For 100% Recycling of Waste in JEJU!

Background

As a resident of Jeju island, I was confronted with the following news about waste: "**Research showed a significant lack of waste management centers in Jeju. Many landfill sites are operating overtime, and some have been dug up again even after being filled up. Different types of waste were mixed up in many.** The Jeju environmental activist association advocated policies to reduce household waste, and the modernization and activation of recycling centers."

Our group aims to (1) compare and contrast Jeju's current recycling situation with other cities and (2) find problems & ways to improve waste management in Jeju.

Analysis of Jeju's status quo regarding waste

Data Collection

Because we aim to conduct data analysis by complete observation, we used Statistics Korea's most recently updated data. This could be found in **KOSIS, the national Statistics portal**. (https://kosis.kr)
Waste can be categorized into household waste (rubbish), commercial waste, and biomedical waste. This analysis will primarily be concerned with household waste.
We used data about...
- Each administrative district (e.g. population)
- The amount of household waste
- Household waste treatment
- Household waste management budget and use

* Only data for each day was used

1 Korea's Recycling Status

In Korea, household waste is collected as
(1) common waste (non-food waste that can be recycled such as plastic, paper, aluminum cans) or (2) food waste, and (3) volume-based waste (waste that cannot be recycled such as rubber or dirty plastic)

Waste Disposal Type

46% of waste was disposed as volume-based waste (VBW)

[Recycle Rate per Waste Discharge Type]

1 **For CW and food waste, nearly 100% were recycled**
➔ If waste sorting was done better on the household/individual level, recycling could become more efficient

2 **Only 18% of VBW could be used for recycling**
➔ Required additional labor to re-sort waste that was disposed as VBW

3 Common Waste by Type

4 VBW by type

3 CW could be categorized into paper, plastic, bottles, and can, all of which could be recycled

4 **VBW is sorted at local centers, and some are recycled, but most were sent to landfills or incinerated.**
- Plastic was 20% of VBW. During incineration, they could produce Dioxin, a highly toxic compound.
- When buried in land (especially coastlines), takes 450+ years to decompose. In the process, microplastic could have serious impacts to the marine ecosystem
➔ Plastic must be recycled, as much as possible.

Recent Trend in Waste Increase (5 Years)

Disposal Type

VBW Management Type

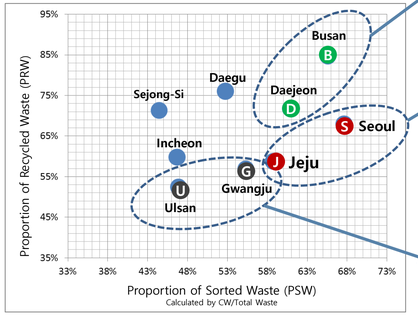
* Refers to plastic within VBW

VBW Plastic Management Type

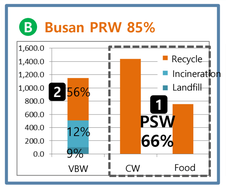
- **Total waste increased by 12% (VBW by 15%, common waste 11%, Food waste 9%)**
➔ Waste is constantly increasing, so waste management will only become more important
- **Amount of waste that was incinerated grew by 9%, while landfills decreased by 4%. Recycling increased by 17%**
➔ The increase in proportion of recycled waste must be a positive phenomenon. But, the amount of waste that is incinerated or buried is still more than 4.4 times of what is recycled.
➔ Methods to resolve this problem is necessary
- **Incineration is preferred to landfills, and amount of plastic incinerated grew by 36%**
- **Amount sent to landfills increased by 13%, and amount Recycled increased by 155%**
➔ Increase in the proportion of recycling is a positive signal, but the proportion of incineration is 60% worldwide, and is quickly increasing

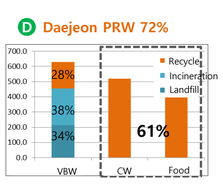
2 Comparison of Recycling Rates between Korean Major Cities

By plotting the correlation between the proportion of sorted waste and the proportion of recycled waste in each Korean major city, we can classify the following three clusters

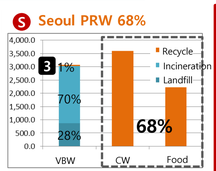


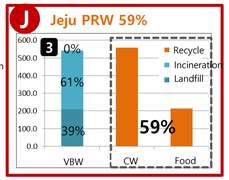
Cluster 1
Cities with high PSW and PRW



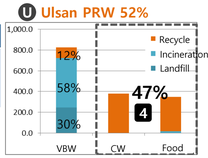


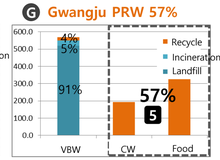
Cluster 2
Cities with high PSW but low PRW because of not recycling VBW





Cluster 3
Cities with low PSW and PRW





- Type 1) The most ideal city for waste management was B Busan
1 ➔ PSW High (66%), and also
2 56% of VMW was recycled, which contributed to the total PRW of 85%. Both proportions are exceptionally high.

- Type 2) S Seoul and J Jeju
3 did not recycle VMW
➔ A portion of VMW were plastic that could have severely negative impacts on the environment, so additional analysis seems necessary

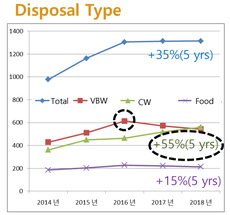
- Type 3) U Ulsan and G Gwangju have a low PSW of 4 47% and
5 57% respectively. Both also had low PRW
➔ Could benchmark Type 1 cities to enforce recycling policies and improve waste management systems.

3 Analysis of Jeju's Waste Recycling

Jeju Special Self-Governing Province is a special district in South Korea; it is one of the nine provinces in Korea, and the only island of the nine provinces. Due to its geographic singularity, it is regarded as a self-governing region in the country.

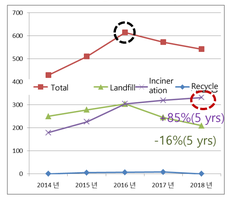
Trend in amount of waste produced for the last 5 years

Disposal Type



- Total waste increased by 35% for the last 5 years
- Positive that amount of CW has increased by 55%
- VBW is decreasing since 2016

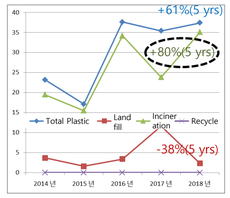
VBW Management Type



- Amount of VBW is on declining since 2016
- Amount sent to landfill decreased by 16%, but that of incineration rose by 85% (almost twice)
- Recycle rate is almost 0%
➔ Because Jeju is suffering from lack of landfills, it has a high incineration rate

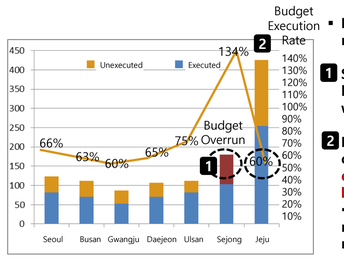
* Refers to plastic within VBW

VBW Plastic Management Type



- Plastic within VBW increased by 61%
- Plastic is mostly incinerated, and recycle rate is 0%
➔ Must fundamentally be solved to overcome environmental problems

Household Waste Management Budget per Capita (HWMBC)



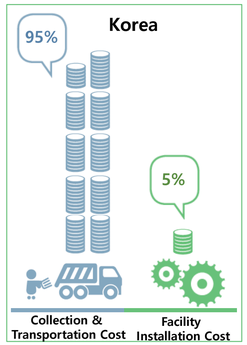
- Korea's average budget execution rate is 67%

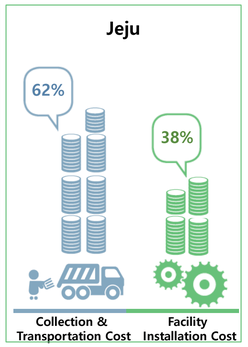
1 **Sejong city, a new town, is over the budget by 34% (Actively combating waste problems)**

2 **HWMBC of Jeju is higher than other cities. However, the budget execution rate is 60%, which is the lowest among all cities**
➔ Because Jeju already allocates much budget to household waste management, the budget must be used more actively for solving waste problems.

Comparison of Budget Use

- Jeju uses more budget on facility installation compared to other cities, but Jeju still lacks landfills as most of the facility installation costs are used for incineration centers.
➔ Incineration has a limit, so a long-term plan involving recycling and landfills are needed.





Conclusion

When plastic is buried into the ground, 450+ years are needed for natural decomposition. In the case of incineration, Dioxin is produced. Also, there is a distinct lack of landfills in Jeju.

The ultimate solution is to reduce waste, and actively recycle plastic.

To this end,
1. We must increase waste sorting and reduce the amount of VBW. We need more education and campaigns about waste sorting.
2. Ideas such as a ECO mileage system that provides benefits to regions with decreased VBW could also be helpful.
3. Municipalities must also help to minimize incineration and landfilling VBW. Budget planning must be more realistic, and be executed.
4. Governments and Municipalities must consistently diagnose the status quo and improve upon it.

In my community, Jeju, waste sorting is relatively active, whereas the low rate of recycling is a major problem. Improvements such as more active budget execution are needed.

Ideas for Further Research

From PRW to budget, different cities largely varied in many areas. We could expand upon these areas to different countries to consider more cases.

There is potential to develop a transnational environmental agreement supported by collecting and analyzing international household waste data.