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Expand Waste Management System to Medium/Small Cities and Rural Area

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The fate of all Indonesia's plastic waste, in each archetype (million tons per year, 2017)

| | Mega Cities | Medium and Small Cites | Rural | Remote | Total |
|------------------------------------|-------------|------------------------|-------|--------|-------|
| Total Generation | 1.6Mt | 1.8Mt | 2.5Mt | 0.9Mt | 6.8Mt |
| Leakage into Sea, Lakes and Rivers | 4% | 8% | 12% | 15% | 10% |
| Dumping on Land | 1% | 3% | 8% | 8% | 5% |
| Open Burning | 21% | 45% | 61% | 64% | 48% |
| Official dumpsites | 3% | 3% | 14% | 15% | 9% |
| Managed Disposal | 51% | 29% | 0% | 0% | 20% |
| Recycling | 20% | 12% | 5 % | 0% | 9% |

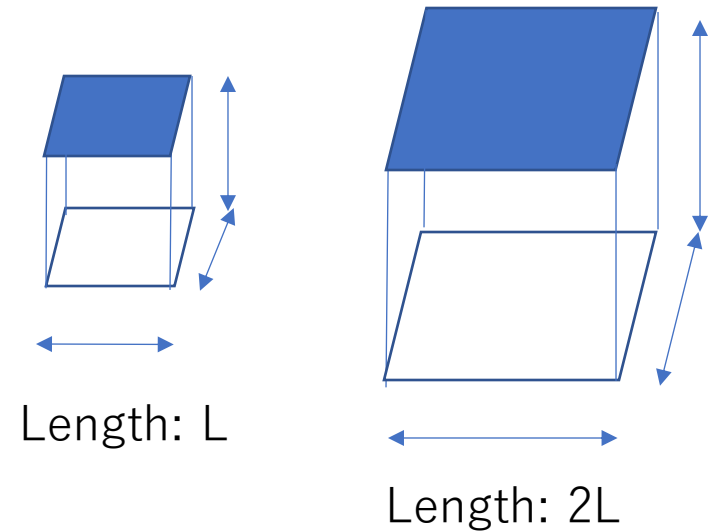
The estimated total plastic-waste generation of 6.8 million tonnes per year requires further research to reconcile with industry production and importation estimates. Further research and action are also required to assess and then reduce plastic pollution from primary microplastics (small plastic particles from sources including textiles, tyre dust and personal care products) and maritime waste (plastic pollution at sea, primarily from shipping and fishing industries).

Source: World Economic Forum (2020) *Radically Reducing Plastic Pollution in Indonesia: A Multistakeholder Action Plan: National Plastic Action Partnership.*

Economies of Scale in Waste Management

- Theoretical Explanation

- Construction cost of incinerator or landfill site is basically proportional to surface area of the facility. In other words, the proportional to the square of the length. The capacity of the treatment is proportional to volume, which is proportional to the cube of the length. (Fujii, 2005)



- Empirical Studies

- Bel and Warner (2014) reviews recent multivariate econometric studies on inter-municipal cooperation and cost. Among 7 studies deal with solid waste management, 5 studies found inter-municipal cooperation saves cost significantly.
- Sasao (2020) also verified the economies of scale in waste management, using data in the Philippines.

Area of surface
= $6L^2$

Volume
= L^3

In this case, capacity of treatment (volume) becomes 8 times, while construction cost (Area of Surface) only increases 4 times.

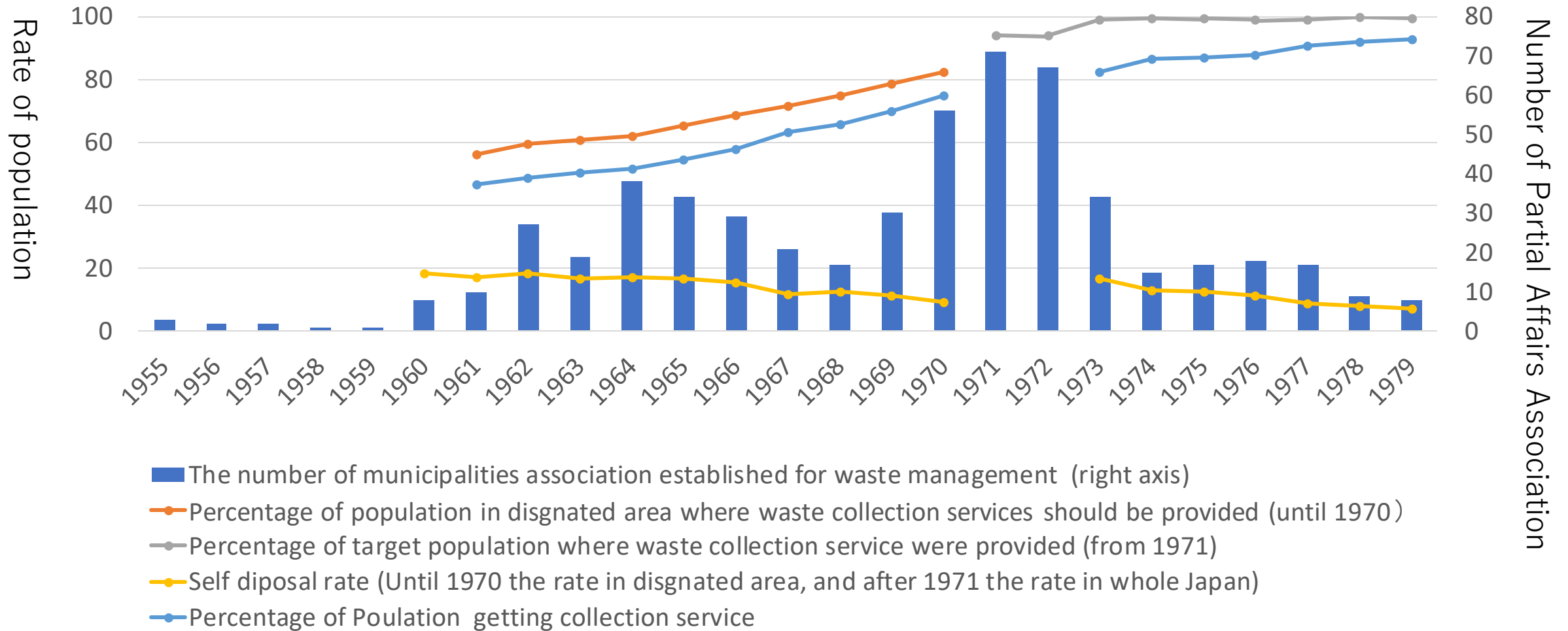
Area of surface
= $24L^2$

Volume
= $8L^3$

Japanese Experiences

- The Waste Cleaning Act was enacted in 1900, under pandemic of Plague. City governments were mandated to conduct waste management was only cities.
- The Public Cleaning Act was enacted in 1954.
 - Waste management services should be provided in designated area, which are cities and other area where governor of prefecture specified.
 - In 1961, in terms of population, the share of designated area including cities is 56.3%. Even designated area, 18.3% of them did not receive waste collection services.
- Waste Management and Public Cleansing Act was enacted in 1970
 - Designated area for waste management was deleted in new Act. All cities, towns and villages should conduct proper waste management.
 - Many cities, towns and villages formulated Partial Affairs Association to treat and dispose waste
 - In 1970, population in designated area was 82.5% of total population, while 9.2% in designated area did not get waste collection services. In 1980, population planned to get waste collection services was 99.4% of total population.

Number of Established Partial Affairs Association concerning Waste Management



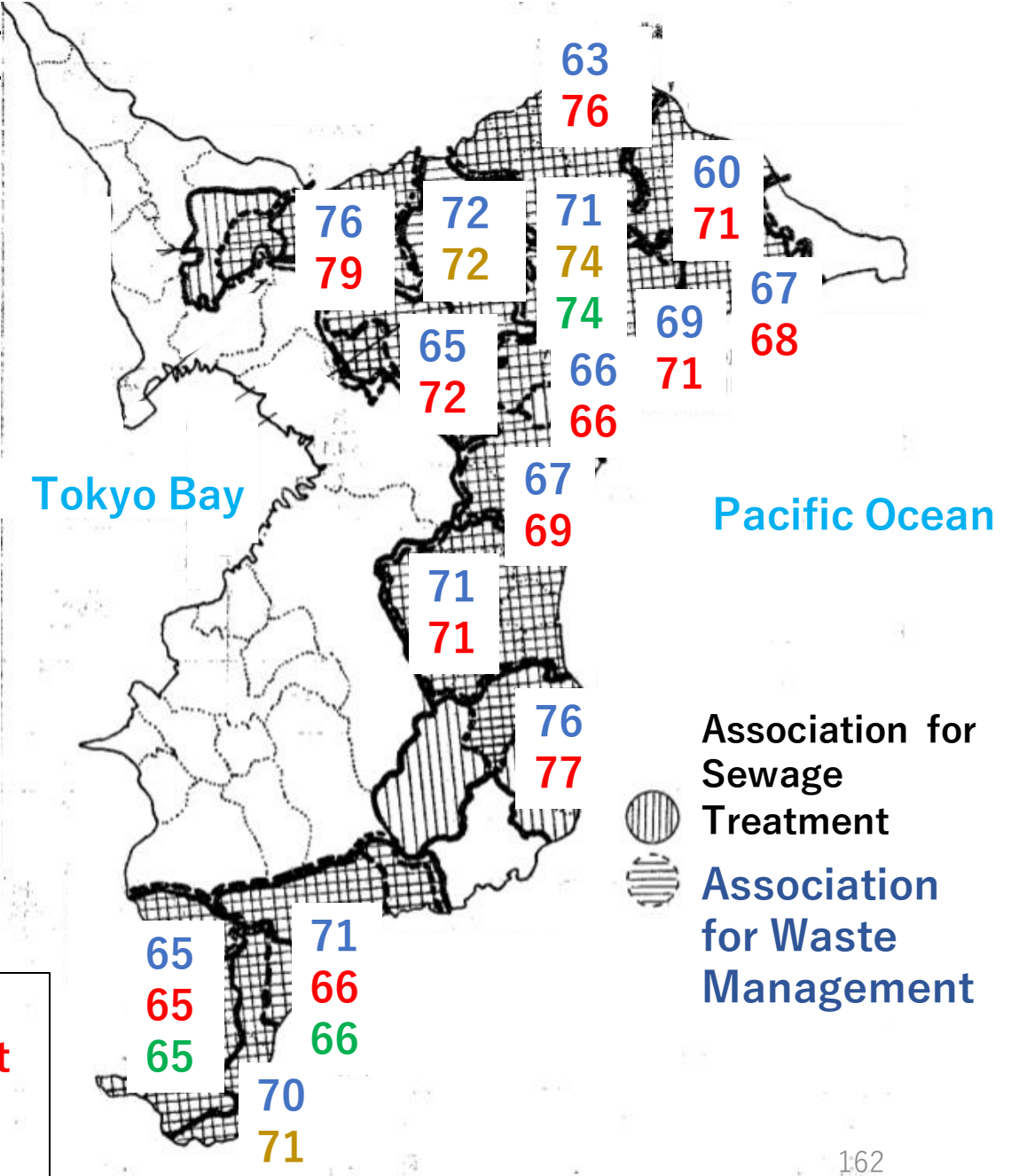
Regional Waste Management in Chiba Prefecture in 1960s and 1970s.

Number of Association with Waste Treatment/Disposal Facility

| | 1960 | 1965 | 1970 | 1975 |
|---------------------------|----------|----------|----------|----------|
| | -64 | -69 | -74 | -79 |
| No. of Association | 0 | 5 | 7 | 3 |

Number of municipalities in an association: 2-11.
 Number of Partial Affairs Association consisting of cities and town/villages: 10.
 Number of Partial Affairs Association consisting of town/villages: 5.

Year of Establishment of Association
Year of Operation of Incineration Plant
Year of Treating Bulky Waste
Year of Operation of Landfill



Types of Regional Waste Management

| | Types | Example | Explanation |
|-----------------------------|------------------------------------|---|--|
| Inter-municipal cooperation | Regional Government Scheme | Waste-To-Energy plant planed in West Jawa, Indonesia. Provincial government lead the scheme, instead of city and other municipalities. | Regional government make agreement with local governments in the region and accept waste from them. |
| | Leading Municipality Scheme | Waste to Energy Plant in Phuket, Thailand (Phuket city contracted with surrounding municipalities to receive waste. The city also contacted with private company which construct and operate waste to energy plant. | A municipality hosting waste treatment or disposal facility make agreement with and receive waste from other municipalities. |
| | Municipalities' Association Scheme | Partial Affairs Association in Japan | Local governments formulate association to treat and/or dispose waste jointly. |
| | Private Sector Leading Scheme | Some private landfills accepting ashes from Waste-to-Energy plants in Japan. Some private landfills and RDF Plants in Thailand. | Private sector operates waste treatment and disposal facility which accept waste from multiple local government. |

References

- Bel, Germa and Mildred E. Warner (2015) “Inter-municipal Cooperation and Costs: Expectations and Evidence” *Public Administration*, Vol.39, No.1, pp.52-67
- Fujii, Minoru (2005) “Advantage and Disadvantage in Regional Waste Management” *Waste Management Research* Vol.16, No.6. pp. 328-333. (in Japanese with English abstract)
- Kojima, Michikazu (ed.)(2020) *Regional Waste Management – Inter-municipal Cooperation and Public and Private Partnership*, EIA and IDE-JETRO. <https://rkcmpd-eria.org/publication/18>

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- Ch.4 Cost Efficiency of Regional Waste Management and Contracting Out to Private Companies
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- Ch.6 Internal and External Factors in the Development of Regional Waste Cooperation in the Greater Bandung Region
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- Ch.8 Clustering and Public–Private Partnerships: The Tools of Municipal Solid Waste Management Reformation in Thailand