Institute for Global Environmental Strategies

Report Part Title: Current Urban Organic Waste Management and Policies in Cambodia

Report Title: A GUIDE FOR TECHNOLOGY SELECTION AND IMPLEMENTATION OF URBAN ORGANIC WASTE UTILISATION PROJECTS IN CAMBODIA

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2.
Current Urban Organic Waste Management and Policies in Cambodia

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2. Current urban organic waste management and policies in Cambodia

2.1 Legislation and national policy on solid waste management

2.1.1 Legislation and regulation

The government of Cambodia notified the sub-decree No. 36 on solid waste management in April 1999. This sub-decree is the fundamental law of solid waste management. It applies to all activities related to disposal, storage, collection, transport, recycling, dumping of household and hazardous waste.

Based on this sub-decree, the Ministry of Environment (MOE) shall establish guidelines on disposal, collection, transport, storage, recycling, minimising and dumping of household waste in provinces and cities in order to ensure the proper management of household waste (Ministry of Environment, 1999).

According to this sub-decree, the authorities of the provinces and cities shall establish the waste management plans in their province and the city for short, medium and long terms. In addition, they are responsible for collection, transport, storage, recycling, minimising and disposal of waste.

As a supplement to the sub-decree on solid waste management, Ministry of Environment (MOE) and Ministry of Interior (MOI) issued a ministerial declaration (Prakas) no. 80 in 2003 (Inter-ministerial MOI/MOE, 2003). The objectives of this declaration are to improve the responsibility of an authority and involve institutions for efficient implementation of solid waste management in provinces and cities of the Kingdom of Cambodia, in order to protect human health, environmental quality, scenery and biodiversity. The declaration clearly stated that disposal of waste in public spaces, streets and canals is illegal. In addition, local governments are required to provide sufficient waste bins, arrange "forbidden" signs and educate the residents on proper waste management, establish temporary waste stock, and clean and dispose the generated solid waste in their administrative area regularly.

Unfortunately, the detailed regulations, standards and guidelines, which have to be established based on the above sub-decree and declaration, are not yet complete due to lack of personnel capacities and budget constraints.

Beginning in 2010, the Municipality of Phnom Penh (MPP) has been implementing a pilot project to fine people for discarded waste in the public parks. Once people are

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familiar with the concept and practice, the MPP will extend the coverage area of such regulations.

2.1.2 *Integration of 3R strategy in solid waste management*

In 2008, the Ministry of Environment (MOE), with support from the United Nation Environment Programme (UNEP), drafted a strategy on the 3Rs (reduce, reuse, recycle: Appendix I) for sustainable solid waste management in the Kingdom of Cambodia.

The Cambodian national 3R strategy aims to establish an efficient solid waste management system through increased waste collection service, promote waste separation for recycling, enhance organic waste composting, and improve disposal sites. By 2015, the government plans to compost 20% of organic waste from all sectors. By 2020, the government plans to increase composting of organic waste from households by 40% and from business centres by 50%.

The 3R concept is very new to Cambodian national and local officials. Therefore, the Government of Cambodia plans to i) establish the 3R policies and regulations for waste management at national and local levels based on the existing environmental legal instruments and related statues, ii) organise capacity building programmes for government officials, iii) implement pilot scale projects in the selected urban area, iv) disseminate knowledge and implicate the 3R policies and regulations in public and private sectors, and v) integrate the 3R initiatives into the national policy development.

2.2 Current urban organic waste management

The data on quantity and composition of municipal solid waste in Cambodia is not systematically collected. It is mostly interpreted from the data of Phnom Penh and in some cases data from a few major cities are included. For instance, the Ministry of Environment has reported that waste generation in Cambodia is approximately 520,000 tons/year[1] (Sokha, 2008). In 2009, we interviewed waste collection companies and the local government officials in four major cities of Cambodia: Phnom Penh, Battambang, Siem Reap and Kampong Cham. It was found that the assumption of waste generation in these cities is 1,465 tons/day or 534,725 tons/year which is slightly higher than the data of national solid waste generation (Table 2.1). Therefore, it is construed that the quantity of waste generation in Cambodia is underestimated. Consequently, environmental problems which are related to improper waste management would be higher than the expectations.

As shown in Table 2.1, waste generation rate in Phnom Penh is higher than other small cities. Phnom Penh is more modernised and crowded than other cities in Cambodia. In 2009, COMPED investigated waste composition at the disposal sites in Phnom Penh, Kampong Cham, Battambang, and Siem Reap (Fig. 2.1). It was found that food waste generation in more urbanised cities is higher than in less urbanised cities (Table 2.2). In fact, according to the composition of the generated waste, food waste amounted to 70% in Phnom Penh, 71% in Battambang, 54% in Siem Reap, and 60%

[1] 1 ton = 1,000 kilograms

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Table 2.1 Municipal solid waste in major cities of Cambodia in 2009

City	Area (km^2)	Population (persons)*	Waste generation (tons/day) **	Per capita waste generation (kg/person/day)	Waste collection (tons/day) **	Residents pay for waste collection service (%)**
Phnom Penh	290	1,325,681	1,200	0.91	1,005	80
Battambang	140	143,656	100	0.70	51	<20
Siem Reap	473	174,265	115	0.66	115	N/A
Kampong Cham	162	63,771	50	0.78	35	10%
			Sum = 1,465	Average = 0.86	Sum = 1,206	

* Population census 2008
** Interviewed with waste collection company and local governments

Table 2.2 Waste compositions in four major cities in Cambodia

City	Waste composition at disposal site (%)							
	Food	Paper	Plastic	Metals	Textile	Glass	Wood and dry matter	Others
Phnom Penh	70	5	6	2	3	2	6	6
Battambang	71	2	10	3	2	4	6	2
Siem Reap	54	6	11	1	3	3	11	11
Kampong Cham	60	5	12	1	1	2	3	16
Average	64	4	10	2	2	3	6	9

Figure 2.1 Waste composition analyses at Kampong Cham

in Kampong Cham.

The traditional waste management practices at household level are throwing away food waste at their backyard and using it as a feed for household pets but these actions are difficult to practice due to limited space. In addition, a significant amount of food waste is being generated from hotels and restaurants in large cities. Therefore, waste generation particularly food waste delivered to disposal sites is higher than smaller cities.

2.2.1 Waste collection service

Due to the limitation of budget and personnel, the local authorities transferred their responsibility on waste collection and disposal to contracted private companies without monetary compensation. Therefore, waste collection service is based on the

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waste fee that private companies collect from the residents. Many of the contracted waste collection companies failed to recover the cost of waste collection because the residents are not willing to pay for the service. Residents who refused to pay for the waste collection service have their waste dumped in a public space, such as in front of neighbourhood house and private land. Often, the waste is then burned.

The waste collection companies are unable to collect a sufficient amount of service fees from the residents. Thus they have limited their services to densely populated and high income areas (Fig. 2.2) where most residents paid for waste collection service. In general, the coverage of waste collection service in urban Cambodia is lower than 50%, except in Phnom Penh where waste collection service covered 84% (Table 2.1).

Collection of the service fee is successful, to some extent, in Phnom Penh due to the cooperation of the contracted waste collection company (CINTRI) with the Electric Department of Phnom Penh City (Electric du Kambodge). The waste fee is included in the electric bills. However, around 20% of residents who have no access to electricity do not pay for waste collection service.

Waste collection in Siem Reap is also handled by a private company. A strategy for collecting the waste fee is door-to-door service. The Environmental Department of Siem Reap notified and enforced a local regulation to associate waste collection service. Also, if the residents are not satisfied with the waste collection service, they can inform the Environmental Department of Siem Reap directly.

The fee for waste collection service is based on economic condition of residents, not on quantity of waste generated. For instance, the service charge for each general household is 5,000 Riel (USD1.25 per month), but the charge is more expensive for each large house owner (USD 2.5) and business enterprise (USD 5-50) such as restaurants, jewellery shops and hotels. This policy aimed to make it payable by residents, but there is no incentive for waste reduction.

2.2.2 *Waste disposal*

Generally, the waste collected by the

Figure 2.2 Waste Collection in Cambodia's Cities

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private company is simply dumped in the disposal sites without considering the basic management practices such as compaction and covering with soil layer. Often, the disposal site generates foul odours and outbreaks of houseflies. Residents in the vicinity of the landfill site are exposed to health risks caused by houseflies and vermin. Sometime, burning is practiced to reduce the volume of waste. Such practices could release smog and other carcinogens.

Due to its geographical feature, the most of the disposal sites in Cambodia are located in flood prone areas. Leachate[2] is produced during the degradation process of waste which percolates and contaminates with groundwater table and surface waste in the surrounding paddy fields. The residents closer to the disposal sites are exposed to hazardous substances and pathogens.

The most advanced landfill was constructed in Dang Kor, Phnom Penh in 2009 (Fig. 2.3). This disposal site has a compaction and leachate drainage system, even though housefly outbreak is a serious problem that has threatened the living conditions of the residents in the vicinity of the landfill.

Figure 2.3 New disposal site at Dangkor, the Phnom Penh Municipality

In some cities, the waste disposal sites are owned by local governments, but some are owned by contracted private companies. In cases where the local government owns the disposal facility, private companies must pay the disposal fee. Due to budget constraints, there is not much difference in the quality of management of the disposal sites whether owned by local governments or private companies.

Despite an increasing waste generation rate in Cambodia, there is a very little improvement of financial and institutional capacities development in local governments or contracted private sectors for enhancing the situation of waste disposal sites. The price of land is rapidly increasing. Therefore transport distances between the disposal sites and the downtown area tend to increase anytime a new disposal site is established. Consequently, the cost for waste transportation increases, but residents are still not really willing to pay. If these shortcomings continue, the standard of solid waste management in Cambodia will worsen. Consequently, environmental impacts from improper solid waste management would increase and these negative effects will badly influence human health and income generation from tourism.

2.2.3 Waste separation at the generation source

In 2009, there was no mainstream waste separation at the generation source practiced in Cambodia. Separation of recyclable waste was practiced on a voluntary basis due to an

[2] Leachate is water that has percolated from waste. Normally, it is highly polluted.

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indirect influence caused by increasing the economic value of sellable waste.

Waste pickers play a dominant role in separating sellable waste that is dropped in waste bins and at disposal sites. For instance, more than 2,000 waste pickers that are working at both the downtown and the disposal site of Phnom Penh, help reduce waste buried in landfill.

Food waste that has no value in the recycling market occupies the landfill – making it difficult to separate sellable materials, emitting foul smell and toxic gases to human health, making it a place full of resident vermin and disease carriers, and polluting the soil and water environment.

2.2.4 Current organic waste utilisation

Generally, the utilisation of urban organic waste in Cambodia is very low. Organic waste is utilised for two purposes: animal feed and composting. However, only a low percentage of food waste from restaurants is collected for animal feed. Also, only a few composting facilities are operated by NGOs.

With respect to animal feed, some farmers claim that direct feeding of food waste is not favourable in comparison to instant feed in terms of growth rate. There is also a concern on animal health due to the poor quality of food waste. Therefore, it is necessary to process food waste to a suitable standard for animal feed.

For the composting facility, Cambodian Education and Waste Management Organization (COMPED) established a windrow composting facility at the old disposal site of Phnom Penh (Fig. 2.4). A new composting plant was constructed in Battambang by COMPED in 2009 and it has been operating since April 2010. Some household composting is promoted by the Community Sanitation and Recycling Organization (CSARO).

The composting plant at MPP received 5 tons/day (1,800 tons/yr) of organic waste from a market which accounts for 0.4% of Municipal Solid Waste (MSW) or 0.7% of food waste generated in this city (see Appendix II for technical details). The composting activity of this project declined when the local government of Phnom Penh closed the old disposal site and started

Figure 2.4 Composting by COMPED at Phnom Penh Municipality

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to use the new one in 2009. This facility was terminated by the operator due to uncertainty over local government policy that is likely to begin supporting energy production (rather than compost) from waste.

2.3 Impacts of improper organic waste management and climate change

Biodegradation of organic waste under anaerobic condition (e.g. in a landfill) can generate greenhouse gases (GHG). Methane is the most serious GHG emitted from the waste sector, since its global warming potential is more than 20 times higher than carbon dioxide[3]. Methane generation per kilogram of organic waste varies depending on the extent of absence of oxygen and the type of organic waste. For example, one kilogram of food waste can release 0.42 $KgCO_2eq$ when it is dumped into an unmanaged shallow landfill (<5 m depth) but the emissions can be as high as 1.05 $KgCO_2eq$ if the same amount of waste is disposed on a deep compact landfill (>5 m depth) (Sang-Arun and Bengtsson, 2009).

Cambodia has low capacity to invest in landfill gas capture; therefore, most of the methane from landfills and dump sites is released directly to the atmosphere. As shown in Table 2.1, it is estimated that methane emissions from landfill of organic waste in major cities in Cambodia in 2008 was approximately 360,000 tons CO_2eq (assuming disposal in unmanaged deep landfills). Currently, urban population and waste generation per capita of Cambodian are increasing due to urban development and economic growth. In addition, there is also an increase of waste collection service and disposal by landfill. Therefore, the potential methane emissions from landfills are set to increase.

2.4 Overall discussion

Improving urban organic waste management in Cambodia requires efforts from both national and local governments. The national government should establish an enabling legal framework and develop guidelines for solid waste management suitable for the country. Budget allocation from both national and local governments should be made to ensure resources for solid waste management. Local governments should implement policy and follow regulations established by the national government.

The involvement of the private sector for waste collection and in some cities for disposal is a good initiative to reduce the workload of local governments and create business opportunities for the contracted private companies. However, local governments should support the contracted private companies to ensure efficient waste collection service and improved disposal system, by providing awareness raising campaign to residents. The local governments should encourage residents to reduce waste generation, discard waste in proper containers, drop waste at the collection points on given schedules, and pay for waste collection and disposal services.

[3] Scientists reported global warming potential (GWP) of methane over carbon dioxide in different level. However, the value that adopted for national GHG inventory report to the IPCC is 21.

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Disposal of urban organic waste at disposal sites should be avoided as this waste could contribute to soil, water and air pollution, cause an odour nuisance, spread vermin and insects, cause a disease outbreak, and also reduce the quality of other recyclable wastes. In order to avoid environmental impacts from landfill of organic waste, organic waste should be separated for effective utilisation, for instance, by means of animal feed, soil amendment materials and alternative energy.

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