Institute for Global Environmental Strategies

(Waste Management and Resources Project)

Urban Organic Waste Management Option for Climate Change Mitigation in Developing Asia Countries: A case study on composting

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Introduction

- **Population & economic growth**
- **Change of consumption patterns – instant foods, electronic goods, etc**
- **Change of lifestyles – eating out, small family with condensed population area**

↓

Rapid increase of waste

↓ **Improper management**

- **Public nuisance**
- **Environmental pollution and health hazards**
- **Global warming**

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- **Social resistance to disposal site construction**

Objectives and methods

1. Review waste management practice in developing Asia
2. Investigate and estimate potential methane emission from disposal site (landfill base) of municipal solid waste in developing Asia countries
3. Observe national policy and local practice on composting of urban organic waste in developing Asia
4. Identify policy needs to promote composting for climate change mitigation

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Results and Discussion

1. Waste Management Practice in Developing Asia Countries

- Open dumped and open burning are still widely practiced
- Low collection rate of waste: some countries are even lower than 50%
- Approximately 30-70% of waste composition is food, but about or less than 10% of waste is composted
- Ongoing movement for waste management is shifting to sanitary landfill and incineration which nowadays expected to produce energy from those technology
- However, not so many cities can construct sanitary landfill and incineration, further the operation is improper due to lack of personnel and financial supports: China, Bangladesh, Philippines and Thailand

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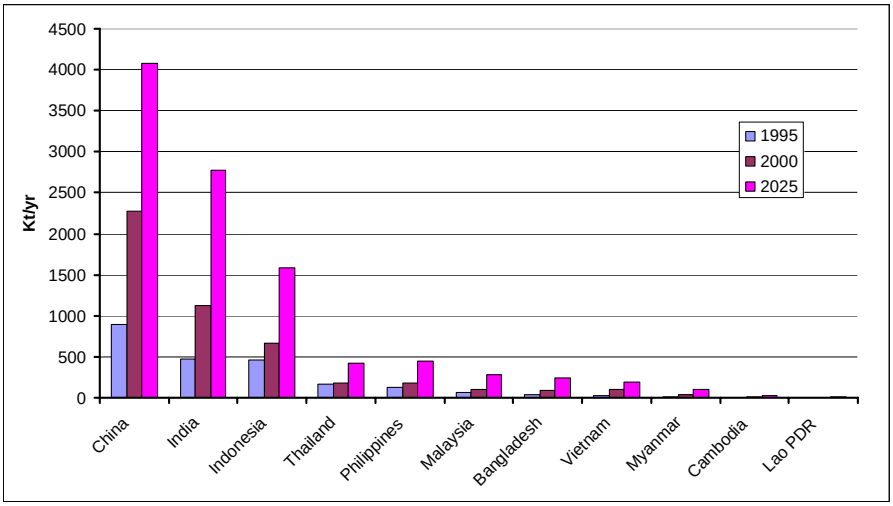
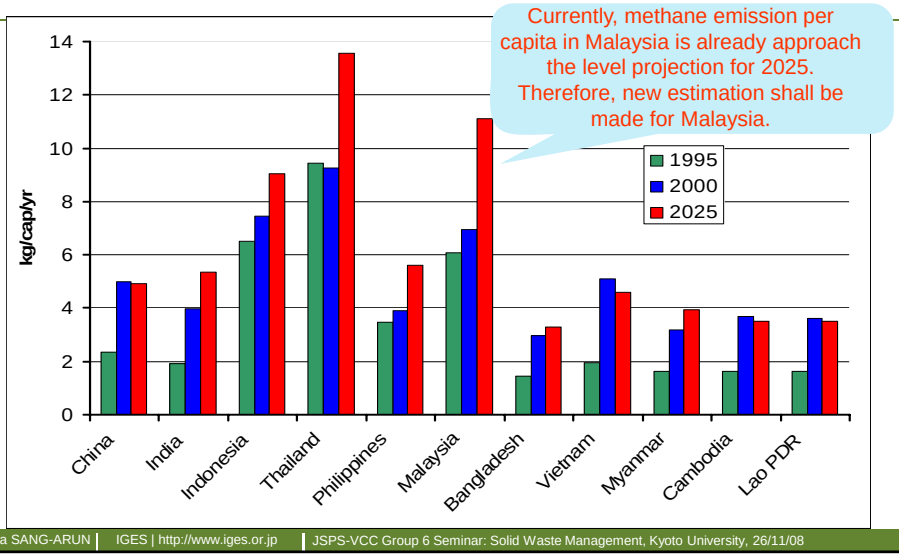
2. Potential methane emission from disposal site of municipal solid waste in developing Asia countries



Potential methane emission per capita in developing Asia



How to reduce methane emission from landfill?

1. **Reduce organic waste dumped into the landfill**
   - Reduce over food consumption → Reduce food waste generation
   - Use the organic waste as a material for other products
     - Animal feed : Pig, Chicken, Duck, Fish, etc.
     - Compost for food production in urban fringe area
     - Biogas production for energy use

2. **Pretreatment the organic waste before dumped into the landfill**
   - Mechanical-Biological Treatment (MBT)
     - Compost-like products with high contamination of heavy metal (This product is not suitable for agriculture, but being use as a covering material for MBT and later dispose in landfill)
     - Separation of plastic waste for energy use as a Refuse Derived Fuel
     - Around 30% of waste volume decreased, thus can extend the lifetime of landfill

Example: Mechanical-Biological Treatment in Phitsanulok, Thailand

Source: Suthi Hantragul, Phitsanulok Municipality

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Comparison between anaerobic fermentation for biogas and aerobic fermentation of composting

Issues	Anaerobic fermentation for biogas production	Aerobic fermentation for compost production
Technology	High and not yet stable	Varied from low to medium and stable
Management	Trained personnel	Residents can manage by themselves when low technology applied
Cost	Higher than composting	Low
Secondary products	Organic materials for soil improvement	no
Environmental and management risks	Higher than composting	low

3. Composting: an alternative to waste management and climate change

- Reduce methane emission from waste sector
- Increase soil carbon storage
- Potential to earn carbon credit (CDM)
- Bridge the linkage between waste management and urban agriculture which important for food supply
- Possible to apply in all levels: household, school, community, and cities
- Possible to manage with low cost, but labor intensive for some methods
- Generate income (compost and foods) to the household, community and the city

Example of income generation from composting

- Dhaka, Bangladesh
  - Waste Concern produced 3.75 tons per day of compost. The compost was sold with 37-74 US$ per ton. The production by Waste Concern will increase if the new composting plant is constructed.
- Nonthaburi Municipality, Thailand
  - The municipality produce compost 0.6 ton/day, the compost was sold to farmers with the price of 42.81 – 57.09 US$ per ton. It can reduces around 1.5% of expense for waste management.

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Composting policy and lesson learnt in high GHG emission countries (1)

- China, India, Indonesia, Thailand and Philippines

China

- China indicates landfill as the common practice, however composting is also promoted for organic waste management
- Several large-scale composting plants in China are implemented by international donors, but many of them are not being operated due to technical problems and inferior quality of compost
- Not so many NGOs is active in promoting composting in China

Composting policy and lesson learnt in high GHG emission countries (2)

India

- Emphasize composting for biodegradable waste in its municipal solid waste management and handling rule in 2000
- Special funding is arranged to construct large-scale composting plants (100-700 ton/day), which is contracted to be operated by private company
- However the success is seen in community and household composting which initiated by NGO and local government

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Composting policy and lesson learnt in high GHG emission countries (3)

Philippines

- Emphasize composting in its Ecological Solid Waste Management Act 2000
- Most composting project is in small scale in the community level which initiated by local government and NGOs

Composting policy and lesson learnt in high GHG emission countries (4)

Indonesia

- Still in drafting new national law to improve waste management
- Community based and household composting is being promoted by NGOs

Thailand

- Has no specific mentioning on composting in the national law but the composting is being promoted under the national agenda to produce safe-food for exports
- Composting is being promoted by several departments but the practices are still in small scale

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Example: Composting in Bangkok, Thailand (supported by IGES-Kitakyushu Network)

Source: Mr. Thongchai Baitragul, BMA 2008

Registration to CDM by waste sector in Asia

- 303 CDM projects in waste sector registered globally (as of 24 Nov 2008)
  - 84 projects registered by Asia
    - 26 projects registered by Malaysia
      - 9 projects sell to Japan
      - 5 composting projects registered for palm oil waste management
        - » One project sell to Japan
        - » Four projects sell to Denmark
      - 1 project on composting for palm oil waste is under reviewing (UK)
- Most projects are landfill gas recovery

No registration for composting of urban organic waste by Malaysia

Composting projects registered to CDM in Asia

1. Bangladesh: Organic waste composting in Dhaka (18/05/06)
2. China: Composting of organic waste in Wuzhou (21/07/07)
3. Philippines: Laguna de Bay community waste management project: avoidance of methane production from biomass decay through composting -1 (18/03/08)
4. India: Avoidance of methane emissions from municipal solid waste through composting in Puri Municipality, Orissa (review requested)

CDM Registered composting project

Project	Scale	Daily volume of waste (ton)	Composting technique	Proponent	Buyer	Ton of CO_2 credit (7 yrs)
Dhaka, Bangladesh	Large	700 ton/day (max.) (160 ton of compost)	Static pile aeration	NGO	The Netherlands	624,816
Wuzhou, China	Large	248 ton/day (82 ton of compost)	Forced aeration	Private company	Germany	293,163
Laguna de Bay region, Philippines	Small (comprise of seven small municipalities)	- No indication	-Windrow -Bioreactor -Rotating bio-drum	Government	The Netherlands	42,403

Carbon Market

- The price of carbon market can be checked daily through at http://www.pointcarbon.com/
- At the beginning of December 2008, the price of CERs (secondary: Point Carbon) are around US$18 per ton of CO_2.

Note: 1 CER = 1 ton of CO_2

4. Research findings

- Composting is an alternative to landfill gas recovery which possible to obtain CDM credit
- The registration of composting project to CDM is very few, tends to increase after the success case of Bangladesh, China and the Philippines
- The composting in a large-scale & high technology implementation can be failed easier than the small-scale with low technical requirement
- Many ongoing composting projects have not yet registered to the CDM

5. Policy recommendations

- Composting should be promoted to reduce methane emission from landfill especially where the landfill gas recovery is not equipped for energy use
- Waste separation at sources should be promote to ensure the compost quality
- The pilot projects can be applied for waste from food and vegetable's markets, cafeteria, schools, and other high organic waste generation organizations
- Cooperation between the municipality and the peri-urban farmers should be concerned to ensure the market of compost in the cities
- The government should support the registration of composting project to the CDM which motivate the movement in composting within the countries and also other countries

6. Conclusion

- Composting should be promoted to reduce organic waste flow to landfill and also reduce methane emission from landfill, which will also resulted in increase lifetime of the landfill
- Composting can be practiced at all level and produce lesser environmental problem than improper landfilling, therefore the social resistance to composting is not being found in any investigated countries
- Composting is being practiced in several countries, but the registration to CDM is very low, therefore the promotion to register composting project to the CDM would help expand the composting of organic waste in developing countries
- The composting project requires waste separation at source thus small-scale composting would be more appropriate than the large-scale system

Ongoing and further activities of IGES-WMR team

- Utilization of waste biomass (urban and agricultural waste) for food security, energy use, and climate change mitigation in Cambodia, Lao PDR and Thailand
- Investigating co-benefits of waste management, particularly from 3Rs initiatives
- Supporting development of 3Rs national implementation plans for target developing Asian countries
- Study on second hand goods and electronic wastes in Asia
- Investigation on chemical in products and developing information sharing system to reduce risk of chemical hazard through the product life cycle

IGES-WMR Team Researchers

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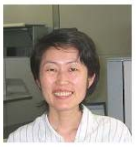

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