



# Local initiatives towards zero waste in developing countries: Learning from Phitsanulok Municipality, Thailand

Janya Sang-Arun

Policy researcher  
Sustainable Consumption and Production Group  
Institute for Global Environmental Strategies (IGES)

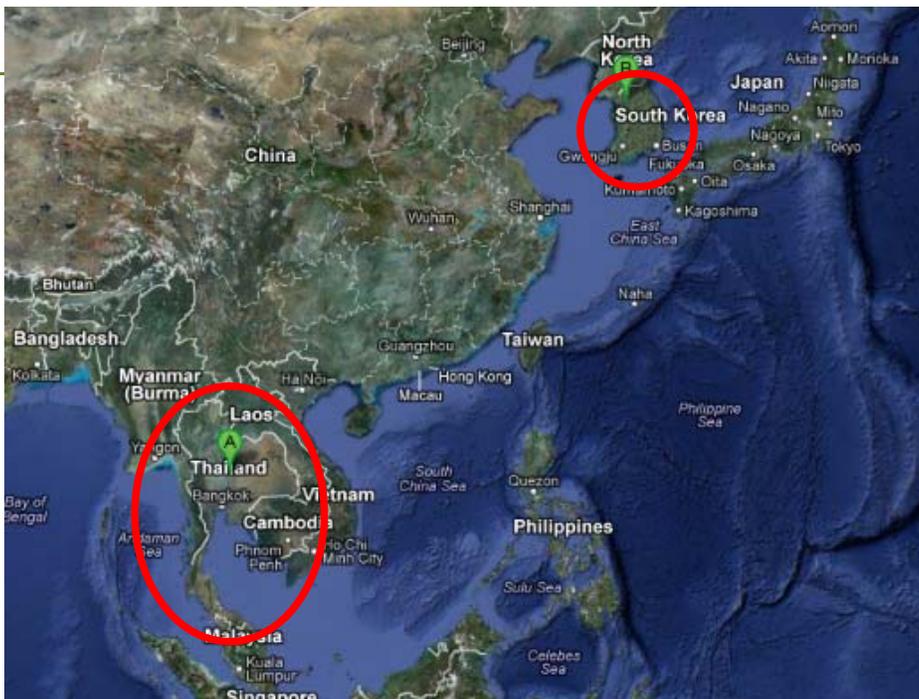


IGES-SCP

Phitsanulok zero waste model



## Geographical location

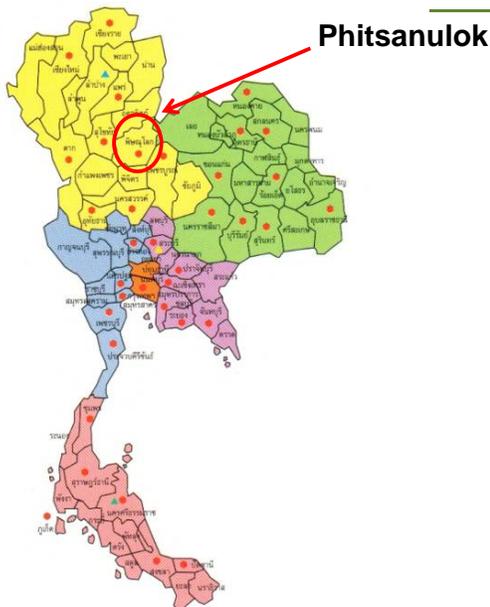


## Overview of municipal solid waste management in Thailand

- Thailand has about 67 million people
- Waste generation is 16 million tonnes/year
- Waste composition is 64% organic waste, 30% recyclables, 3% hazardous waste, and 3% others
- 80% of waste is collected
- Only 35% of generated waste is properly disposed
- 26% of waste was recycled and recovery (as of 2011)

Source: PCD 2012

## Phitsanulok Municipality



- 18.26 km<sup>2</sup> of municipal area
- 24,000 households
- 90,000 registered population
- 50,000-100,000 non-registered
- Waste generation in 2011 is about 76 tonnes/day
- Estimated waste composition is 40% organic, 40% recyclables, 20% others

## Driving force of the zero waste policy in Phitsanulok Municipality

- Rapid increase of waste generation (1.5 kg/person/day)
- The municipality changed open dumping sites very often and each time the distance from the town to dumping site is further
- Increase social resistant from local community on disposal sites
- Land price is increasing

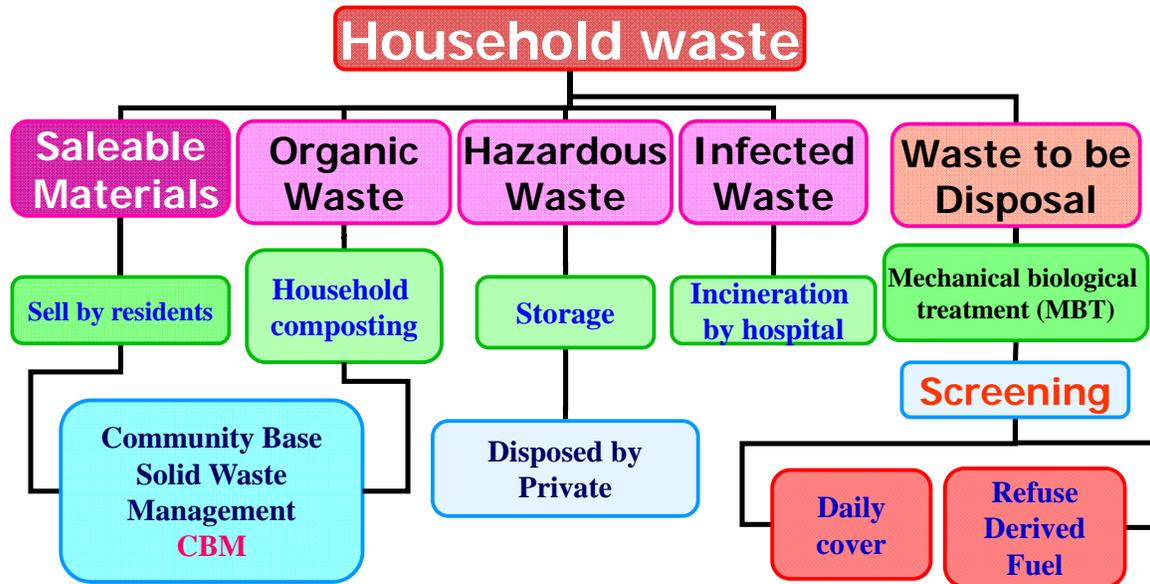


Photo: Suthi Hantrakul

## Improvement of municipal solid waste management toward zero waste landfill

- **Started in 1997 with support from GIZ** (Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH)
- Introducing the 3Rs (reduce, reuse, recycle)
- Introducing community based waste management and public participation
- Introducing polluter pay principle
- Promoting household and community composting
- Promoting recycling business
- Applying mechanical biological treatment (MBT) prior to sanitary landfill
- Converting plastic to oil (not fully operated yet)
- **Aimed for zero waste landfill since 2007**

## Phitsanulok Model on municipal solid waste



Source: Phitsanulok Municipality

## Implementation

- Based on a voluntary basis
- Reducing use of plastic bag by using reusable containers for shopping and carrying food
- Campaign to encourage residents separate recyclables for sale
- Collaborating with waste buyers
- Promoting household organic waste composting
- Implementing a mechanical-biological treatment (MBT) and segregation of plastic from MBT for pyrolysis (liquid fuel-diesel, gasoline)



Photo: Suthi Hantrakul

## Examples of awareness raising campaign and training on community based waste management



CBM training for communities



Mobile awareness raising program



Mobile awareness raising program



Promoting reducing use of plastic shopping bag

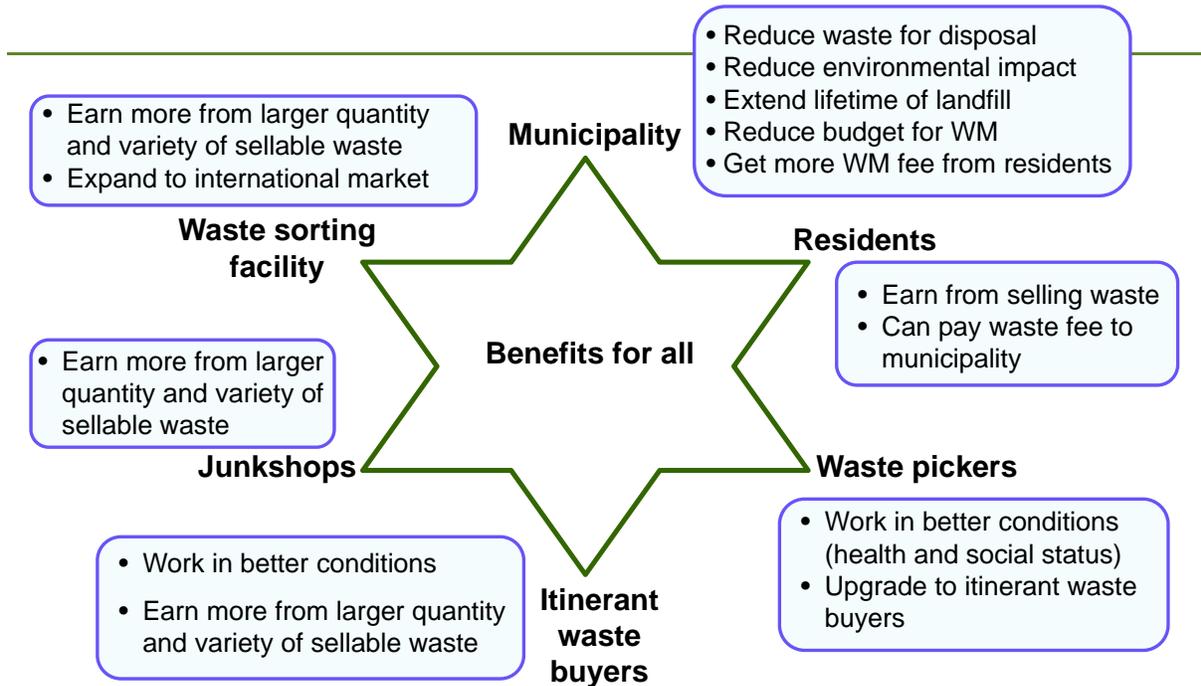
Photo: Suthi Hantrakul

## Promoting recycling business

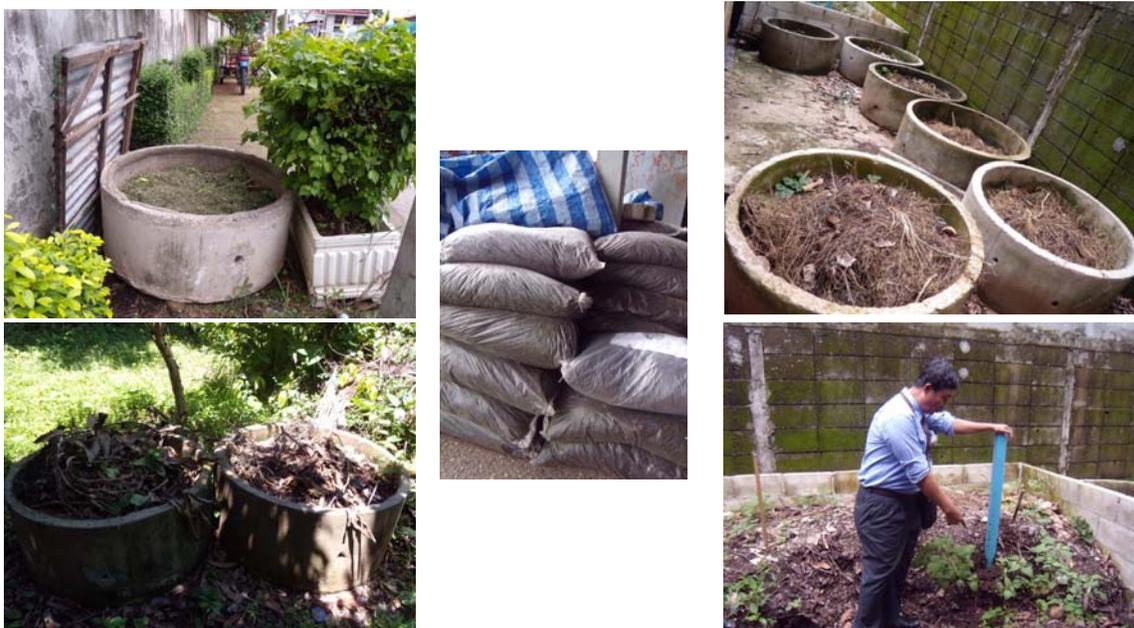
- Involvement of waste buyers since the beginning of project development process.
- Active interaction with residents (e.g. door knocking program) and other stakeholders.
- Involvement of educational institutes (schools, university).
- Continuous awareness raising and follow-up activities.
- Facilitating the mechanism of waste separation for sale and regulating the environmental and health impacts, without interfering with the business mechanism.
- Introduction of waste bank program
- Free market competition = many waste buyers.



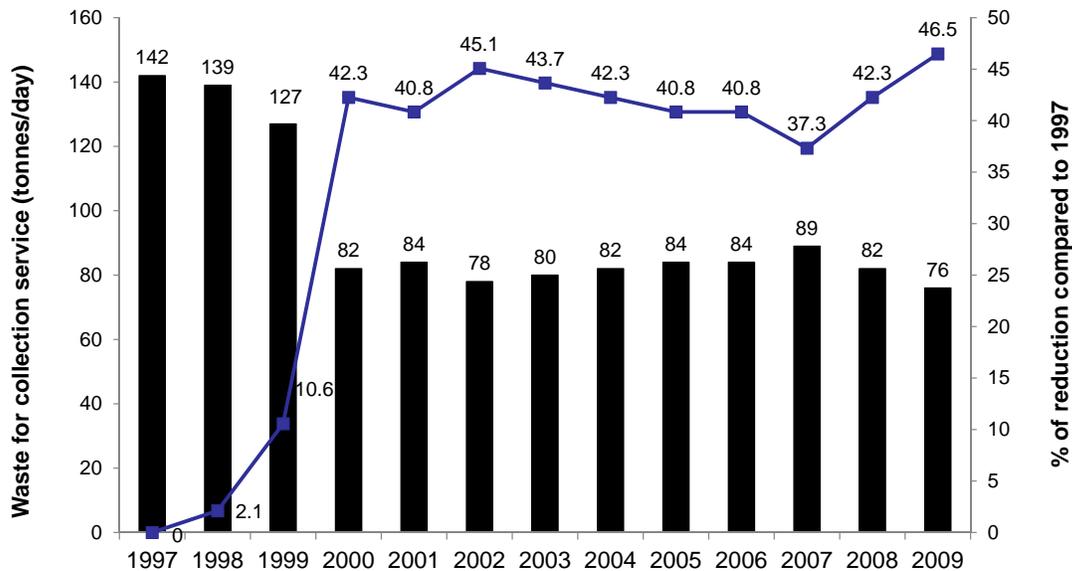
## Benefits of sustainable recycling business



## Sustainable organic waste management: household and community composting



## Changes in MSW to landfill site after introducing the 3Rs in Phitsanulok, Thailand



## Changes in MSW generations after introducing the 3Rs (II)

- Waste to be collected was decreased from 1.5 kg/person/day to 0.9 kg/person/day
- Reducing frequency of waste collection from a daily basis to every two days
- Reducing cost for waste collection and disposal (210,000 USD/year)

## Mechanical - Biological Waste Treatment prior to sanitary landfill

Area: 35.2 hectares



Homogenizing and forming the pile



Passive composting for 9 months



Compost like product



Plastic

## Conversion of plastic to oil

Refuse Derived Fuel :RDF

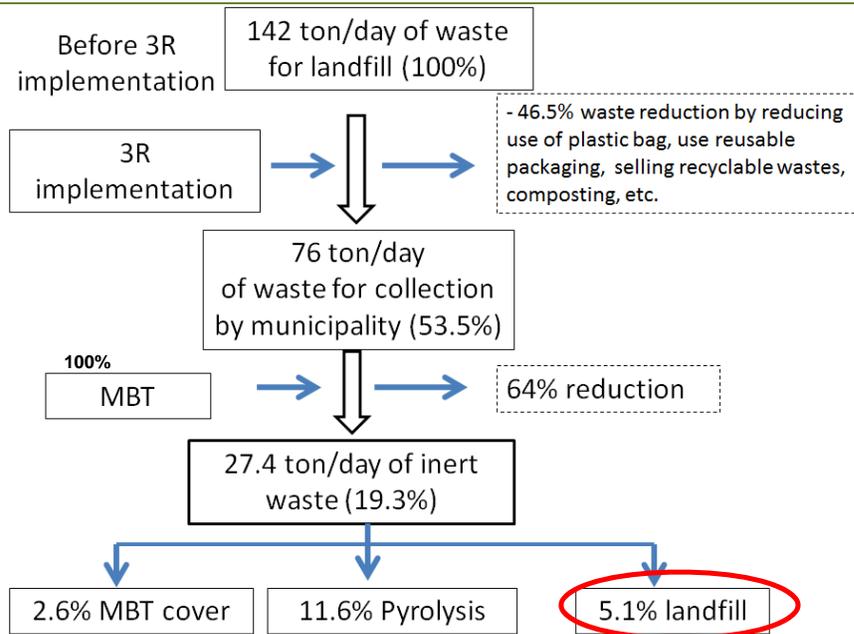


Pyrolysis

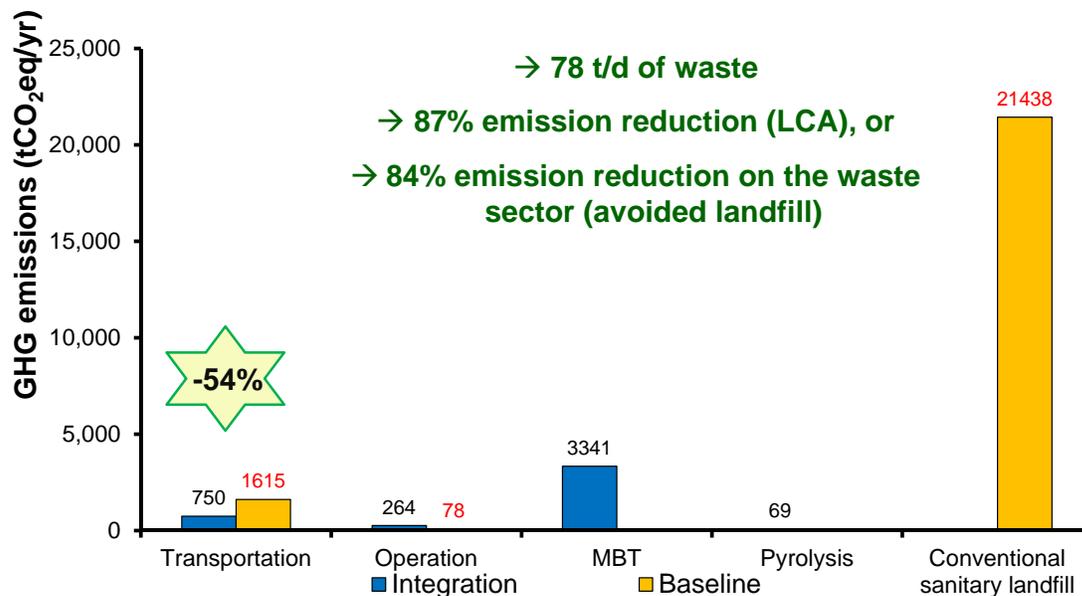


Source: Phitsanulok Municipality

## Achievement of zero waste target



## Reduction of GHG emissions (Lifecycle approach)



## GHG emissions from material recycling (rough estimation)

Recyclables	Weight (t/d)	GHG emissions per tonne (tCO <sub>2</sub> eq)	Total emissions (tCO <sub>2</sub> eq/d)
Paper	8.7	-2.08	-18.0
Plastic	5.4	0.25	1.4
Aluminium	1.4	-12.08	-17.4
Steel	5.0	-1.85	-9.3
Glass	15.5	-0.46	-7.1
<b>Net</b>	<b>36</b>		<b>-50.5</b>

**Phitsanulok Municipality contributes to avoidance 50.5 tCO<sub>2</sub>eq/day when compare with non-recycling**

**If this emission is included, the Municipality can achieve zero GHG emissions (LCA).**

Note: Suchada et al., (2003), approximate composition of collected recyclables by various participants in the municipality is 24% paper, 15% plastic, 43% glass, 4% aluminum and 14% steel.

## Conclusion

- Phitsanulok Municipality has gradually achieved the zero waste target through the 3Rs implementation, polluter pay principle, public participation, pre-treatment prior to landfill and pyrolysis
- The remaining waste to landfill is approximately 5%
- Phitsanulok Municipality may need advance technology such as incineration and ash recycling to achieve zero waste landfill, however this technology is too expensive for developing countries.