studies* 64, no. 3 (2005): 639-75; Yun-jae Park, "Sanitizing Korea: Anti-cholera Activities of the Police in Early Colonial Korea," *Seoul Journal of Korean Studies* 23, no. 2 (2010): 151-71; Chŏng Kŭn-sik, "Singminji wisaeng kyŏngch'al ŭi hyŏngsŏng kwa pyŏnhwa, kŭrigo yusan: singminji t'ongch'isŏng ŭi sigagesŏ," *Sahoewa yŏksa* 90 (2011): 221-270.

[83] Before the SSA, local excrement collectors used to gather human waste without charge and sold it as fertilizer. The SSA charged households a monthly fee for its operation. When these requirements were not met, Koreans were fined up to five yen or detained for up to ten days. Kim Sang-ŭn, "Chosŏn omul sojeryŏng silsi chŏnhu ŭi Kyŏngsŏng-bu ch'ŏngso haengjŏng ŭi kusŏng kwa unyŏng," *Tosi yŏn'gu* 21 (2019): 71-101.

[84] Sin Tong-wŏn, *Han'guk kŭndae pogŏn ŭiryosa* (Sŏul: Hanurak'ademi, 1997).

[85] This sanitary management took up as much as 50% of the city's finances in the 1910s. Sŏ Ho-ch'ŏl, "Sŏur ŭi ttong ojum sugŏ ch'egye ŭi hyŏngsŏng kwa pyŏnhwa: 1890-nyŏndae huban put'ŏ 1930-nyŏndae chŏnban kkaji," *Sŏulgwa yŏksa* 93 (2016): 198-200.

[86] Kim, "Kyŏngsŏng-bu," 91.

improved conditions by institutionalizing sanitary services (e.g., waste collection), it had little effect on the sanitary conditions of local people.

After liberation, the city was confronted with a surge of waste. Without much in the way of resources, the city assumed waste collection and disposal. Using 100 motorcars and 300 handcarts left from the colonial period, it collected 300,000 *kwan* of household waste per day.[87] During the U.S. Military administration (1945-1948) and the First Republic (1948-1960), the city requisitioned collection vehicles from the U.S. Army.[88] The city's meager resources were insufficient to dispose of its rubbish, leaving streets clogged with refuse.[89] The city's tangled urban layout hindered the circulation of waste vehicles. A modern waste management system had not yet been established and the city's makeshift collection equipment remained inadequate to deal with ever mounting waste generation.

The Korean War (25 June 1950 - 27 July 1953) further exacerbated the waste problem, reducing the city's capacity to nearly nothing.[90] As a result, in October 1953 shortly after the South Korean government returned to Seoul, the city was forced to mobilize military vehicles and private cars for waste collection. The city requisitioned approximately twenty motorcars from civilians, fifteen vehicles from the Korea Civil Assistance Command (KCAC), eighteen police vehicles, as well as 500 horse-drawn carts. These, however, were insufficient to collect the 1,500 truckloads of daily generated waste. Collection intervals were inconsistent and once-a-week pickup schedules were occasionally missed.[91] Throughout the postcolonial and postwar periods, cleanliness and hygiene - the public provision of cleaning services - became a measure of functional government. Their poor operations compelled the government

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[87] Sŏul T'ŭkpyŏlsisa p'yŏnch'an Wiwŏnhoe, *Sŏul 600-nyŏnsa che 6-kwŏn* (Sŏul: Sŏul T'ŭkpyŏlsisa p'yŏnch'an Wiwŏnhoe , 1996). 1 *Kwan* is 3.75 kilograms.

[88] "Chŏksan pulha kuch'ean mijinbo,"*Kyŏnghyang Sinmun*, August 21, 1947; "Kkaekkŭthaejinŭn Sŏul kŏri ch'ŏngso nŭn ku hal," *Kyŏnghyang Sinmun*, December 28, 1948;

[89] "Sŏul ŭi p'yojŏng (21) kiri makhil chigyŏngŭro," *Kyŏnghyang Sinmun*, November 6, 1946.

[90] "Unbanhal myoch'aek ŏmna iljuire han pŏnssik ch'irŭndadŏn ssŭregi," *Kyŏnghyang Sinmun*, August 13, 1949.

[91] "Sinae ch'ŏngso chagŏp min'gan 'ch'urŏk' ch'ongdongwŏn," *Tonga Ilbo*, October 5, 1953; Sŏul T'ŭkpyŏlsisa p'yŏnch'an wiwŏnhoe, *600-nyŏnsa*.

to prioritize the waste problem.

CONSOLIDATING WASTE MANAGEMENT: FROM FRAGMENTATION TO CENTRALIZATION

The establishment of the SSA and the need to institutionalize its activities led to the Dirt Removal Regulation legislation. This imposed duties on the city's residents such as installing dust bins, toilets with receptacles made of impermeable materials, and sewer ditches, but did not address the city's role. The public provision of waste collection was instated in the 1936 Dirt Cleaning Law (*Chosŏn omul sojeryŏng*), mandated shortly after the legislation of the City Planning Law (*Chosŏn sigaji kyehoengnyŏng*).[92] After liberation and the Korean War, the DCL continued to be the basis for the 1961 Dirt Cleaning Act (DCA, *omul ch'ŏngsobŏp*)[93] until the 1984 promulgation of the Waste Control Act.

Administering waste management for a half century, the limitations of the DCA began to become apparent. Under the DCA, the term "dirt" (omul) included human waste, dust and refuse, sludge, and wastewater.[94] The DCA also focused on "cleaning" in order to maintain a sanitary environment. Its duties included the collection and transport of waste to distant locations and moving waste "out of sight." However, waste had become increasingly complicated both in terms of its material characteristics and its types, which necessitated adequate disposal strategies that dealt this complexity, particularly toxicity. Additionally, the growing volume of waste necessitated new approaches to waste management such as reduction and recycling. Because the DCA only dealt with waste after it was generated, it was unable to accommodate the many changes to waste during the developmental period.

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[92] http://www.law.go.kr/법령/조선오물소제령/(00914,19611230);
http://www.law.go.kr/법령/조선시가지계획령/(00984,19620120)

[93] http://www.law.go.kr/법령/오물청소법/(00914,19611230)

[94] Governing the disposal of both sewage and waste under the same law, the DCA primarily considered public health and sanitation concerns. Due to the immediate pressure to construct a modern sewage system, building sewer system infrastructure preceded modernizing street cleaning, waste collection, or disposal methods.

Over the course of the 1960s and the 1970s, there were numerous amendments to the DCA. The amount of waste from households and industrial production was growing, and the disposal of toxic and hazardous materials was on the rise. In 1963, a year after establishing the first Five-Year Plan, the government mandated the Pollution Prevention Act (*Konghae pangjibŏp*, PPA), which addressed the regulation of industrial waste discharge; its enforcement decree, however, had to wait another four years.[95] In the 1973 amendment, the DCA introduced the term "waste" (*p'yegimul*) for the first time, but it included neither industrial waste nor different treatment requirements.[96] It was the 1977 Environmental Protection Law (*Hwan'gyŏng pojŏnbŏp*, EPL) that legislated the regulation of industrial waste, shifting the sanitation focus of the PPA in an environmental direction. As a result, waste management was split between the DCA (household waste) and the EPL (industrial waste).

[95] It also took four years before its administrative body, the pollution division within the Ministry of Health and Social Affairs (Pogŏn sahoebu, MHSA), was established.
http://www.law.go.kr/법령/공해방지법/(01436,19631105)

[96] Waste included refuse, ash, sludge, human excrement, and dead animals.

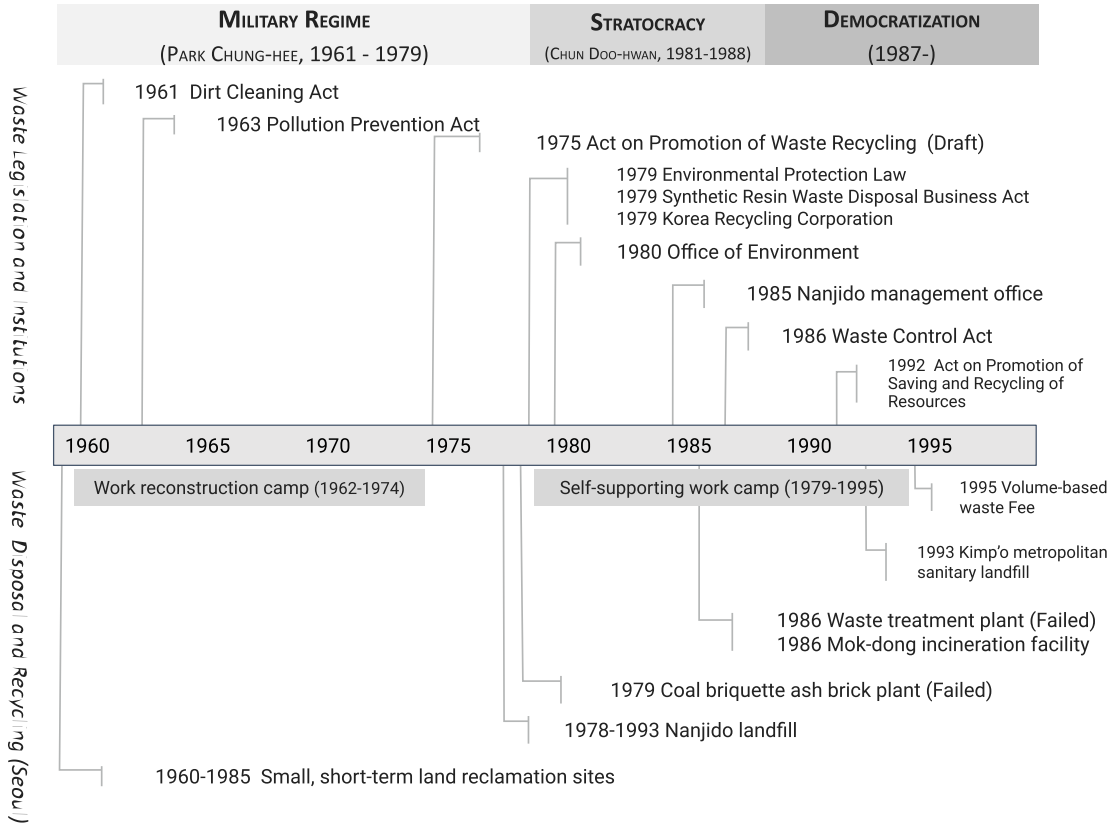

Figure 1-1 The development of waste legislation, institutions, and disposal methods

Parallel to the legislation of different types of waste, we also see an internal shift in the bureaucratic bodies that governed waste. The public provision of sanitation underwent a series of institutional reorganizations, illustrated in the proliferation of different administrative bodies engaged with waste: the Security Department of the Police (1953-1960), the sanitation department in the Bureau of Social Affairs (1960-), the Cleaning Bureau (1962-), the Sanitation Bureau, the city's cleaning department in the Environment Bureau (1973-), and the Office of Environment (*hwankyŏngch'ŏng*, OoE).[97] These shifts reflect how the perception of waste changed in each period: first it was a threat to public hygiene and sanitation, and later a source of pollution and environmental problems.

In the early 1980s, this legal and administrative fragmentation was

[97] Sŏul Taehakkyo hwan'gyŏng kyehoek yŏn'guso, *Tosi kohyŏng p'yegimul ŭi hyoyulchŏk kwalli e kwanhan yŏn'gu* (Sŏul: Sŏuldaehakkyo, 1983), 136-137.

integrated. The 1980 establishment of the OoE consolidated environmental issues under a unified public authority, including all issues of waste, reframing them as explicitly linked to environmental concerns. In 1986, the Waste Control Act (*p'yegimul kwallipŏp*, WCA), the first comprehensive law governing the management of waste, merged together all waste-related laws. Yet, at its inception, the WCA still maintained a sanitary focus, setting the goal of contributing to "the public health and environmental conservation." It also considered waste to be "something to be disposed of" rather than something to be prevented or reused. It was only in the 1990s that the city's focus expanded beyond sanitation and approached waste problems from a precautionary perspective, such as volume reduction and recycling.

WASTE GENERATION

In the 1950s and the 1960s, most municipal solid waste was little more than dust and refuse. From the 60s onward, the country's accelerated development led to the growth of South Korea's urban population and industry. The volume of waste continued to climb exponentially as the country's population growth, with Seoul in particular undergoing radical changes (See Figure 2-2).

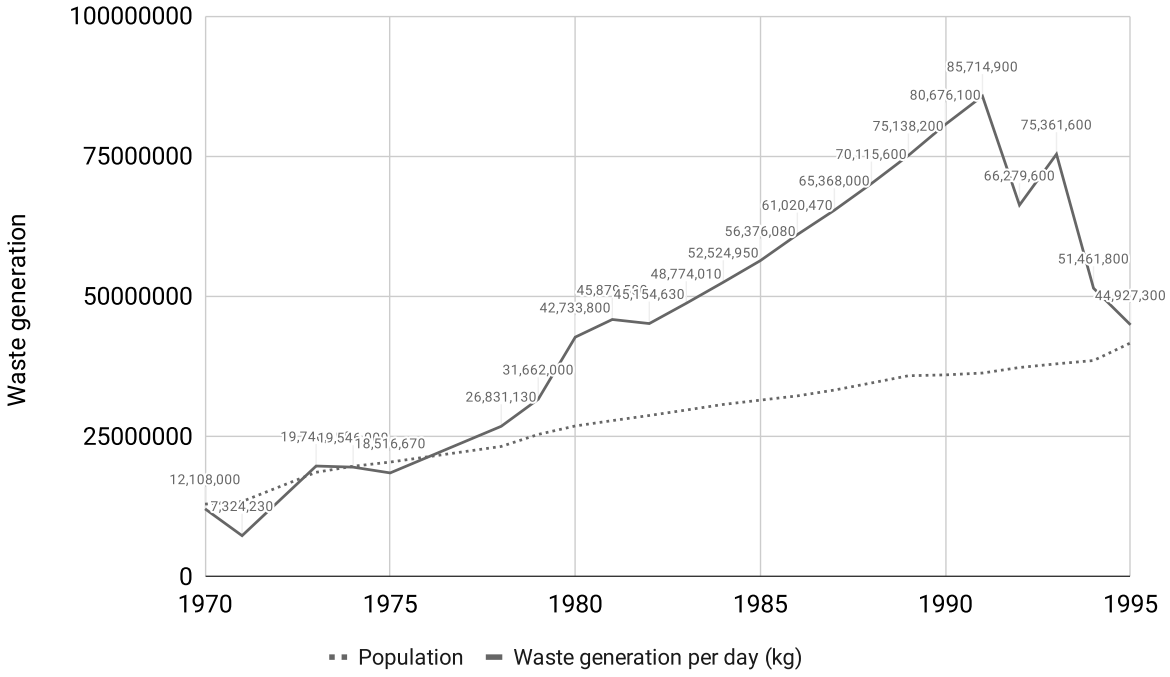

Figure 1-2 Population growth and daily municipal solid waste generation in South Korea
Source: Naemubu, Municipal Yearbook, 1970-1995.

Figure 1-2 shows waste generation until 1995,[98] indicating an incremental trend in which the year 1991 marked the peak amount of waste. Between 1965 and 1978, the waste generation rate rose by 10.7% per year, surpassing the 6.4% annual population growth rate during the same period.[99] In the 1970s, increasing production and consumption levels drove the growth in waste generation. First, the amount of waste was on the rise: throughout the 1970s, Seoul's per capita waste generation almost doubled from 1.36 kg in 1970 to 2.5 kg in 1980.[100] Second, the increasing availability of consumer products changed the composition of waste, in particular the proportion of combustible waste. Growing income disparity also affected this trend, with wealthier neighborhoods producing more burnable waste.[101]

[98] The declining trends after 1993 does not indicate a decrease in the total amount of waste generation. After the 1993 opening of Kimp'o sanitary landfill, household waste was separated at the source, and the waste generation statistics excluded the amount of recyclable materials. O Yong-sŏn, "Ssŭregi chongnyangchedo ŭi hwan'gyŏng kaesŏn hyogwa e kwanhan pip'anjŏk p'yŏngka," *Han'guk chŏngch'aek hakhoebo* 15, no. 2 (2006): 245-270.

[99] Sŏul T'ŭkpyŏlsi, Sŏul T'ŭkpyŏlsi ŭi chut'aek mit ssŭregi ch'ŏrimunje wa haegyŏl pangan e kwanhan yŏn'gu (Sŏul: Sŏul T'ŭkpyŏlsi, 1978).

[100] Sŏul T'ŭkpyŏlsi, *Sŏul-si p'yegimul ch'ŏri kibon kyehoek* (Sŏul: Sŏul T'ŭkpyŏlsi, 1988).

[101] An investigation in Seoul showed that 80% of waste generated in low-income neighborhoods was non-burnable, mostly ash, whereas approximately 70% of waste generated in high-income neighborhoods was burnable, mostly organic waste such as food scraps. Sŏul T'ŭkpyŏlsi, *Ssŭregi*, 287.

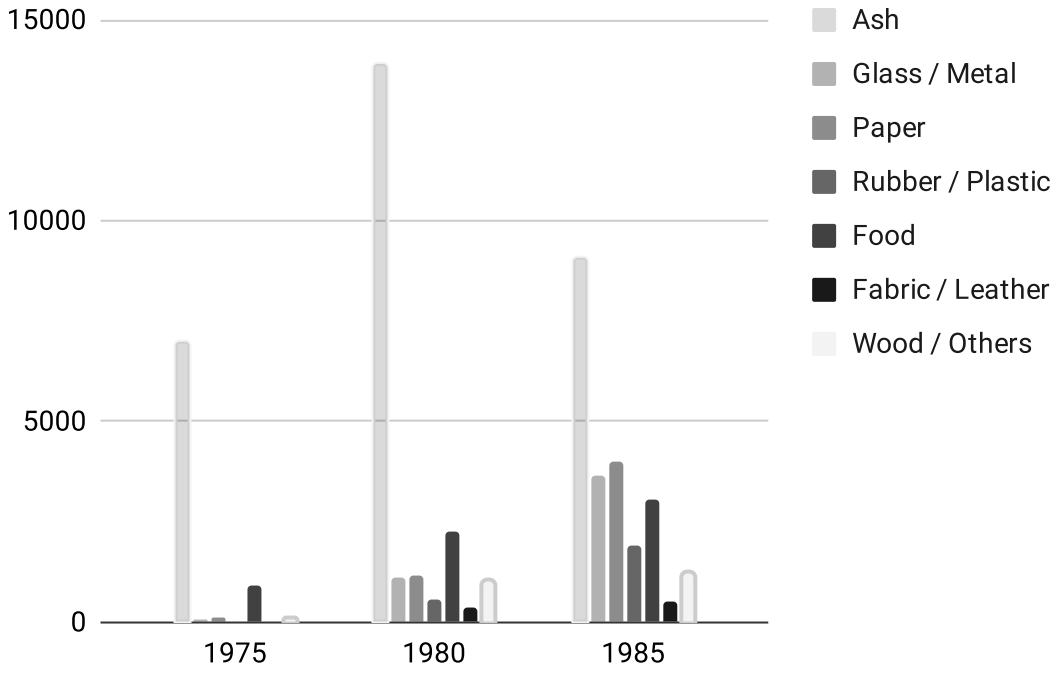

Figure 1-3 The composition of municipal solid waste in Seoul (Unit: ton)
Source: Sŏul T'ŭkpyŏlsi, Sŏul-si p'yegimul ch'ŏri kibon kyehoek (Sŏul: Sŏult'ŭkpyŏlsi, 1988).

Figure 1-3 shows the composition of Seoul's waste between 1975 and 1985. In the 1970s, coal briquette ash comprised 80% of household waste generation. Between 1975 and 1985, unburnable waste decreased from 86% to 54.36%, whereas burnable waste increased from 13.4% to 45.64%. The amount of burnable waste tripled, showing steep rises in paper, glass, and metal; plastics did not yet have its own category, taking up only small proportions. The change in household heating sources reduced the amount of ash, but the total volume of waste rose significantly, especially the increased proportion of burnable waste such as glass bottles, metal and aluminum cans, plastics, and vinyl. More and more waste was the result of the increased production and consumption of mass-produced goods.

In the 1970s, the city government's sanitation concerns focused on dust and refuse, especially coal ash and food waste. Seasonal variations exacerbated municipal waste collection challenges: kimchi making increased food waste in the winter, while coal briquettes piled up during the colder months, particularly in lower-income neighborhoods. Focusing on specific waste materials within the overall waste stream did not provide a long-term solution to the overall waste problem. As shown in Figure

1-3, waste's composition changed rapidly. Few could have predicted waste generation and composition patterns. Technological advances in the manufacturing sector did not necessarily lead bureaucrats or researchers to anticipate new influxes into the waste stream or alterations in the waste's material properties.

COLLECTION

In 1970s Seoul, waste-related problems were frequently included in the city's annual commitments, reflecting the severity of urban waste issues. Newspapers regularly reported on household waste remaining uncollected for more than a week, leading to waste mountains in the street.[102] In remote areas (*pyŏnduri*) or hilly sections of the city, where houses were stacked together along narrow alleyways, residents suffered from waste piled up in the street for weeks and sometimes even months.[103] Some areas of Seoul's outskirts were designated as no-collection areas and officially excluded from the city's waste management service.

Waste collection, which comprised the majority of the city's waste management efforts, largely relied on human labor.[104] The city's solid waste management cost breakdown shows that the largest proportion was spent on labor, which amounted to 69.8% of the budget in 1981, 65.3 % in 1982, and

[102] "An ch'yŏganŭn ssŭregi [Uncollected Waste]," *Tonga Ilbo*, October 29, 1966; "Sŏul ŭi kolmok ssŭregi sat'ae [Waste Crisis in Seoul's Alleyways]," *Kyŏnghyang Sinmun*, January 10, 1967.
[103] "Ssŭregi Sŏul [Garbage Seoul]," *Tonga Ilbo*, March 15, 1967; "Sŏul T'ŭkpyŏlsijang kwiha [Dear the Mayor of Seoul]" *Kyŏnghyang Sinmun*, October 12, 1968; "1973-yŏn sijŏng myŏngam (6) omure much'yŏ sanda ch'ŏngsonan [The Bright and Dark Side of Seoul's Administration in 1973, Part 6: Buried in Dirt - Cleaning Crisis], " *Tonga Ilbo*, December 22, 1973, June 6, 1974; "Tosiŭi wŏnsijŏk ssŭregi ch'ŏri [The City's Primitive Handling of Waste]," *Kyŏnghyang Sinmun*, March 16, 1976.
[104] Koryŏ taehakkyo kiŏp kyŏngyŏng yŏn'guso, Sŏul T'ŭkpyŏlsi ch'ŏngso haengjŏng ŭi unyŏng silt'ae punsŏk kwa kaesŏn e kwanhan kibon yŏn'gu (Sŏul: Sŏul T'ŭkpyŏlsi, 1975).

72.6% in 1983.[105] The number of municipal solid waste management workers in Seoul saw a threefold increase over two decades (from 4,471 in 1971 to 8,256 in 1980 and 13,006 in 1991), representing approximately 40 to 50 percent of the country's entire sanitation workforce. In contrast, little was spent to improve or invest in the waste processing infrastructure: 6.2% was spent on vehicle maintenance, 3.1% on equipment reinforcement, and 2.7% on facility reinforcement.[106]

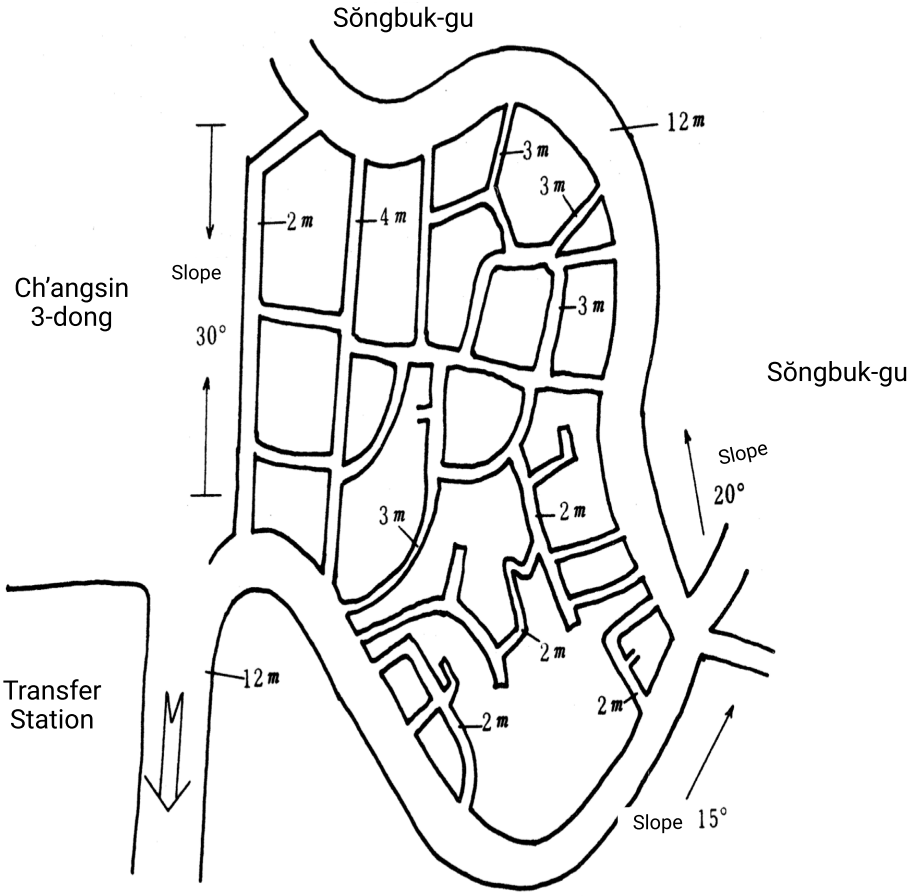

Figure 1-4 The Road Connection in Collection-Unfriendly Area: Ch'angsin 3-dong, Sŏngbuk-gu, Seoul

[105] Except for the years 1963-1964, Seoul's waste management remained a public service. Since 1979, the city has contracted out special collection areas, as well as apartment complexes, markets, or buildings, to private haulers. The city was left with the more inconvenient and labor-intensive areas. Sŏuldaehakkyo hwan'gyŏng kyehoek yŏn'gusoŏŏŏ, *Tosi kohyŏng p'yegimul*, 136-137; Kukt'o t'ongil yŏn'guwŏn, *Tosi kohyŏng p'yegimul ŭi hyoyulchŏk sugŏ pangan yŏn'gu* (Sŏul: Kukt'o t'ongil yŏn'guwŏn, 1983).

[106] Kukt'o t'ongil yŏn'guwŏn, *Tosi kohyŏng p'yegimul*, 59.

Source: Sŏuldaehakkyo hwan'gyŏng kyehoek yŏn'guso, Tosi kohyŏng p'yegimul, 127.

Both government administrators and academics voiced the need for increased efficiency and effectiveness in waste handling, and that the collection of waste required mechanization to reduce its reliance on human labor.[107] However, it was Seoul's urban topography that necessitated its "labor-intensive waste collection practices." Thoroughfares were distributed irregularly; 13.9 % of the roads were narrower than 4 meters, preventing vehicular access; steep slopes in collection areas ranged from below 15 degrees to 30-40 degrees of slope, meaning that only carriers or pushcarts could access such areas (See Figure 1-4).[108] Automating the collection process, such as by introducing forklift trucks or automated waste loaders with compactors, required developing an infrastructure that would allow waste to circulate freely (e.g., the reach of paved roads or the availability of thoroughfares). To mechanize waste collection required that it be incorporated into urban planning from the start.

For the city, its inadequate collection infrastructure and heavy dependence on human labor was a matter of operational costs. For the workers, uneven urban development and insufficient infrastructure and equipment directly affected their health and safety. Manual collection heightened the risk of accidents. In 1987 alone, of the 17 deaths among sanitation workers in Seoul, 15 died in traffic accidents, comprising 4% of the workforce.[109] In particular, overloaded collection carts often accelerated down sloping roads, sometimes overturning and killing the city's collection crews.[110] The lack of

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[107] Sŏuldaehakkyo hwan'gyŏng kyehoek yŏn'guso, *Tosi kohyŏng p'yegimul*, 97-103; Sŏul T'ŭkpyŏlsi, *P'yegimul kibon kyehoek*.

[108] Kukt'o t'ongil yŏn'guwŏn, *Tosi kohyŏng p'yegimul*, 46.

[109] "Ch'ŏngsowŏn anjŏn sago tasi chŭngga [Cleaners Accidents Increasing Again]," *Kyŏnghyang Sinmun*, December 21, 1987.

[110] In one instance, a collection truck filled with garbage, weighing up to a ton, shifted onto a laborer's body. One collector, climbing a sloping road with a garbage-full cart, collapsed under his own cart; another worker, while using the cart to lift garbage into a container, was crushed by the overturned cart. "Kkŭldŏn sure e kkallyŏ ch'ŏngsowŏn sumjyŏ [A Janitor Died, Crushed Under His Cart]" *Kyŏnghyang Sinmun*, December 1, 1983; "Kwajŏk iŏk'a mikkŭrŏjyŏ 50-tae ch'ŏngsowŏn sumjyŏ [Overloaded Collection Cart Slipped and Killed a Janitor in His 50s]," *Tonga Ilbo*, April 22, 1989;

mechanization also increased workloads: some municipal sanitation workers - as many as 30% of them in 1990 - had their family members work with them during their shift to provide extra labor.[111] Common as it was to receive family help in garbage collection, this practice equally exposed "family crews" to injuries and accidents, and who was accountable.[112]

These accidents and casualties - the consequence of ill-suited infrastructure - periodically made sanitation workers visible. Such a situation continued into the 1980s. One commentator noted that while South Korea exported automobiles around the world, its sanitation workers were left with primitive collection carts with no brakes.[113] Others, including the municipal sanitation workers union, demanded that sanitation workers be included under the Occupational Health and Safety Act.[114] Editorials in two major newspapers, *Tonga Ilbo* and *Hangyore Sinmun*, condemned the moral degeneracy of a society in which sanitation workers died for the price of prosperity, and that their new job title, sanitation worker (Hwan'gyŏng mihwawŏn, literally translated a *person who beautifies environment*), merely embellished their title without protecting them.[115]

"Ch'ŏngsowŏn nunkil ch'ambyŏn sonsure muge mot igyŏ [A Tragic Accident of a Janitor on a Snowy Road, Unable to Handle the Collection Cart Weight]," *Han'gyŏre Sinmun*, January 23, 1990.

[111] When a worker was injured or ill, family members assisted or took over their workload. "Abŏji taesin il naon ch'ŏngsowŏn kajok ŭmjuch'ae ch'iyŏ hyŏngje chunggyŏngsang," *Kyŏnghyang Sinmun*, March 12, 1987; "Ch'ŏngsowŏn namp'yŏn topta yŏksa [Killed by a Car Accident While Helping A Janitor Husband]," *Kyŏnghyang Sinmun*, March 1, 1989.

[112] One wife was run over by the collection cart while descending the downward slope; a wife and her children, while helping out their father, were hit by a car. "Ch'ŏngsowŏn namp'yŏn topta ch'ambyŏn [A Tragic Accident While Helping A Janitor Husband]," *Tonga Ilbo*, March 12, 1985; *Tonga Ilbo*, March 3, 1989.

[113] "Ch'ŏngsowŏn ijik … ap'at'ŭ ssŭregi subuk [Janitors Quit Their Job, Heaping Waste in Apartments]" *Tonga Ilbo*, March 11, 1989.

[114] "Ch'ŏngsowŏn to sanŏbanjŏnbŏp hyet'aek chwŏya [Occupational Safety and Health Act for Janitors]" *Han'gyŏre Sinmun*, January 5, 1990.

[115] "Ch'ŏngsowŏn sago taech'aek sigŭp: sonsure e chedong changch'i rŭl [Urgent Measures for Janitor Accidents: Add Brakes to Waste Collection carts]," *Tonga Ilbo*, November 4, 1989; "Onŭ ch'ŏngsowŏn ŭi chugŭm kwa anjŏn taech'aek: 'hwan'gyŏngmihwawŏn'iran irŭm i anssŭrŏpta [A Janitor's Death and Safety Measures: A Shame on the Name 'Sanitation Worker']," *Han'gyŏre*, November 7, 1989.

Despite occasional discussions about improving waste collection equipment (such as attaching rear view mirrors to the carts, renovating vehicles, and introducing collection carts with brakes), these efforts typically fizzled out before resulting in tangible changes to working conditions.

In situations where collection infrastructure and equipment were scant, an array of municipal waste workers - road sweepers, waste collectors, vehicle operators, among others - formed a major element in the waste infrastructure. When the city dealt with waste collection by increasing the number of workers with little investment in improving labor conditions, human labor often replaced or supplemented insufficient or absent infrastructure, especially the low-tech, labor-intensive practices of collecting, hauling, and separating waste.[116] Although this infrastructural labor played a crucial role in the city's smooth functioning and the reproduction of urban life, it was neither recognized nor fairly compensated before automation and modern waste collection processes gradually replaced it.

DISPOSAL

Urbanization, Land Reclamation, and Waste Disposal

During the 1960s and 1970s, waste disposal entailed little more than the simple dumping of waste (Figure 1-5). The city's land reclamation or readjustment sites often served as city dumps, where waste was deposited to level pits and low-lying land or to fill public waters. Land reclamation sites offered the city economically viable and spatially proximate disposal options while using waste as a substitute for fill, saving on reclamation costs.[117] These temporary dumpsites were scattered around Seoul,

[116] For works that discuss waste labor as a form of "people as infrastructure", see Rosalind Fredericks, *Garbage Citizenship: Vital Infrastructures of Labor in Dakar, Senegal* (Durham, NC: Duke University Press, 2018); Amy Zhang, "Invisible Labouring Bodies: Waste Work as Infrastructure in China," *Made in China Journal* 4 no. 2 (2019): 98-102.

[117] For example, at the Kuŭi reclamation site, contractors pressed the city for additional waste influx in order to complete the construction on schedule. Sŏul T'ŭkpyŏlsi, *Chin'gae maerip yoch'ŏng* (Sŏul: Sŏul

receiving waste from nearby districts usually from within a 10-kilometer radius (See Figure 1-6). After reclamation, the sites were developed for commercial or residential purposes.

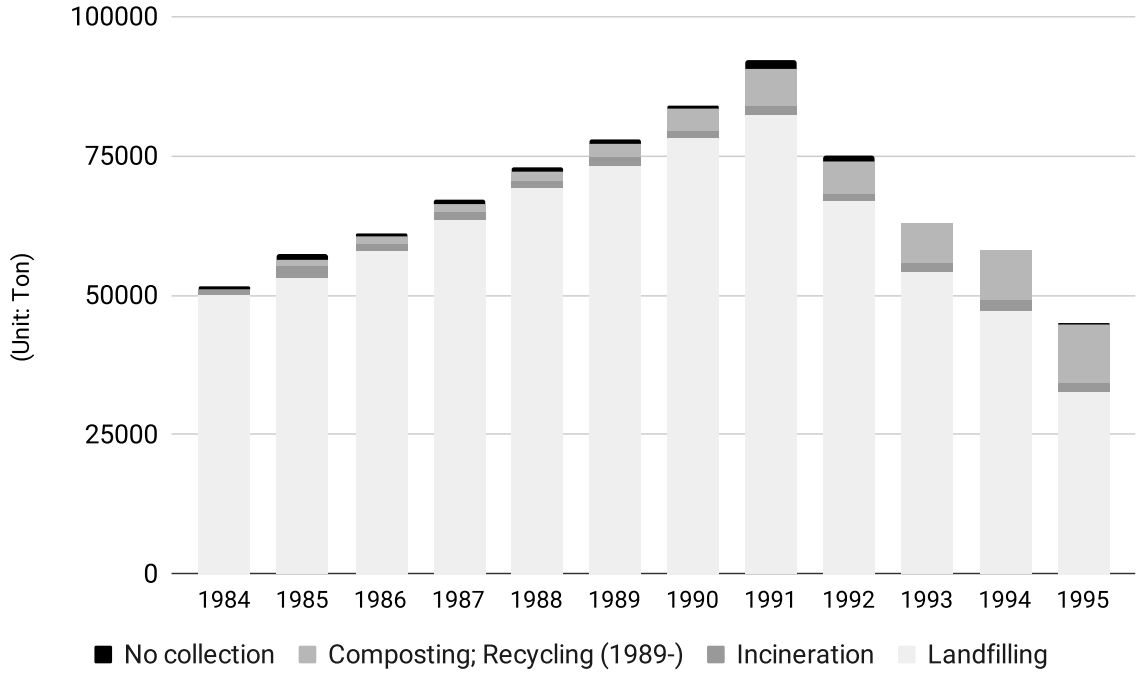

Figure 1-5 Nationwide Solid Waste Disposal, 1984-1995.
Source: Naemubu, The Municipal Yearbook (Seoul: Naemubu, 1984-1995).

These makeshift disposal solutions left the city with little need to invest in necessary infrastructure. Prior, residents living near dumpsites were frequently exposed to dust and odors. While the city occasionally urged garbage carriers and dump operators to cover the refuse with dirt and spray water and disinfectant, it only provided temporary relief. Although the city's waste management was primarily triggered by sanitation concerns, little consideration was given to the public health or environmental consequences of open dumping. Until the 1970s, dumpsites dispersed throughout the city and changed frequently, lasting anywhere from a few months and two years. (See

T'ŭkpyŏlsi Chugŏ chŏngbigwa, 1975); *Chin'gae maerip hyŏpcho* (Sŏul: Sŏul T'ŭkpyŏlsi, 1977); *Kuŭi ch'ŏbunjang pokt'o yoch'ŏng* (Sŏul: Sŏul T'ŭkpyŏlsi, 1979).

Figures 2-6).[118] By the late 1970s, the city's disposal options began to disappear: most areas for land reclamation or public water sites were developed, leaving few options for disposal (Figures 2-7).

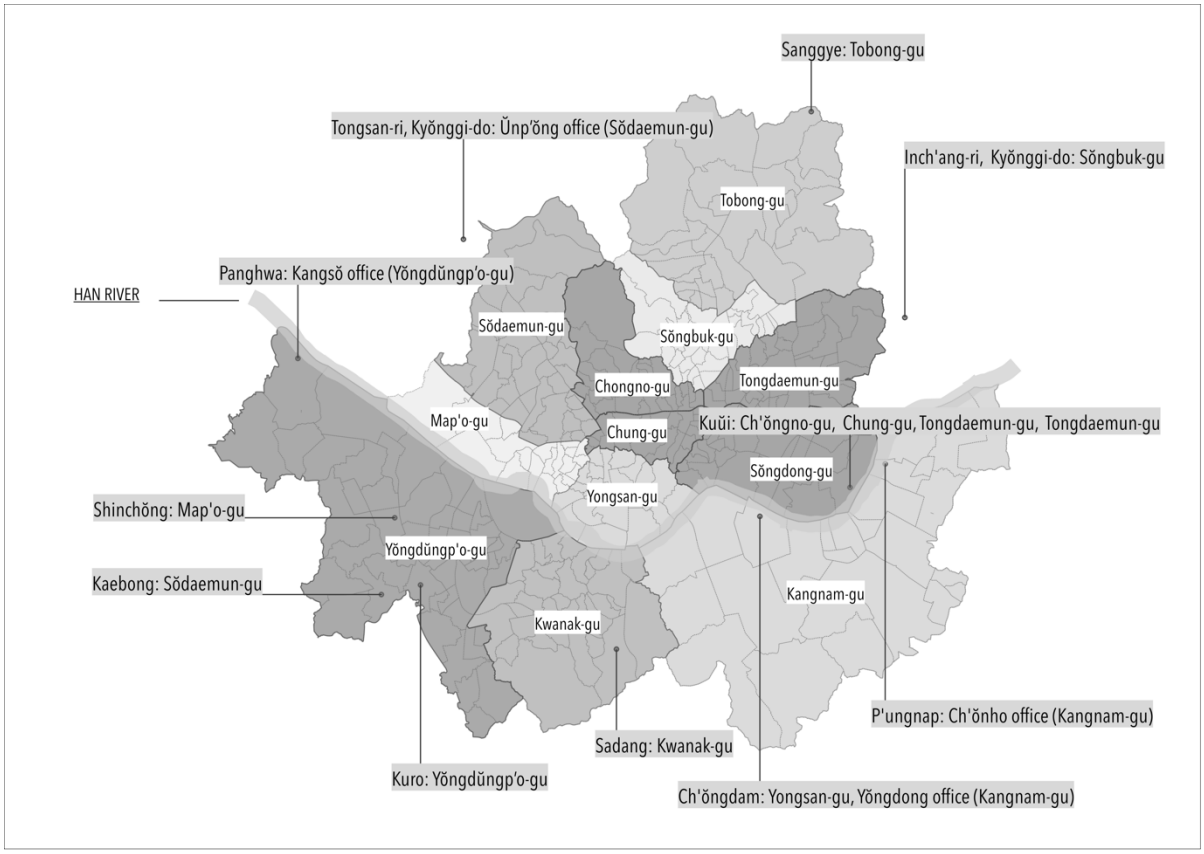

Figure 1-6 Dumpsites in Seoul, 1975

Source: Koryŏdaehakkyo kiŏp kyŏngyŏng yŏn'guso, *Ch'ŏngso haengjŏng*, 37.

[118] Koryŏdaehakkyo kiŏp kyŏngyŏng yŏn'guso, *Ch'ŏngso haengjŏng*, 38.

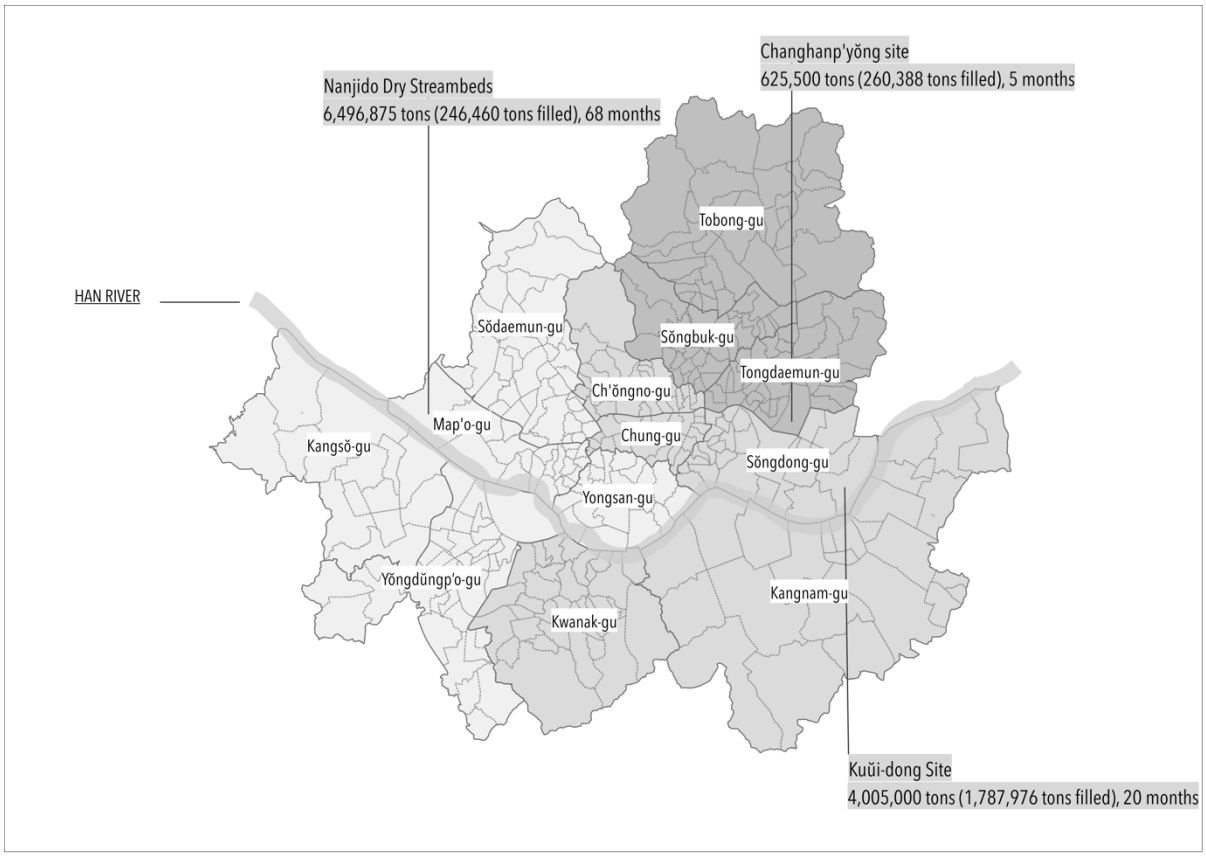

Figure 1-7 Dumpsites in Seoul, August 1977

Source: Sŏul T'ŭkpyŏlsi, Nanjido ssŭregi ch'ŏbunjang hwakpo kyehoek (August 2), (Sŏul: Sŏul T'ŭkpyŏlsi ch'ŏngsogwa, 1977).

In August 1977, the city produced a disposal plan that designated the whole Nanjido area as a waste disposal site.[119] The completion of the breakwater in July 1977 provided the city 2.9 million square meters (878,280 *pyŏng*) of land.[120] Nanjido was on Seoul's western border, tucked away from the city and distant from residential areas. Although the city considered mountain valleys or other low-lying lands outside

[119] In March 1977, the city planned to use Nanjido's Saet stream, a tributary of the Han River on the west end of Seoul (See figure 1-7 and 1-8); in August 1977, it planned to reclaim dry streambeds in Saet stream, using waste as fill.

[120] "Sŏulsigyesim nanji chebang ch'ukcho sŭngin [The Construction Approval for Nanji Breakwater in Seoul]" *Maeil Kyŏngje*, December 29, 1976; Sŏul T'ŭkpyŏlsi, *Ssŭregi chonghap chongmal ch'ŏrijang hwakpo kyehoek* (Sŏul: Sŏul T'ŭkpyŏlsi, 1977).

its boundaries, transportation costs and overall inefficiency dissuaded it.[121]

Nanjido began as a disposal site for six Seoul districts. Despite its designation as a "waste and sewage disposal facility," and its eventual use for fifteen years, Nanjdo was not designed as a long-term, primary landfill nor a sanitary landfill, i.e. equipped with a leachate liner, gas capture facilities, and daily covering.[122] Initially, there was little landfill infrastructure on site. The majority of the landfill budget was allocated for to compensate the land expropriation (76%, $5.3 million), whereas only 24% was allocated to operating costs ($2.2 million), a sum equal to the annual cost of soil covering.[123]

As Figures 6 and 7 show, until the early 1980s Seoul's disposal sites were located in each city district, divided by geographic proximity and only designed for short-term use with varying capacity. In the early 1980s, Nanjido became Seoul's sole landfill, opening a new era of large-scale and long-distance disposal, which, over the next decade, would move even further from central Seoul. Nanjido's designation was a result of authoritarian developmentalism: there was no feasibility study or public hearing for landowners. However, by the 1980s, ushered in by land development on Seoul's periphery and a growing urban middle class, such top-down siting of disposal facilities would no longer be possible. As Nanjido's capacity began to dwindle, the city confronted a staggering volume of waste, changing composition of discards, and waste disposal's environmental impact.[124]

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[121] Sŏul T'ŭkpyŏlsi, *Nanjido ssŭregi ch'ŏbunjang hwakpo kyehoek* (Sŏul: Sŏul T'ŭkpyŏlsi ch'ŏngsogwa, 1977).

[122] To what extent the city anticipated the use of Nanjido as a landfill remains unclear. The 1977 disposal plan shows two different estimates: one using the landfill for fifteen years, disposing garbage from six districts of Seoul; and the other six years from fifteen districts. Sŏul T'ŭkpyŏlsi, *ch'ŏbunjang*.

[123] The total budget was $7.5 million. Sŏul T'ŭkpyŏlsi, *Chonghap omul ch'ŏrijang hyŏnhwang* (Sŏul: Sŏul T'ŭkpyŏlsi, n.d.).

[124] After six years of operation, in 1983, 70% of the available landfill space had already been filled. "Ssŭregi munjeŭi simgaksŏng [The Severity of Waste Problems]," *Kyŏnghyang Sinmun*, January 24, 1983.

Developing Modern Waste Disposal Strategies

Until the 1970s, few statutes or guidelines regulated waste disposal.[125] Nor was there a unified authority that governed waste-related issues. Local authorities ran their own disposal sites with little coordination. During the 1980s, the situation around waste disposal quickly changed. First, both the amount and material complexity of waste demanded appropriate disposal methods beyond open dumping. Second, experts and academics voiced concerns about the environmental consequences of then-existing landfilling practices, especially groundwater contamination and possible landfill gas explosions.[126] Third, the 1980 establishment of the OoE consolidated environmental issues under a unified public authority. The OoE framed waste management as explicitly linked to environmental concerns, elevating it to an integral element of urban planning infrastructure. As such, future disposal plans were woven into the spatial planning system and national environmental plans.[127]

In the 1980s, waste management increasingly came to be defined as a technological issue. In the Han River Basin Environmental Master Plan (1983), researchers examined various disposal technologies for Seoul.[128] An array of

[125] While the 1973 amendment of the Dirt Removal Law included a revised definition of "dirt", it did not address disposal methods. The Law rather focused more on the responsibility of the government and the cleaning duty of the citizens.

[126] "Hwan'gyŏngch'ŏng hwan'gyŏng yŏnghyang p'yŏngka nanjido kongwŏn kyehoek 'wihŏm nŏmu mant'a' [The Environmental Impact Assessment of the Office of Environment: 'Too Much Risk' in the Nanjido Park Plan]," *Tonga Ilbo*, October 16, 1985; "Sŏul ssŭregi maeripchi p'okpal wihŏm [Explosion Risks in Seoul's Waste Disposal Sites]," *Tonga Ilbo*, December 9, 1981.

[127] The OoE released three regional-level environmental conservation plans—the Han River Basin (1983), the Nakdong River Basin (1985), and the West and South Sea Basin (1986)—followed by the 1986 Environmental Conservation Long-term Master Plan (Hwan'gyŏng pojŏn changgi chonghap kyehoek, 1987-2001), a national-level long-term master plan. In these plans, the OoE indicated that it sought to coordinate environmental conservation with the Comprehensive National Territorial Plan (Kukt'o chonghap kyehoek) and coastal reclamation plans—especially when designating landfill sites.

[128] The Han River Basin Environmental Master Plan was one of the first coordinated long-term environmental conservation plans published, outlining long-term policies for pollution control and environmental management throughout the period 1984-2000 Hwan'gyŏngch'ŏng, Enjiniŏring saiŏnsŭ,

bureaucrats, scientists, and industry experts evaluated each stage of collection and disposal, including cadastral mapping of the city's roads and plotting the most efficient collection routes. These plans then compared optimal landfill and transfer station locations across jurisdictions, and specified the types of collection vehicles and disposal equipment required at each disposal site. This analysis was further translated into the number of haulages required per day and the number of work shifts. Pace, truck load, hauling distances—all of these minutiae of the labor process were rearranged to accommodate new disposal methods.

As for actual disposal options, the Han River Basin Plan examined three possibilities: incineration, composting, and sanitary landfilling.[129] Each scenario was simulated either on its own or in combination with the other methods, and evaluated for technological viability, economic efficiency, and environmental impact. Incineration required a fixed volume of waste and was not entirely reliable if the waste's composition changed. Composting, which was both ecologically beneficial and technologically reliable, was well suited to Seoul's waste, which contained a high proportion of compostable material (45%).[130] However, the byproducts from each method - steam energy and compost - lacked sufficient commercial value, making them less attractive. Landfilling offered the most economical and technologically stable option, and it could also accommodate any changes in the waste's composition or quantity.

Investigators recommended converting the Nanjido Landfill into a sanitary landfill while developing a new, regional landfill.[131] The OoE set out to

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Hyosŏng kŏnsŏl chusikhoesa, *Han'gang yuyŏk hwan'gyŏng pojŏn chonghap kyehoek saŏp: kohyŏng p'yegimul pumun pogosŏ* (Sŏul: Sŏul T'ŭkpyŏlsi, 1983).

[129] Other methods included pyrolysis, anaerobic digestion, refuse-derived fuel combustion, mass incineration, composting, and sanitary landfills with and without methane gas recovery. Hwan'gyŏngch'ŏng et al., *Kohyŏng p'yegimul*, 181-194.

[130] Hwan'gyŏngch'ŏng et al., *Kohyŏng p'yegimul*,185.

[131] Landfilling presented three options: converting Nanjido to a sanitary landfill, operating two landfills in Seoul, or constructing a metropolitan regional landfill in Inch'ŏn. All of them hinged on implementing sanitary landfill techniques.

find a new site in the metropolitan area.[132] Having a readily available landfill site, the city could bypass a site selection process and potential opposition from residents; it could also delay investing in an additional landfill or constructing a regional landfill. However, the site selection process took longer than the current landfill capacity due both to disagreement over disposing of Seoul's waste in surrounding jurisdictions as well as bureaucratic wrangling.[133] Ultimately, it was only in 1987 that the new regional landfill site was selected in Kimp'o.[134]

In the early 1980s, the city was also planning to construct a comprehensive waste treatment plant on the northeast corner of the Nanjido site.[135] The plant combined human and mechanical sorting of recyclable items, the incineration and manufacture of refuse-derived fuel (RDF), and composting (See Figure 1-9).[136] Waste materials were put onto a belt conveyor and passed through a trommel screen, a spinning drum with a mesh screen that mechanically separates

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[132] In 1983, the OoE assessed three potential locations in Inchŏn, a coastal city adjacent to Seoul, and issued a feasibility assessment to the government. Hwan'gyŏngch'ŏng, *Sudokwŏn taedanwi p'yegimul maeripchang sŏlch'irŭl wihan t'adangsŏng chosa pogosŏ* (Sŏul: Hwan'gyŏngch'ŏng, 1983).

[133] The establishment of the OoE did not imply that they were empowered to make significant changes to the disposal problem. For instance, a JICA report indicated that the new sanitary landfill plan was on hold at the Economic Planning Board. Japan International Cooperation Agency (JICA), *Master Plan and Feasibility Study on Seoul Municipal Solid Waste Management System in the Republic of Korea* (Tokyo: JICA, 1985), 240. Another conflict arose from siting process. As of 1983, the mayor or governor of the local government or the head of the district had the jurisdiction to authorize waste disposal/treatment facilities. To avoid a potential conflict over the site of waste disposal facilities, the OoE proposed delegating permission-granting authority to them. Hwan'gyŏngch'ŏng et al., *Kohyŏng p'yegimul*.

[134] "Kimp'o haeane ssŭregi maeripchang [Waste Disposal Site in Kimp'o seashore]," *Tonga Ilbo*, June 2, 1987.

[135] In 1983, a research team from the Korea Advanced Institute of Science and Technology submitted a plan to the city for the plant's construction. In December of that year, Hyundai Engineering and Construction, a South Korean conglomerate that was also one of the contractors in the Han River Basin Environmental Master Plan, was selected as the turnkey construction contractor. Han'guk kwahak kisurwŏn, *Sŏul-si tosi kohyŏng p'yegimul Ch'ŏrijang kŏnsŏl kibon kyehoek e kwanhan yŏn'gu* (Sŏul: Sŏul T'ŭkpyŏlsi Ch'ŏngsogwa, 1983).

[136] While the city was aware that the plant alone would be insufficient to dispose of Seoul's waste, the project proceeded as the country's first attempt to build a large-scale waste treatment plant. Han'guk kwahak kisurwŏn, *Tosi kohyŏng p'yegimul*, 181.

different sizes of solid waste (e.g., coal ash particles from larger debris). The residual materials discharged at the lower end of the drum went through an air classifier where compostable particles were separated. The burnable waste that could not be retrieved on its own was sent to an RDF facility to be converted into pellets. Finally, at the composting facility, a magnetic separator separated out metals. The remainder of the organic waste would be composted for 20 days before being landfilled or sold to a seedbed or plant nursery.

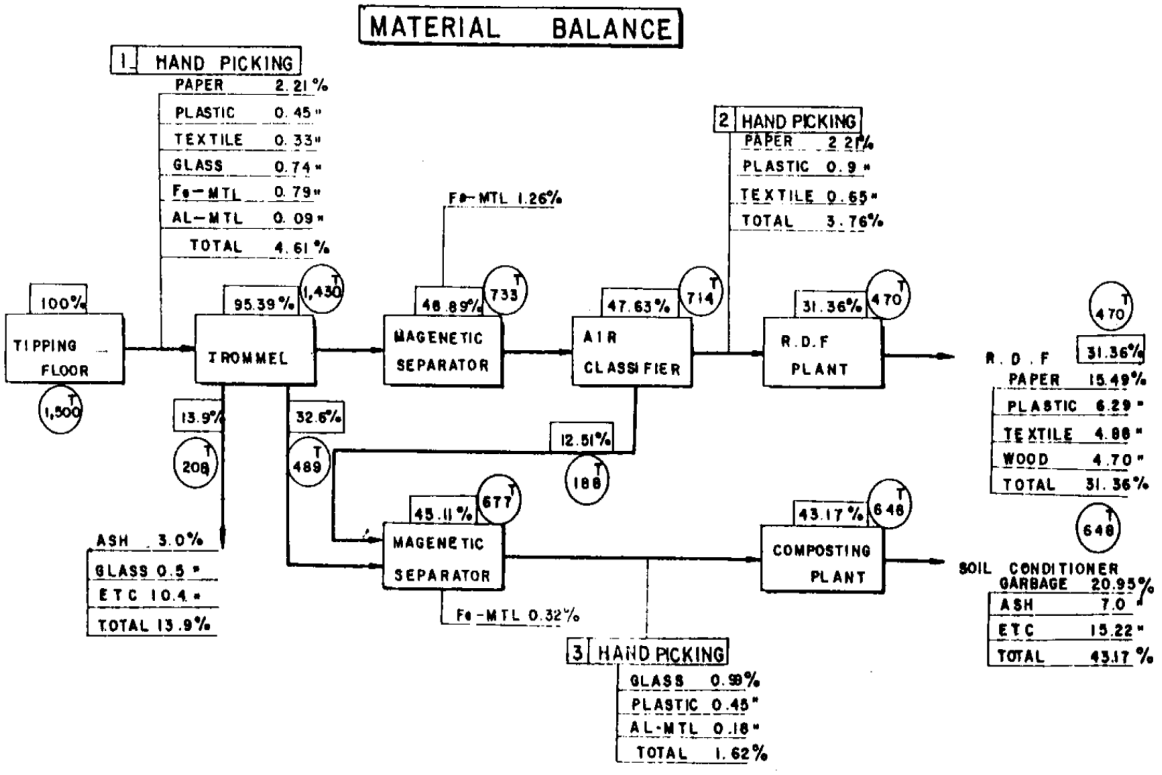

Figure 1-8 Waste treatment plant operation process

Source: Han'guk kwahak kisurwŏn, Tosi kohyŏng p'yegimul, 82.

The plant, brought from Denmark, was tailored to Seoul's municipal waste situation, the most significant being the utilization of human labor in the mechanical separation process. As Figure 1-8 shows, the plant installed three hand-picking stations supplied by conveyor belts: between a feed conveyor and a trommel screen section, between an air classifier and an RDF plant, and at the composting facility. After materials were

manually separated (paper, plastic, textile, glass, or metals), they were sent to a baling machine for transportation. The additional manual labor, according to the report, would greatly improve the precision and efficacy of mechanical separation. The report recommended diverting existing Nanjido waste pickers (otherwise surplus) to the plant's mechanical process, indicating that their work would vanish after the plant's completion and the landfill's closure. More importantly, enhanced precision of material recovery resulted in a modest profit to the facility's operator.[137]

Despite two pilot tests in 1986 and 1988, the plant never became operational. Unseparated at the source, the material composition of Seoul's waste hampered the automated facilities' proper function. The trommel screen lacked sufficient centrifugal force to separate coal ash and construction debris. The air classifier was unable to process the high proportion of wet organic waste. The produced RDF pallets contained so much water and vinyl (60%) that they were unusable as fuel. The contractor repaired and reinforced additional facilities, but the second pilot test in 1988 was also unsuccessful.[138] Neither the waste treatment plant nor the regional landfill offered any viable alternative to the disposal problem.

Landfilling as a Fallback Option

As the Nanjido landfill was approaching its maximum capacity, the city resorted to converting it into a sanitary landfill. As suggested in the OoE and JICA's reports, the city produced a mounding landfilling plan in 1985 (Figure 1-9).[139] By adopting area landfilling,[140] a method that creates mounds of garbage on the previously filled and

[137] While this plan did not include any profit estimates, it planned to hire 80 workers for hand-sorting roles. Han'guk kwahak kisurwŏn, *Tosi kohyŏng p'yegimul*, 104; 118-119; Hwan'gyŏngch'ŏng et al., *Kohyŏng p'yegimul*, 256-259 (76-79).

[138] The facility was eventually shut down in 1988, and lawsuits followed between the city and the contractor. The constructors argued that the plant required source separation for further processing of waste materials, and as such, the failure of the plant was the city's responsibility.

[139] Sŏul siriptae sudokwŏn kaebal yŏn'guso, *Nanjido p'yegimul ipch'e wisaeng maerip saŏp hwan'gyŏng yŏnghyang p'yŏngka pogosŏ* (Sŏul: Sŏul T'ŭkpyŏlsi ch'ŏngsogwa, 1985).

[140] "Nanjido e ssŭregi tongsan [Garbage Hills in Nanjido]," *Tonga Ilbo*, June 26, 1984.

leveled trench area,[141] it allowed the city to extend its lifespan.[142] The plan detailed the infrastructural investment necessary for sanitary landfilling: lining the landfill to create physical barriers against possible runoff or gas infiltration; installing pipes to extract landfill gas and constructing ignition points; collecting leachate from previously landfilled waste; and constructing anaerobic lagoons to treat the discharged leachate. A modern, sanitary landfill (infrastructure, operation, and maintenance) was costly: the initial investment required 10 billion wŏn, spread over the period between 1985 and 1994, and the annual operational costs amounted to 1.86 billion wŏn, of which 48% (890 million wŏn) was spent on maintenance costs.[143] Even with this significantly increased operation cost, it still offered a far cheaper solution than any other disposal methods.[144]

[141] Originally, Nanjido was intended to be both a borrow pit and a landfill. Dumping began with the quarry's infilling, a technique known as trench landfilling. When the quarry was filled, dumping was relocated to the landfill's northwestern region until it reached ground level. Sŏul T'ŭkpyŏlsi, *Wŏldŭk'ŏp kongwŏn kŏnsŏlji* (Sŏul: Sŏul T'ŭkpyŏlsi, 2003).

[142] At that time, Nanjido had already been leveled to a height of 20 meters. The city estimated that Nanjido could be in use for the next ten years until its height reached 60-70 meters above sea level. Sŏul siriptae sudokwŏn kaebal yŏn'guso, *Hwan'gyŏng yŏnghyang p'yŏngka*, 67.

[143] In contrast, at its 1977 inception, the city estimated that Nanjido's operation, which was largely limited to soil covering, would cost 1.7 billion wŏn during the entire planned duration between 1978 and 1984.

[144] The disposal cost per ton remained at 206 wŏn, and the maintenance cost per ton 100 wŏn. Sŏul siriptae sudokwŏn kaebal yŏn'guso, *Nanjido p'yegimul ipch'e wisaeng maerip saŏp kibon kyehoek pogosŏ* (Sŏul: Sŏul T'ŭkpyŏlsi ch'ŏngsogwa, 1985), 201.

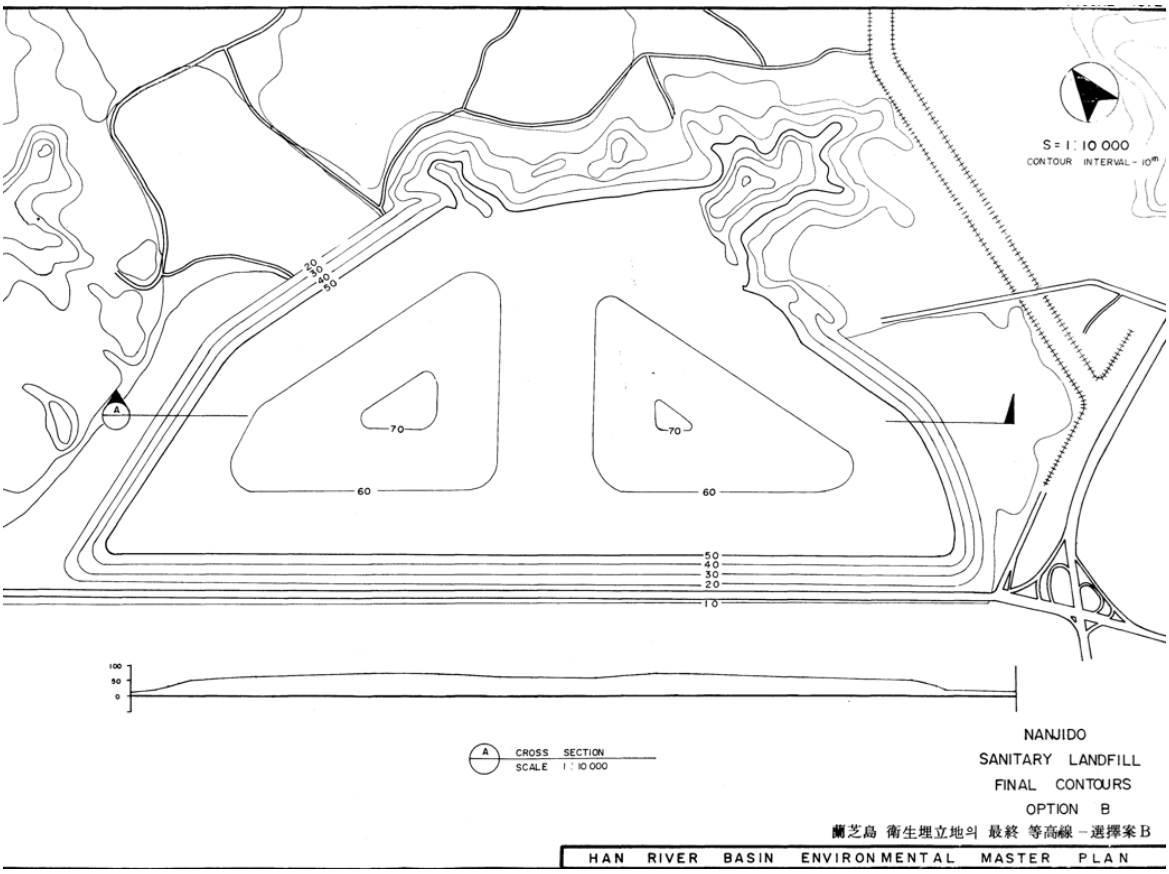

Figure 1-9 The final contour of Nanjido sanitary landfill, option B
Source: Hwan'gyŏngch'ŏng et al.,Kohyŏng p'yegimul.

Despite the discussions about sanitary landfilling, Nanjido's disposal practice - and the city's waste management system - remained largely unchanged. The city did the bare minimum to construct landfill mounds, including establishing and dividing cells for waste deposition, maintaining landfill slopes, and constructing breakwaters and access roads. But it did not invest in additional landfill-specific equipment for excavating and hauling the covering materials or spreading and compacting incoming debris.[145] Waste pickers continued to reclaim recyclable materials, while covering and compacting their dumping areas with construction debris and excess soil.[146] There was no monitoring

[145] Sŏul siriptae sudokwŏn kaebal yŏn'guso, *Hwan'gyŏng yŏnghyang p'yŏngka*, 178-182.

[146] Excess soil from Seoul's construction sites was deposited in the Nanjido Landfill, which was also used as a covering material. While certain waste types can be used as daily cover or road base, it requires careful profiling and characterization of incoming waste. Nicholas P. Cheremisinoff, *Handbook*

system in place for possible sinkholes and erosion or for landfill gas generation and explosion,[147] with the risk born entirely by the workers.[148]

The blueprints for future waste disposal approached it as a professional sector that required specific expertise, imported technologies, and facilities run by trained specialists. Yet, the designs for automated sorting facilities and sanitary landfills also integrated recycling labor into modern disposal practices. It is emblematic that several policy reports highlighted the recycling labor of waste pickers and incorporated it into the disposal process: their labor's environmental and economic value and the possibility of bringing their role into formal waste management systems through institutionalizing recycling. The next section examines how this process unfolded.

RECYCLING

There was no formal recycling program in place between the 1960s and 1980s. However, a variety of actors recycled waste materials. Figure 1-10 illustrates municipal waste collection and recycling processes in the 1970s and 1980s. The grey arrows indicate recycling flows that occurred outside of formal waste management systems: note how informal recycling occurred in each stage of waste generation, collection, transportation, and disposal. This recycling economy gradually found its way into official trade and industrial output, such as paper mills or metal smelters, and diverted

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of Solid Waste Management and Waste Minimization Technologies (Oxford: Butterworth-Heinemann, 2003), 104.

[147] The sanitary landfill plan recommended a monitoring system for leachate generation, drainage, or composition; gas emission and its site-specific concentration behavior; compacting and settling that occurred during daily operations; and the impact of the landfill's anaerobic process on the continuing settlement.

[148] At times, sludge pits overflowed or waste collapsed along the landfill slopes. "Nanjido ssŭregi munŏjyŏ sodong [Waste collapse in Nanjido]," *Kyŏnghyang Sinmun*, April 4, 1990. At others, a garbage truck rolled over on an instable dumpsite slope while unloading, which took the lives of waste pickers. "Nanjido p'yep'um sujip pubu ummak tŏpch'in t'ŭrŏk e apsa [Waste Picker Couple Crushed to Death by a Truck]," *Tonga Ilbo*, January 17, 1990.

recyclable materials away from the waste stream.[149]

The majority of recycling work was self-employed and operated on a small-scale. The informal recycling workforce was made up of individual waste pickers (*nŏngmajui*) carrying their wooden baskets (*mangt'ae*), junk peddlers (*komul haengsang*) with the clanking sound of metal scissors, itinerant waste pickers lugging their four-wheeled carts, or the inmates of waste picker camps. They either scavenged from street litter or collected recyclable materials from residential and commercial areas, before selling them on to junk depots (*komulsang*), small neighborhood workshops that purchased recyclable materials from individual waste pickers. There were also groups of waste pickers at either waste picker camps or disposal sites, which I examine in detail in chapters 3 and 4. Only the intermediary buyers handled waste materials in sufficient quantity to supply manufacturers. This workforce, while not centrally managed, was well-suited to the characteristics of recyclable materials, which were distributed in small quantities throughout a vast geographical area.

[149] Yun Chin-ho, "Tosi pigongsik pumun," in *Han'guk chabonjuŭiron*, ed. Yi Tae-gŭn and Chŏng Un-yŏng (Sŏul: kkach'i, 1984), 251-287.

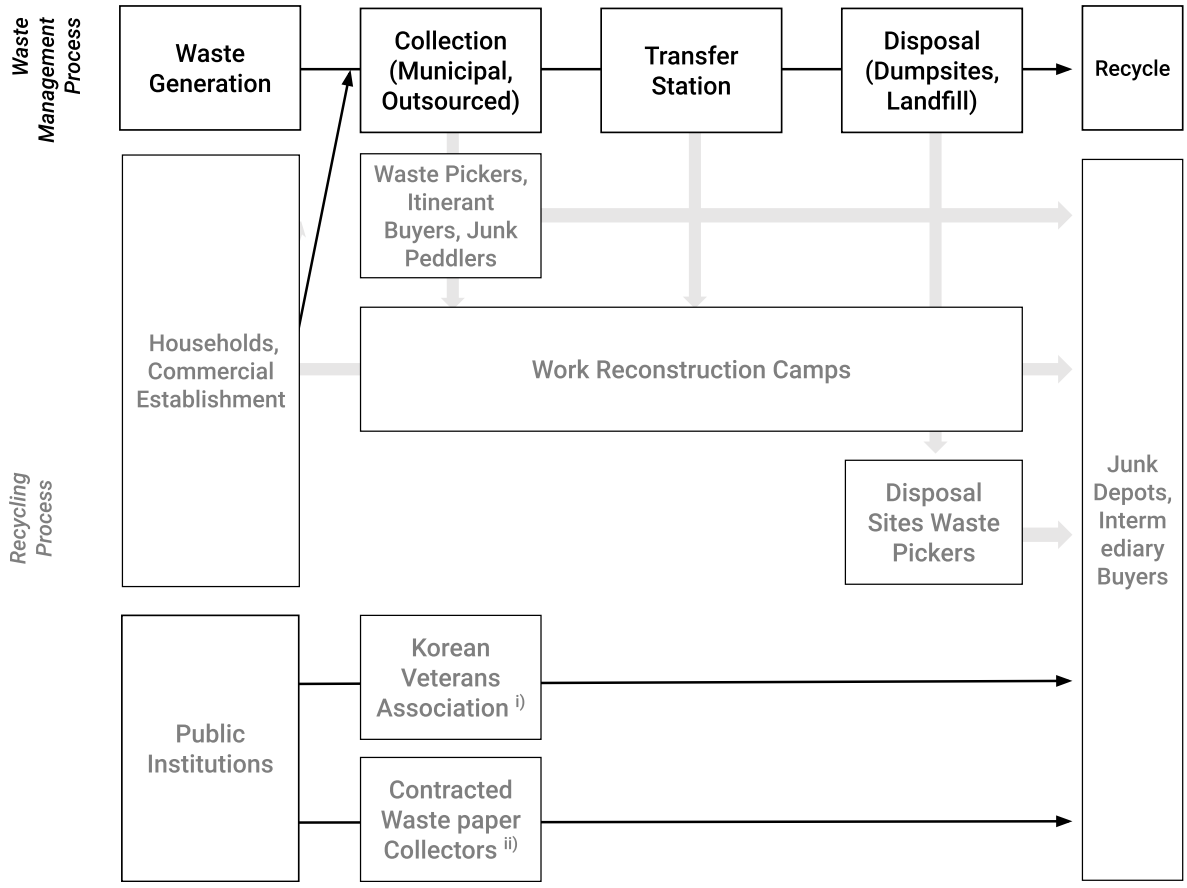

Figure 1-10 Waste management and recycling flow in the 1970s and the 1980s

Source: Kwahak kisulch'ŏ, P'yep'um, 146; Sŏuldaehakkyo hwan'gyŏng kyehoek yŏn'guso, Tosi kohyŏng p'yegimul, 269; JICA, Master Plan, 95 (2-15)).

Retrieving residual value from waste items did not always remain in the hands of the urban underclass. Following postwar reconstruction, the government, facing scant resources, resorted to using waste materials to maintain patronage networks and assist certain war victims.[150] At a cabinet meeting in 1960, the ministries discussed granting "patriotic associations" the right to collect waste materials,[151] implying that the state

[150] Nam Ch'an-sŏp, a social welfare scholar, indicates that South Korean welfare policy may be traced back to war victim's relief initiatives in the 1950s. Nam Ch'an-sŏp, "Han'gugŭi 60-yŏndae ch'oban pokchi chedo chaep'yŏn e kwanhan yŏn'gu: 1950-nyŏndaewaŭi kwallyŏnsŏng ŭl chungsimŭro," *Sahoe pokchi yŏn'gu* 27 (2005): 33-76.

[151] Despite no indication that any contracts were rewarded as a result of this meeting, a list of social organizations authorized to collect waste paper from public institutions reveals who these "patriotic associations" were. The Ministry of General Affairs compiled a list of them in 1974, and half of them

owed them a debt of gratitude.[152] One such example is the Korean Veterans Association (*Chaehyang kuninhoe*, KVA), which was granted exclusive rights to collect from US and UN military bases in 1963,[153] and was named the official waste paper contractor from government organizations in 1974.[154] These contracts allowed the KVA to launch its own waste business. Once awarded as a form of patronage and nepotism,[155] neither the KVA's business nor its role as the exclusive collector was contested, even when recyclables collection was no longer done through clientelist

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were various types of veterans' organizations, including the Korean Veterans Association (Chaehyang kuninhoe, hereafter KVA), the Vietnam War Veterans Association (Wŏllam ch'amjŏn chŏnuhoe), the Association of the Bereaved of Disabled Veterans (Taehan sangŭi kun'gyŏng yujokhoe), Anti-communist League (Pan'gong yŏnmaeng), among others. Ch'ongmuch'ŏ, *Chongi sobi chŏryak undong ch'ujin hyŏnhwang pogo (Che 65-hoe)* (Sŏul: Sŏul T'ŭkpyŏlsi, 1974).

[152] Che 42-hoe kungmu hoeŭi, Aeguktanch'e e taehan p'yep'um purha rŭl chonghapchŏgŭro kyehoek ŭl suriphanŭnde kwanhayŏ (Sŏul: Kungmuwŏn, 1960), BA0085197.

[153] Prior to the KVA being authorized as a contractor by the Ministry of Health and Social Affairs in 1963, municipalities in Kyonggi Province were in charge of dirt removal in the bases and managed the tax revenue generated by dirt removal. P'yŏngt'aek-si, *P'yŏngt'aek-kun yuen'gun pudae nae omul ch'ŏri suipkŭm kwalli t'ŭkpyŏl hoegye sŏlch'i chorye* (P'yŏngt'aek: Kyŏnggi-do P'yŏngt'aek-si, 1962), BA0049008; P'och'ŏn-gun, *P'och'ŏn-gun yuen'gun pudae nae omul ch'ŏri suipkŭm kwalli t'ŭkpyŏl hoegye sŏlch'i chorye p'yeji chorye kongp'o* (P'och'ŏn: Kyŏnggi-do P'och'ŏn-gun, 1965), BA0172213.

[154] Both President Park Chung-Hee and the Prime Minister directed that wastepaper collecting rights be granted to "associations that significantly contribute to society." Taet'ongnyŏng pisŏsil, *Hyanggun p'yehyuji saŏp e kwanhan pogo* (Sŏul: Taet'ongnyŏng pisŏsil 1974), EA0004793.

[155] It is worth noting that people who had been "wasted" by society were given waste collection privileges by the military regime. As historian Hujii Takesi [Fujii Takashi] points out, returned Korean War veterans became surplus to society, posing threats to political legitimacy and social stability. Subsidizing the KVA, either directly or through income sources, was justified on the grounds that it would employ veterans who would otherwise be unemployed due to a lack of capital or skills. The KVA established a "wastepaper office" (*p'yehyuji saŏpso*), afterwards renamed the "recyclable resources office" (*chaejawŏn saŏpso*). The KVA used its own nationwide organization for its wastepaper industry, employing 112 members in regional offices. This awarding of official waste collector status bolstered the KVA's financial independence. Hujii Tak'esi [Fujii Takashi], "Toraon 'kungmin' chedae kunindŭl ŭi chŏnhu," *Yŏksa yŏn'gu* 14 (2004): 255-295; Chaehyang kuninhoe, *Hyanggun 50-yŏnsa* (Sŏul: Taehan Min'guk chaehyang kuninhoe, 2002), 136.

arrangements.[156]

The Oil Crisis and the Reevaluation of Waste

The 1973 Oil Shock prompted systematic attention to the value of recyclable materials in waste. Owing to concerns about raw material and fuel supply, prospects for the country's economic policy - the "Big Push" program of heavy and chemical industries (*chunggongŏp kongŏphwa*) - were dwindling. Faced with a global resource crisis, the authoritarian developmental state repositioned waste as a potential resource requiring state control.[157] It framed waste materials as potentially recoverable resources and, similar to coal and oil, incorporated their administration into resource management.

In its 1975 study on the effective use of solid waste, the MST criticized the then-current state of waste reclamation.[158] The recycling process - distribution - was overly complicated with petty, informal scrap dealers (see Figure 9); there were no reporting responsibilities, leaving the state with little information about the secondary materials trade; and the market for recyclable materials was too volatile, which it attributed to its distribution structure and the absence of supply and demand management, including secondary materials import.[159] Instead, the MST proposed

[156] Because the KVA's waste business was awarded on the basis of political loyalties, it was administered poorly, with allegations of corruption and inefficiency. A year after establishing the wastepaper office, it failed to pay the investment loan redemption obligation and declared bankruptcy. Chaehyang kuninhoe, *Hyanggun*, 136; Kukka pohunch'ŏ, *Chaehyang kuninhoe chŏngsanghwa rŭl wihan kaehyŏk pangan yŏn'gu* (Sejong: Kukka pohunch'ŏ, 2015), 72.

[157] The Economic Planning Board (Kyŏngje kihoegwŏn, EPB), the Ministry of Science and Technology (Kwahak kisulch'ŏ, MST), the Ministry of Commerce and Industry (Sangkongbu, MCI), and the Administration Innovation Committee (Haengjŏng kaehyŏk wiwŏnhoe, AIC) developed strategies to cope with short and long-term resource supply challenges. Ch'ongmuch'ŏ, *Chongi sobi chŏryak undong chŏn'gae* (Sŏul: Ch'ongmuch'ŏ 1974), BA0139631; Kyŏngje kihoegwŏn, *Chawŏn (sŏlt'ang, chongi) chŏryak pangan* (Sŏul: kyŏngje kihoegwŏn, 1975).

[158] Kwahak kisulch'ŏ, *P'yep'um.*

[159] At the time, the country imported 80% of its wastepaper and scrap metal for manufacture. Among 1.11 million tons of waste metal used in 1973, 0.8 million tons were imported and 0.3 million tons (37%) were sourced domestically.

establishing regulatory bodies for recyclable materials–governing the distribution and sale of waste materials[160]; creating a set of classifications; setting price standards; and developing a waste reclamation business on a corporate scale—with the goal of making the waste materials trade similar to other manufactured goods.[161]

Focused solely on bringing the informal waste economy under state control, the MST failed to recognize that the volatility of the scrap market reflected its unique position in the commodities market. This volatility was further amplified by the country's high scrap imports,[162] whose supply was dependant on the exporting country's domestic scrap market.[163] The recyclables market fluctuated according to the availability and affordability of primary and secondary materials; it was this liminality that complicated the scrap trade. In fact, the problems of the waste materials trade—the lack of predictability, regional and sectoral price variations, unstable supply and demand—were shaped less by informality than by the difference between primary and secondary materials, most notably the

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[160] The MST indicated the state subsidized waste metal imports by 174.5 million dollars, in contrast to waste material collection, which was left to petty merchants with no regulation or subsidy. Kwahak kisulch'ŏ, *P'yep'um*, 132-136.

[161] These suggestions were drafted into a comprehensive recycling law, tentatively titled the Act on Promotion of Waste Material Resourcification (P'yep'um chaejawŏnhwa ch'okchinbŏp). The draft addresses licensing waste collection business and designating collection areas, registering waste reclamation business, establishing waste material exchange, and announcing waste material quality and price grades. Haengjŏng kaehyŏk wiwŏnhoe, *P'yep'um ŭi chaejawŏnhwa chisi chunggan pogo* (Sŏul: Ch'ongmugwa, 1975), BA0177304; "Chawŏnnan haegyŏl pangan ŭi hana ro p'yep'um chaejawŏnhwabŏp chejŏng pangch'im [Enacting Waste Material Resourcification Act as one of the Resource Crisis Solutions]," *Tonga Ilbo*, April 17, 1975.

[162] For instance, in 1973, 37% (0.3 million tons) of waste metal was sourced domestically; for wastepaper, 21% (81,600 tons) of total pulp demand was met domestically, with domestic chemical pulp accounting for only 1.6 percent (4,800 tons).

[163] The Oil Shock rekindled interest in waste recovery in both developed and developing countries. Shortly after the Oil Shock and its attendant embargo, the historian Emily Brownell notes how American scrap industries saw scrap export as wasting valuable secondary resources, arguing that "putting secondary materials on the world market was unpatriotic (266)." Because South Korea was a major importer of American wastepaper, such protectionist concerns could have caused yet another resource supply crisis. Emily Brownell, "Negotiating the New Economic Order of Waste," *Environmental History* 16, no. 2 (2011): 262-89.

possibility of mass extraction and transportation.

Notwithstanding the domestic and international environment surrounding the secondary materials market, the MST portrayed existing recycling practice—the work of waste pickers and informal scrap dealers—as merely the subsistence activities of the urban underclass.[164] In the absence of an institutionalized recycling system, it was this unorganized, informal labor force that achieved the country's meager recycling rate.[165] In 1973, the country retrieved 20.5% of wastepaper (110,000 tons out of 537,190 tons) and 9.2% of scrap metal (306 tons out of 3,292 tons) put into industrial production: among them, the Work Reconstruction Camp, a police-led waste picker camp, collected 30,000 tons of wastepaper worth 530 million wŏn.[166] Nevertheless, the state blamed the small-scale handlers and intermediaries for increasing the final purchase price,[167] depicting them as the cause of the inefficient recycling process. The state's desire for a large-scale recycling industry, combined with its disregard for informal recycling practice, led it to neglect a labor force that otherwise could have been incorporated into its goals.

Once the immediate restraints of the Oil Crisis lifted, plans for waste reclamation vanished. Neither the MST's plan or the MCI's draft legislation were

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[164] The MST denigrated waste pickers at the Work Reconstruction Camp as "socially cancerous vagrants," and that individual waste pickers were no different from taking service with a junk depot for survival. Kwahak kisulch'ŏ, *P'yep'um*, 95-96.

[165] In 1973, there were 1,159 scrap businesses in Seoul: 885 junk depots (*komulsang*), 184 intermediary dealers, and 90 suppliers. These figures only include those who obtained a license from the local police station and did not include non-licensed establishments. Junk depots, small workshops located in neighborhoods, usually hired people to collect recyclable materials, whose number varied from 10 to 30. The Work Reconstruction Camp housed 2,000 waste pickers in Seoul. Combined, the report infers that there were at least 10,000 waste pickers in Seoul alone. Kwahak kisulch'ŏ, *P'yep'um*, 93.

[166] Kwahak kisulch'ŏ, *P'yep'um*, 42; 57.

[167] Waste pickers bore the brunt of the reduced selling price due to weight reduction procedures at the distribution stage (e.g., paper balers, iron mills, etc.) that ranged from 5% to 20% to 50% of the total weight. Individual waste pickers were required to pay a deposit or membership fee at some waste picker camps, which increased the profit margin. Consequently, the average profit margin for waste products were typically between 43% and 62%, significantly higher than profit margins in other industries (approximately 6% to 12.3%). This increased price prompted manufacturers to switch to cheaper imported wastepaper. Kwahak kisulch'ŏ, *P'yep'um*, 151-157.

followed by any legislation or institutionalized system.[168] One reason was that the waste/cleaning administration was not part of these recycling discussions: extracting waste's economic value was divorced from everyday waste management. The EPB, the MST, and the MCI were centered solely on building and fostering a recycling industry rather than improving recyclable collections on the ground by implementing separate collection or utilizing then-existing recyclers. With no investment in domestic collection and distribution infrastructure, the lessons of the Oil Crisis were quickly forgotten.

Incorporating Recycling into Waste Management

In the 1980s, recycling efforts diverged in two directions. First, as noted, the city's plans began to incorporate, albeit not necessarily formalize, waste pickers' labor into its disposal policy: waste pickers' own survey report showed the economic contributions of their labor,[169] and three additional reports, produced by governmental institutions, suggested to incorporate waste pickers into the disposal process.[170] The former supported their claims to the value of their labor and fair compensation in the form of housing, while the latter argued waste pickers' recycling performance would benefit the city's waste disposal facilities.

Among the three disposal plans, Seoul City's 1985 Sanitary Mounding Landfill Plan explicitly translated the monetary value of their labor into a revenue source for the city, subsuming their labor under its management. According to the report, 1,500

[168] The legal foundation of recycling had to wait another two decades until the Act on Promotion of Saving and Recycling of Resources was mandated in 1992.

[169] Waste pickers at the Nanjido Landfill conducted their own survey and compiled a report that they used to negotiate with the city for housing. Among 802 households with 3,200 dwellers in 1983, 110 individuals participated in the survey. The average approximate monthly income was 21,000 wŏn (212,670), and the entire recyclable sales were 234 million wŏn; annual sales amounted to over 2.8 billion wŏn. Nanjido saemaul wiwŏnhoe, *Silt'ae chosa*.

[170] The rest of the reports are as follows: Hwan'gyŏngch'ŏng et al., *Kohyŏng p'yegimul*, 256-259; Han'guk kwahak kisurwŏn, *Tosi kohyŏng p'yegimul*, 118-119; JICA, *Master Plan*, 94-97. These reports also refer to figures published in the Nanjido waste pickers' survey report.

waste pickers working in the Nanjido landfill could retrieve 84,000 tons of recyclables per year (approximately 4% of inbound waste), generating 4.23 billion wŏn in annual sales. It proposed to incorporate waste pickers into the formal landfilling process and charge them a fee for access to waste equal to 20% of their sales income through which the city could generate annual revenue of 846 million wŏn, sufficient to cover 94% of annual landfill maintenance costs. Without a fee, the report estimated that a waste picker would earn 235,000 wŏn per month; the 20% fee reduced their income to 188,000 wŏn. Nonetheless, the city argued that the after-fee income was still comparable to a day laborer's wage (6,000 wŏn per day), allowing them to generate profit from their labor. Subsuming the entire workforce of landfill waste pickers presented the city with a substantial revenue opportunity that would reduce the fiscal burden for sanitary landfill operation.[171]

Once the state discovered the economic value of waste, it reacted by enclosing it. When municipal waste management was unsophisticated and there were no recycling programs, waste served as a common pool of resources for the urban poor from which they could scavenge recyclables for their livelihood.[172] Because there were no strict property rights over disposal facilities or waste materials, landfill waste pickers autonomously organized their labor and arranged the sales of recyclables without city oversight; they owned their means of production (material waste) and had collective control over their labor process. More importantly, their labor maintained the metabolic relationship between urbanites and their living environment by returning the material remnants of urban life to the production process. However, by turning waste pickers into city's contracted laborers, they would be separated from the

[171] Despite the "backwardness" of waste pickers scavenging in an admittedly sanitary landfill, the plan advised the city to keep waste pickers because their work was profitable. Sŏul siriptae sudokwŏn kaebal yŏn'guso, *Wisaeng maerip*, 199-202.

[172] Anthropologist Patrick O'Hare suggests that once the state or capital recognizes the value of waste—a value that was often discovered and defined by waste pickers-they claim property ownership over waste; it is then the enclosure of waste begins. Patrick O'Hare, *Rubbish Belongs to the Poor: Hygienic Enclosure and the Waste Commons* (London: Pluto Press, 2022).

means of production by depriving them of unfettered access to waste, dispossessing them of fair compensation for their labor, and severing their autonomy and connection to the labor process.

This enclosure of waste demonstrates how, in informal waste recycling, human labor becomes a crucial means of reproducing the conditions of capital accumulation. Geographer Vinay Gidwani refers to the informal waste transformation economy (e.g., recycling, repurposing, and reprocessing) as an "infra-economy" and its labor as "infra-structural labor": a form of economy that is critical to the production of urban space and capitalist accumulation but receives little recognition.[173] These concepts emphasize invisible or erased forms of labor that reproduce capital's conditions of production, asking how and where such (in)visibility and erasure operate.[174] In formulating disposal methods, we notice that modern waste disposal facilities, with their increased capital investment and technical expertise, complicate the question of property and ownership over waste materials. Waste enclosure and the subsumption of waste pickers raise two competing questions: does the city owe waste pickers for their recycling labor or does the city have the right to charge waste pickers a fee for access to waste? The city sought to profit from waste pickers' labor by instituting a new division of labor: the city serving as the superintending authority and waste pickers as city's contracted laborers.

Neither plan—creating a sanitary landfill or formalizing waste pickers and their labor—eventually came to fruition. However, ideas to transform waste into a profitable resource hint at the emergence of new approaches to the waste problem. During the height of the industrialization and urbanization period, waste was viewed as external to production and a hindrance to urban development and growth. When waste problems—its containment and environmental and health concerns—threatened the conditions of accumulation and urbanization, the state and capital reintroduced

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[173] Vinay Gidwani, "The Work of Waste: Inside India's Infra-Economy," *Transactions of the Institute of British Geographers* 40, no. 4 (2015): 575-95; Vinay Gidwani and Anant Maringanti, "The Waste-Value Dialectic: Lumpen Urbanization in Contemporary India," *Comparative Studies of South Asia, Africa and the Middle East* 36, no. 1 (2016): 112-33.

[174] Gidwani extends what Marx identified as the "conditions of production" to capital's "general" and "external" infrastructure and the labor that produces them. Gidwani, "Waste," 577.

waste either through appropriating informal labor or privatizing the material recovery process (ranging from mundane paper and glass to rare metals and energy). Nevertheless, exploiting and appropriating the waste pickers' labor still remained an afterthought: it was unable to address waste generation itself and its consequences.[175]

Apart from enclosing waste from existing recyclers, another recycling effort sough to incorporate citizens through pilot separation programs. In the late 1970s, source separation first was initiated for specific high-volume waste materials, starting with coal ash. The invention of ash-based brick production technologies and the 1979 establishment of a brick plant prompted the city to separate ash from other household waste for brick production.[176] In the early 1980s, pilot recycling programs were launched again, this time separating burnable and unburnable waste for incineration.[177] In both cases, the lack of separate receptacles for households or carriers for municipal waste collectors hampered separate collection, let alone the eventual failure of both the brick production plant and waste treatment plant. More efficient, well-functioning recycling efforts continued such as introducing different collection days, establishing

[175] There were, albeit infrequently, voices that raised concerns about pollution in relation to production and consumption. *Maeil Kyŏngje*, one of the economic newspapers, criticized the social cost of industrial pollution, claiming that it demonstrated the irrationality of the mode of production. *Maeil kyŏngje*, June 1, 1972. *Tonga Ilbo*, a major newspaper, also indicated the intrinsic relationship between waste and the whole process of production, consumption, collection, and disposal; and that the collection process should be designed in consultation with recycling plans. *Tonga Ilbo*, December 17, 1979.

[176] Each day, the brick factory used 100 tons of ash to produce 100,000 bricks. In addition to the inability to obtain ashes from municipal waste collection, the moisture absorbency of the bricks rendered them unsuitable for construction. Over the 1980s, the amount of coal used in domestic heating decreased, as did the need to recycle it. "Yŏnt'anjae pyŏktol kongjang chun'gong nanjido haru 5-manjang saengsan [Ash Brick Factory in Nanjido, Producing 50,000 Units Per Day]," *Tonga Ilbo* February 27, 1978; "Sŏul-si sŏ seun yŏnt'anjae pyŏktol kongjang 1-yŏn 4-kaewŏl tchae hyuŏp [Seoul's Ash Brick Factory was closed for a year and four months]," *Chungang Ilbo*, February 7, 1981.

[177] "Nanjido, kangdong, kangsŏ, tobong ssŭregi sogakchang ŭl kŏnsŏl 87-nyŏn kkaji [Constructing incinerators in Nanjido, Kangdong, Kangsŏ, and Tobong by 1987]," *Tonga Ilbo*, March 3, 1983.

collection points, or installing separate receptacles for recyclable items.[178] These recycling programs sought citizen participation to reduce the amount of waste sent to landfills, focusing on housewives as the primary agents of change. Without a concrete, long-term disposal system, however, pilot programs were frequently phased out.

In 1993, the opening of a sanitary landfill transformed waste collection and disposal. Seoul selected sanitary landfilling as its primary disposal method: it opted to separate recyclable materials from household waste and sought to minimize the amount of waste sent to the landfill. At the new sanitary landfill in Kimp'o, the residents' committee inspected incoming waste and imposed penalties on municipalities whose waste contained recyclables. A legal and institutional framework followed: launching nationwide source separation in 1991; mandating the Act on Promoting the Saving and Recycling of Resources in 1992; and implementing the volume-based waste fee system (VBWF, Ssŭregi chongnyangje) in 1995, a new nationwide disposal scheme based on a pay-as-you-throw disposal system that further required individual households to recycle.

CONCLUSION

Waste was alternately deemed a nuisance to urban life and sanitation or a potential economic resource. This duality explains why managing waste was fragmented between different ministries and administrative bodies. Despite the diverse range of public authorities who attempted to grapple with waste issues, they all approached waste management as a scientific, technological, and professional matter. In the imperatives of development, waste was presented as a renewable, recoverable

[178] "Ssŭregit'ong 2-kae isang kajŏng pich'i kwŏnjangk'iro [Encouraging Households to Install Two or More Waste Bins]," *Kyŏnghyang Sinmun*, January 19, 1985; "Ssŭregi-yŏnt'anjae kubun yoilbyŏl pulli sugŏ [Differentiating Collection Days for Garbage and Ashes]" *Chosŏn Ilbo* May 30, 1990; "Ilban, yŏnt'anjae, chaehwaryongp'um naenyŏn put'ŏ ssŭregi 3-chong pulli sugŏ [Beginning Next Year, Separate Collection of General Waste, Ashes, and Recyclables]" *Kyŏnghyang Sinmun*, July 24, 1990.

"resource" as recycling provided a means to save foreign currency while also alleviating the obstacles imposed by finite resources both domestic and global. In developing national and municipal disposal policies, less consideration was given to the fundamental causes of environmental degradation and resource depletion: the cost and consequences of unfettered economic growth. Waste was the epitome of the wastefulness ingrained in economic growth and the process of development.

The formation of modern waste management entailed standardizing, automating, and domesticating parts of waste labor, whether sanitation workers, informal waste pickers, or ordinary citizens who separated recyclable materials at home. During its development, day-to-day waste labor was frequently left to the city's low-rank sanitation workers or the urban poor. In the absence of adequate collection and disposal infrastructure, they served as a form of urban infrastructure. Although their labor was integral to waste management practices and urban life, it was often treated as low-tech, labor-intensive, and, to some extent unfairly, unskilled work requiring modernization through mechanization and automation. The social necessity of their labor—maintaining the conditions of urban life—was of less concern than the pursuit of a modern waste management system.

Technological solutions to the waste problem did not address the political question of what to do with the urban poor and especially their labor. Some state measures, such as waste picker camps and waste picker settlements at the Nanjido Landfill, brought the urban underclass under the state's purview while allowing the state to appropriate their labor at a low, even non-existent, cost. The discovery of waste's potential profitability, on the other hand, resulted in waste's enclosure, removing informal waste pickers' means of production and subsuming their labor to the benefit of the state and capital. Further, the institutionalization and professionalization of waste management introduced new ways of thinking about and dealing with waste and, on this basis, it integrated recycling practices into the daily lives of citizens. As a result, recycling, especially the physical handling of waste, was divided into two distinct categories: subsistence labor in the informal waste economy and civic duty in ordinary households, the latter removing the stigma associated with the

former. The chapters that follow investigate how this shift occurred between the 1960s and the early 1990s, and how such changes were embedded in the material, discursive, and spatial dimensions of waste.