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A Review of Fecal Sludge Management in 12 Cities

Annexure A.9
Phnom Penh, Cambodia

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FINAL DRAFT

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Link to full report: http://www.susana.org/en/resources/library/details/2212

A.9 Phnom Penh, Cambodia

All data sourced from Frenoux et al (2012) except where shown.

A.9.1. Summary

Population (millions)	1.6
Percentage of households using on-site sanitation or open defecation	75%
Percentage of total fecal waste (sewage and fecal sludge) safely managed	0%
Percentage of sewage safely managed	0%
Percentage of fecal sludge from OSS safely managed	0%

FSM Framework	Poor
FSM Services	Poor
City Type	1

The sanitation service in Phnom Penh is poor. A sewer network serves a quarter of the city but all of the wastewater collected is discharged untreated to the local river network. The city's FSM service is provided by the private sector who provide a mechanical pit emptying service; however, the service is unregulated and uncontrolled and none of the waste removed is treated effectively. Consequently, one hundred percent of the fecal waste generated in the city is reused/disposed of unsafely to the environment.

A.9.2. Institutional framework

Brief summary of who is responsible for urban sanitation in the country and in the city if different…

The institutional framework for sanitation service delivery in Phnom Penh is unclear with several ministries involved but with poorly defined roles and responsibilities between public health issues, drainage and sanitation management issues.

In urban areas of Cambodia (including Phnom Penh) the Ministry of Public Works and Transport (MPWT) is responsible for urban drainage and sanitation. However, the MPWT is under-resourced for the task with a low capacity for investment and limited skills for managing services. The other significant ministries include: the Ministry of Environment (MoE) which is in charge of water pollution control and environmental protection; the Ministry of Land Management and Urban Planning (MoLMUP) which is responsible for construction standard control and issuing of construction permits; and the Ministry of Industry Mines and Energy (MIME) which is in theory responsible for urban sanitation at the household level and issuing of licenses for sanitation operators, but it remains inactive in this role.

The legal framework is weak. The 2003 National Policy on Water and Sanitation is the only document that frames urban sanitation. However, urban sanitation remains low on the political agenda and there is no strategic plan or laws to detail or enforce this policy (Tsitsikalis, 2012). Invariably, where sanitation issues are addressed, the focus is on providing sewerage and not FSM.

A.9.3. The FSM scorecard

Description of key points in SDA scorecard….

The FSM scorecard for Phnom Penh highlights that the framework is weak. FSM is not covered by national policy and there are no targets, strategies or political will to address the challenge. In Phnom Penh, the sub-sector remains unplanned and devoid of investment with a poor FSM service, resulting in the low scores shown both down and across the scorecard. Private pit emptiers provide a low level of service to a limited number of households and this is recognised by the marginally improved scores for emptying and transport in the output and maintenance elements of the developing and sustaining blocks respectively.

A.9.4. FSM along the sanitation service chain

A brief description of each part of the chain….

Containment:

It is estimated that 3% of Phnom Penh's population practice open defecation while the majority (61%) use a pit or septic tank type containment facility which is then in-turn connected to a combined sewer system. Approximately 25% of the population connect directly to the sewer network (without using a pit or tank) while estimates suggest that the remaining 11% of the population use on-site sanitation only. The quality of all pits and septic tanks (regardless of whether or not they are connected to the sewer network) varies enormously and there is no control over the type and/or quality of containment constructed.

Similarly, the sewer network is old, poorly maintained and blockages and flooding are common (Kopitopoulous, 2005 in Frenoux et al, 2012).

Emptying:

Only 22% of the population report that they have ever emptied their pit or tank using a mechanical emptying truck operated by a private operator (locally known as an ETO (extraction and transportation operator)). The majority of owners have a containment system that overflows to the local sewer network and/or have never emptied their pit or tank. Of the minority who use only an on-site sanitation system less than 1% report that they have ever emptied their tank or pit but even then this material is then dumped in the local environment. There are 24 manual and 19 mechanical ETOs in Phnom Penh. There is little data on the manual emptiers' activities but Frenoux et al (2012) observe that they are mostly involved in sewer cleaning rather than pit emptying.

Transport:

The 19 mechanical ETOs operate 31 vacuum trucks to remove and (in theory) transport sludge to the authorised wetland treatment site. However, it is reported (Frenoux, 2013) that only one of the operators discharges waste at the site, the remainder all discharge illegally; so avoiding the disposal fee and the 10km round-trip to the wetland pumping station. (The MPWT also operate 10 trucks but these are used for sewer cleaning and not pit emptying).

Treatment:

There is no treatment facility in Phnom Penh for wastewater or sludge. The wetlands provide natural removal of biological contamination of the waste discharged to them; however their capacity for treatment is low; only 56% of suspended solids are settled before reaching the river and metal elements (Cadmium, Lead, Copper and Zinc) significantly exceed the WHO standards (Takeuchi Tomonori, 2005 in Frenoux et al, 2012). Furthermore, Nareth et al (2008) (also in Frenoux et al, 2012) indicate that 10% of wastewater is directly discharged into the Tonle Sap and Mekong rivers.

Reuse/disposal:

There is no formal reuse of treated fecal sludge or wastewater. However, the land downstream of the wetlands is used extensively for agriculture (it supplies approximately

20% of the demand for fruit and vegetables in Phnom Penh); farmers use the untreated (or at best only partially treated) wastewater and sludge as irrigation water.

A.9.5. Outcome

An overview or summary of the situation (i.e. poor FSM service delivery, limited FSM service delivery or partial FSM service delivery)

The FSM service in Phnom Penh is very poor. Private sector pit emptiers provide an unregulated, uncontrolled mainly mechanical pit emptying service. However, none of the waste emptied waste is treated effectively, instead it is dumped illegally in the local environment or discharged into wetlands. The sewage collected by the sewer network is also discharged directly into the wetlands and river system without any treatment. The wetlands provide at best only partial treatment and are largely ineffective. Importantly, the land downstream of the wetlands is used extensively for agriculture and use of this largely untreated wastewater and fecal sludge for crop irrigation is of great concern.

References

Frenoux, C., Laurent, Y., Corre, M. Le, Thlang, P., & Tsitsikalis, A. (2012). *Fecal Sludge Management in Phnom Penh*. GRET for the Bill and Melinda Gates Foundation.

Tsitsikalis, A., Thlang, P., Virak, B., Sokkol, Y., Thy, H., Clouet, B., & Frenoux, C. (2012). *Final Report: Volume 1 - Main Report. Landscape Analysis and Business Model Assessment in Fecal Sludge Management: Extraction & Transportation Models – Cambodia*.

Frenoux, C. (2013*). Personal communication.*

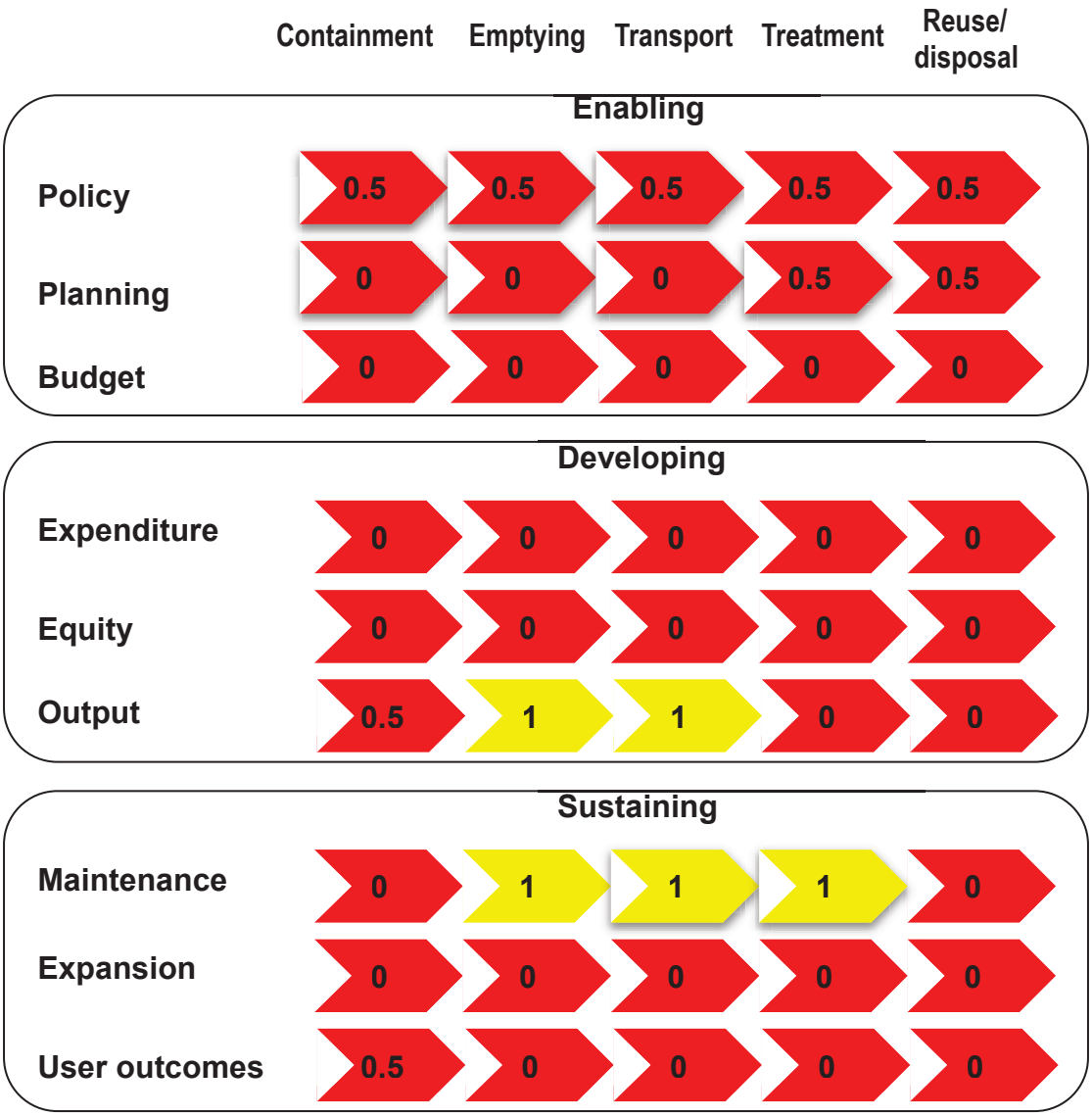


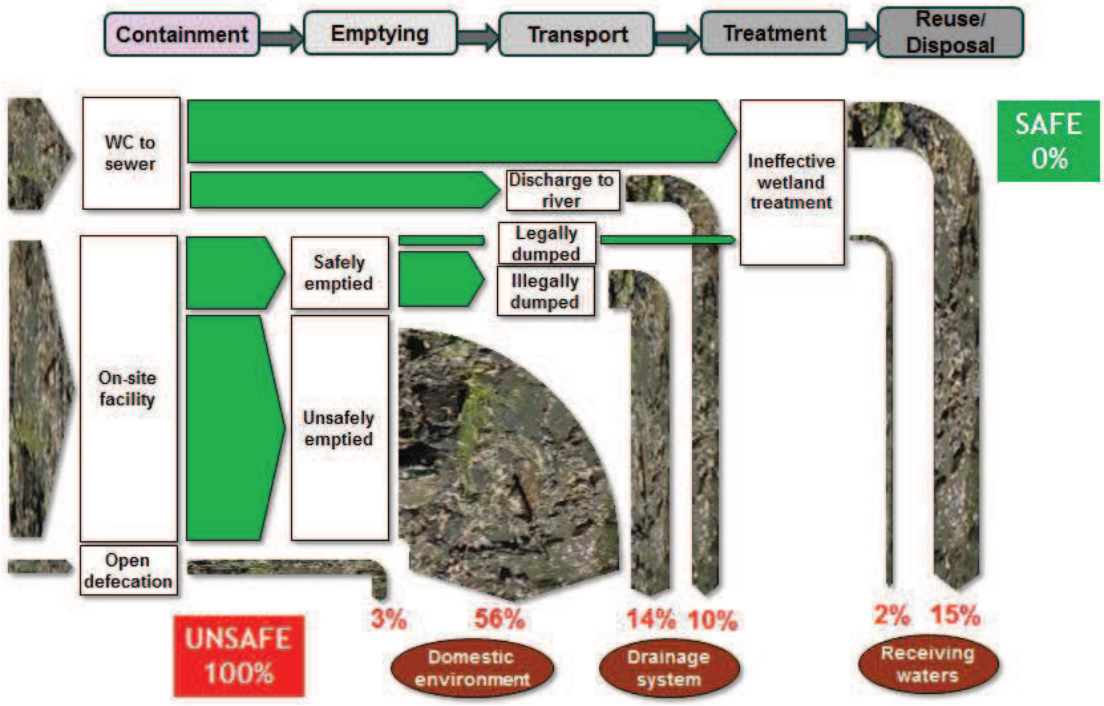
Figure 45: FSM scorecard for Phnom Penh, Cambodia

Fecal waste flow matrix Type of system	*% of FW*	*of which safely collected*	*of which safely delivered*	*of which safely treated*	**Safe: %**
Sewered (off site centralised or decentralised)	25%	100%	60%	0%	**0%**
On-site containment - permanent/emptiable	72%	22%	12%	0%	**0%**
On-site containment - single-use/not emptied/safely abandoned	0%	100%	100%	100%	**0%**
Open defecation	3%	0%			
Unsafe: 100%		**59%**	**24%**	**17%**	
Affected zones		*local area & drainage*	*drainage system*	*receiving waters*	

Notes:

1: All sources shown in waste flow diagram below.

Figure 46: Fecal waste flow matrix for Phnom Penh, Cambodia



Sources: Frenoux et al (2012) unless otherwise stated.
Sewered directly 25%; Mix of pits connected to sewers 61%; on-site only 11%; open defecation 3% (all Frenoux et al 2012, Table 3, p.2)
Mechanical emptying 22% of OSS; Illegal dumping 88% of mechanlcally emptied (Frenoux, 2013)
Only treatment is provided in wetland (Choeung Ek Lake) which provides some biological treatment but is largely ineffective.

Figure 47: Fecal waste flow diagram for Phnom Penh, Cambodia