



Factors Related to Waste Disposal Behavior of Residents Near Canals

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Introduction

- Many South East Asian cities experience flood frequently



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What caused this??

- The aim of this study is to clarify the **factors that inhibit appropriate waste disposal behavior near canals** and waterways.

Hypothesis

- According to the theory of planned behavior, people's behavior are affected by perceived behavioral control, attitude, norms(e.g. Ajzen 1991, de Leeuw et al. 2015)
 - In addition, environmental value, perceived quality of environment, willingness to act to improve the current living environment were selected as potential factors

Hypothesis 1: Residents near the canal are disposing waste into the canal

Hypothesis 2: The following factors induce such waste disposal behavior

- | | |
|--|------------------------------------|
| ✓ Perceived behavioral control (access to waste collection points) | ✓ Descriptive and injunctive norms |
| ✓ Perception of risks of dumping waste into canals | ✓ Willingness to act |
| ✓ Attitude towards inappropriate waste disposal | ✓ Environmental value |
| | ✓ Perceived quality of environment |

Study framework

- Study target: residential areas near canals that suffer from frequent flooding and wastes are visible in those canals → **Lat Phrao canal, Bangkok, Thailand***
- Study method
 - Field investigation and interview → clarify the **current housing, waste collection, canal management conditions** near Lat Phrao
 - Face to face questionnaire survey → people's waste disposal **behavior and factors** that relate to that behavior



Survey target

- Responses were collected from people residing along Lat Phrao canal (n=355)

Community Name	Number of collected responses		Number of Household	Waste Collected by...		Redevelopment status		
				Boat	Car	Completed	Partially	planned
Thai-Yeepun	40	62%	65	✓			✓	
Lad Phrao 80	38	29%	129	✓				✓
Kaow Ha	35	15%	227	✓	✓			✓
Lad Phrao Pracha Uthit	32	39%	82	✓	✓		✓	
Chai Klong Bang Bua	37	10%	372	✓				✓
Ruen Mai Pattana	40	19%	210	✓	✓	✓		
Saphan Mai 2	45	22%	206	✓			✓	
Saphan Mai 1	28	26%	106	✓			✓	
Samackee Ruam Jai	26	19%	136	✓	✓	✓		
Klong Bang Bua	34	26%	129	✓	✓	✓		

Result 1: waste collection near Lat Phrao (1/2)

- Daily household wastes were collected by district officers from **municipal waste bins** located at **collection points**
- District officers collect these wastes from **boats** every day
- Bulky wastes are also disposed of at the collection points and are collected once a week (It is also common for residents to give bulky wastes to junk buyers)



Result 1: waste collection near Lat Phrao (2/2)

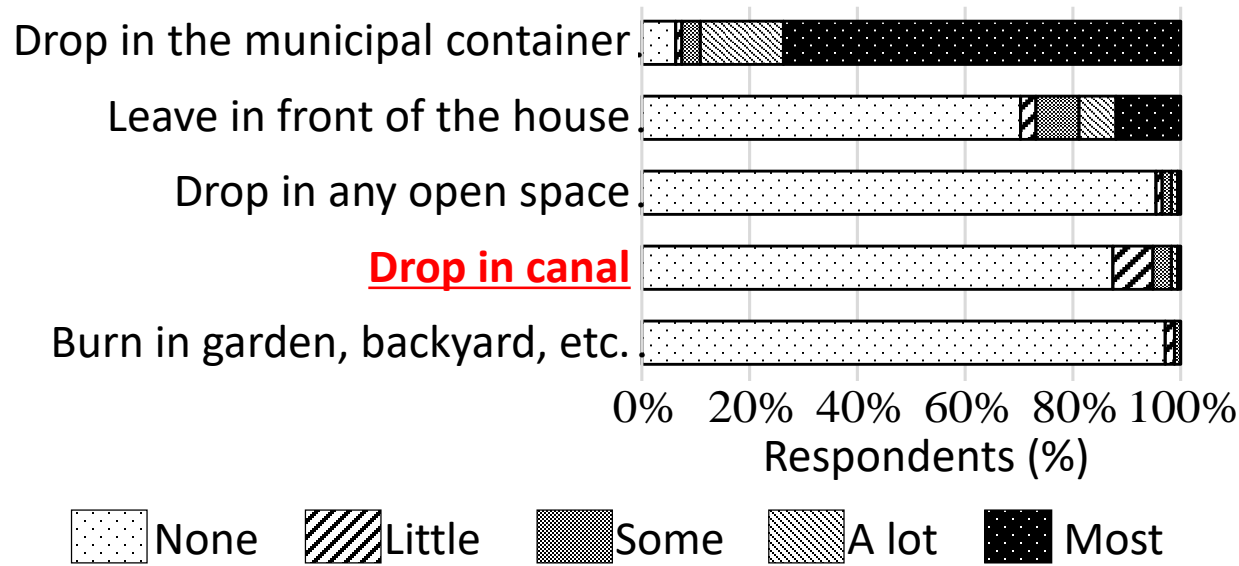


Fig 1. Household waste disposal behavior (n=355)

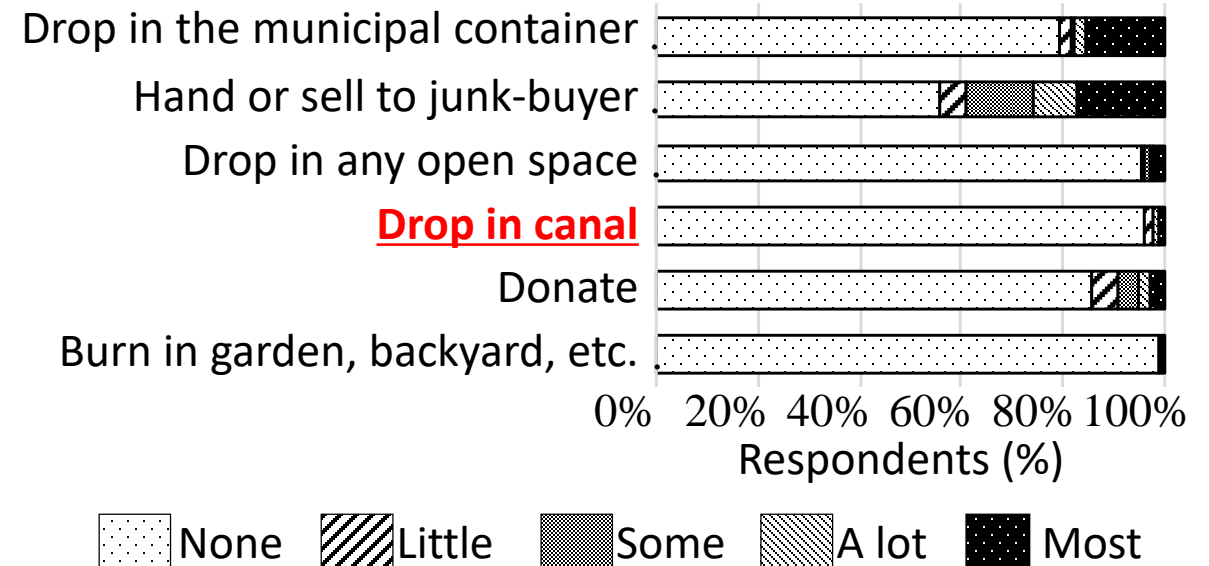
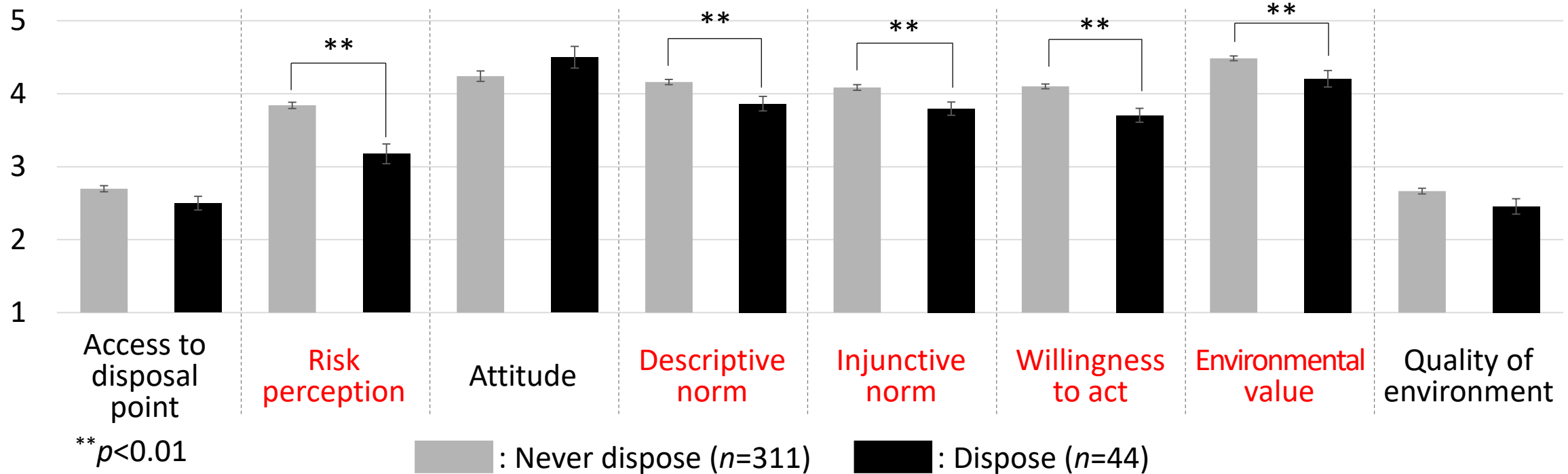


Fig 2. Bulky waste disposal behavior (n=355)

- **12% (household waste)** and 4% (bulky waste) of the respondents said that they **dropped it into the canal**
- About **58%** of the respondents said that the **container** they usually use for waste disposal was **regularly full**.

Result 2: Factors affecting waste disposal behavior



- People who disposed of waste into the canal had significantly lower scores for risk perception, descriptive and injunctive norms, willingness to act for the betterment of the environment, and environmental value than those who disposed of none of their waste.
- The difference in access to a disposal point between the two groups was not statistically significant.

Result 2: Factors affecting waste disposal behavior

- Results of the **Logistic regression analysis** suggest that higher risk perception, greater willingness to act for community cleanliness, and higher perceived quality of the environment lead to a lower chance of waste disposal in canals.
 - ✓ Dependent variable: Whether or not a person have ever dropped waste in canal
 - ✓ Independent variables: potential factors (see table 1 in the abstract)

Table 1 Logistic regression results

	β	SE	P-value	Exp(β)
Intercept	5.516	1.382	0.000	173.502
Risk perception	-0.896	0.217	0.000	0.408
Willingness to act	-0.644	0.310	0.038	0.525
Quality of environment	-0.562	0.269	0.037	0.570

*Hosmer-Lemeshow goodness-of-fit test: P = 0.967., Nagelkerke R² = 0.18

Discussion

• Hypothesis 1: Residents near the canal are disposing waste into the canal

- Household wastes are easily observed in the canal in the study area
- Timbers and plastic packaging were the major components of the wastes collected in the canal (Ishigaki et al. 2018)
- Most of the residents said they mostly used municipal containers for waste disposal and dropped none of their waste into the canal
- Nearly 60% of the respondents stated that the municipal containers they used were always full

→ Some people do, but mostly don't

→ Unintentional disposal (i.e. overflowing or fall of loose waste from collection points) is one of the main cause of household waste in the canals

**did people completely disclose their waste disposal behavior...?*

Discussion

• Hypothesis 2: The following factors induce such waste disposal behavior

- ✓ Perceived behavioral control (access to waste collection points)
- ✓ Perception of risks of dumping waste into canals
- ✓ Attitude towards inappropriate waste disposal
- ✓ Descriptive and injunctive norms
- ✓ Willingness to act
- ✓ Environmental value
- ✓ Perceived quality of environment

- Our statistical analysis suggested that people who have higher risk perception are less likely to dispose of waste into the canal
- It was also suggested that people who enjoy their current environment and who are willing to take actions to improve the environment are less likely to dispose of waste into canals

→ Those who intentionally dispose waste into canals do so because they are not well aware of the consequences

→ People who place greater value on their living environment dispose less

**the statistical analysis need to be refined/verified further*



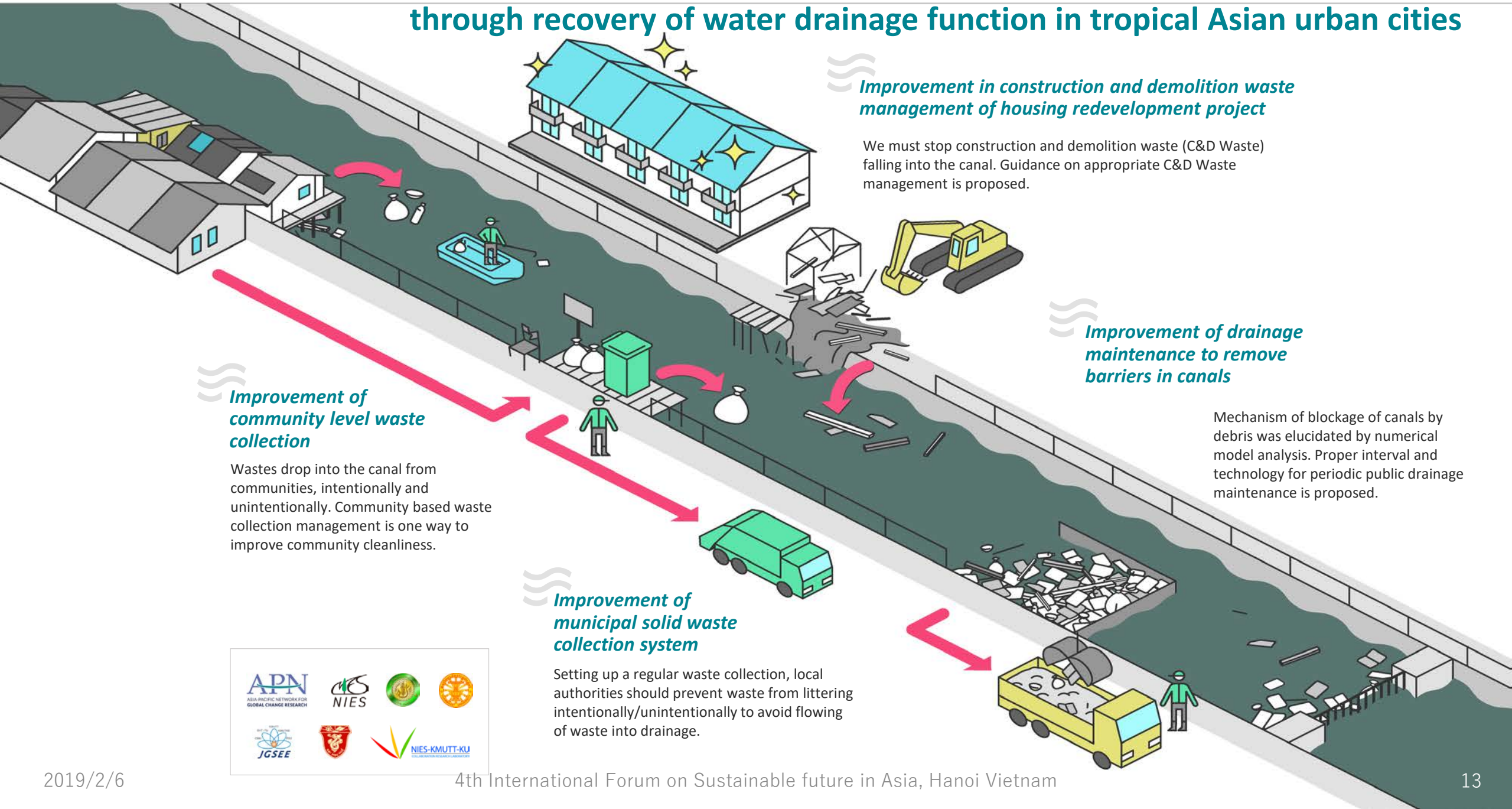
Conclusions

- Unintentional disposal (i.e. overflowing or fall of loose waste from collection points) is one of the main cause of household waste in the canals
- Those who intentionally dispose waste into canals do so because they are not well aware of the consequences

Recommendations

- Improve the **management of waste collection points** to avoid unintentional disposal of wastes into canals
- Improve the **overall quality of the living environment** in places where many untended wastes are observed

Appropriate Solid Waste Management towards flood risk reduction through recovery of water drainage function in tropical Asian urban cities



Improvement of community level waste collection

Wastes drop into the canal from communities, intentionally and unintentionally. Community based waste collection management is one way to improve community cleanliness.

Improvement in construction and demolition waste management of housing redevelopment project

We must stop construction and demolition waste (C&D Waste) falling into the canal. Guidance on appropriate C&D Waste management is proposed.

Improvement of drainage maintenance to remove barriers in canals

Mechanism of blockage of canals by debris was elucidated by numerical model analysis. Proper interval and technology for periodic public drainage maintenance is proposed.

Improvement of municipal solid waste collection system

Setting up a regular waste collection, local authorities should prevent waste from littering intentionally/unintentionally to avoid flowing of waste into drainage.





Future directions

- Difference of risk perception between upstream residents and downstream residents should be analyzed
- Find out the impact of knowing “waste catchment area” in the canal can affect the risk perception of residents
- In-depth interviews to be conducted in selected communities to find what factors induce “appropriate waste disposal behaviors”



Acknowledgements

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