

A Review of Fecal Sludge Management in 12 Cities

Annexure A.1 Santa Cruz, Bolivia

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FINAL DRAFT

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A.1 Santa Cruz, Bolivia

All data sourced from Ortuste (2012) except where shown.

A.1.1. Summary

Population (millions)	1.7
Percentage of households using on-site sanitation or open defecation	60%
Percentage of total fecal waste (sewage and fecal sludge) safely managed	45% to 59% ⁸
Percentage of sewage safely managed	100%
Percentage of fecal sludge from OSS safely managed	9% to 38%
FSM Framework	Poor
FSM Services	Poor
City Type	1

A sewer network that serves nearly half of the city dominates the sanitation service in Santa Cruz. The majority of waste from this network is treated satisfactorily and discharged safely to the environment⁹. The rest of the city's population use on-site sanitation type facilities and a portion of these households benefit from a private-operator-run pit emptying service that transports and discharges the fecal sludge to the same treatment works provided for the sewer network. However, this FSM service is relatively small and the majority of the fecal waste generated by households using on-site sanitation is held in containment systems of varied quality, many of which do not safely contain the fecal waste and/or cannot be emptied.

A.1.2. Institutional framework

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

Bolivia has had a regulatory framework for the management of water and sanitation since 1997. However, only in the last two years have key steps been taken to implement it properly. In 2009, the Authority for Oversight and Social Control of Drinking Water and Basic Sanitation (Autoridad de Fiscalización y Control Social de Agua Potable y Saneamiento Básico – AAPS) was created. In addition, the Administrative Regulatory Resolution 227/2010 was issued in 2010. This regulates fecal sludge collection services by requiring operators to obtain licences from the AAPS; the approval of tariffs for fecal

⁸ This range accounts for the percentage of fecal waste that is contained in single use pits that are not emptied but covered over once full. Burial of waste is considered a safe disposal method but in many cities the number of pits that are managed in this way is unknown. Where data is weak or missing, and for the purpose of this study, best estimates have been used for the percent of fecal waste safely contained; therefore, where applicable, a range of values is shown and the percent safely contained is marked as yellow on the waste flow diagram to indicate the level of uncertainty.

⁹ From Sanz (2013) although no data available to confirm sewerage network and wastewater treatment plant efficiency.

sludge emptying services; and a requirement that a sanitation service provider must prepare a plan for fecal sludge removal that can be implemented by a service operator.

However, there are gaps in the Regulatory Resolution relating to fecal sludge management and final disposal. For instance, through the resolution, municipal governments have the authority to issue and grant an 'environmental operators license,' but once issued there is no mechanism for monitoring fulfilment of the commitments. The institutional framework for FSM is therefore weak but improving; the recent creation of a new regulatory authority and the introduction of administrative regulations are considered to be important steps to creating a more supportive enabling environment although improved planning and FSM-dedicated investment are required to develop the service.

A.1.3. The FSM scorecard

Description of key points in SDA scorecard....

The FSM scorecard for Santa Cruz shows that despite the weak enabling environment an FSM service has developed and is being sustained, albeit only for specific parts of the service chain. Private operators have for a number of years provided a mechanical emptying and transport service to households who use on-site sanitation. Regulation of the service is delegated to AAPS who are tasked with approving the private operators and issuing licences, although importantly there are no legal norms and standards against which to monitor the level of service the operators then provide. (Note: Sanz (2013) reports that norms and standards are currently being drafted.)

In addition to the poor enabling environment, the scorecard shows areas of weakness in a number of areas including expenditure, equity and user outcomes. In particular, there is no quality control or monitoring of the standard or suitability of containment systems used and the adequacy of reuse/disposal arrangements is unsatisfactory in all three blocks of the service delivery assessment. In contrast, while there is no dedicated fecal sludge treatment plant (and there are reportedly no plans to invest in such a facility), treatment is provided through a wastewater treatment plant run by a water and sanitation cooperative - SAGUAPAC - which receives fecal sludge from the private operators' vehicles. It is reported that this is well run and the quality of effluent is monitored and meets the required standards.

A.1.4. FSM along the sanitation service chain

A brief description of each part of the chain....

Containment:

It is estimated that 8% of the population of Santa Cruz practice open defecation while 40% are connected to the city's sewer network. Over half the population therefore use (or have access to) an on-site type sanitation facility; these are a mixture of individual household or multifamily latrines connected to pits or septic tanks. The quality of these units is variable with "many of them improvised, precarious [and built with little regard for] technical standards" (WSP, 2010).

Emptying:

About 40 private operators provide a mechanical pit emptying service in Santa Cruz, 25 of these are legally established while the remaining 15 are unregistered and the level of service they provide is less clear. Many of these companies have been operating in Santa Cruz for over 10 years and some for as long as 40 years. There are no manual emptiers in Santa Cruz.

The percentage of the population who use on-site sanitation and reportedly use a private operator to empty their containment system is around 15% of the population. This leaves a large percentage of on-site sanitation users whose pits are not, or never have been, emptied. For the purpose of this analysis it seems reasonable to assume that two thirds of these on-site facilities are either not emptied and abandoned unsafely or overflow to the environment when full, while the remainder are either abandoned safely when they fill up (by covering the pit with soil) or have not yet filled and safely contain the waste.

Transport:

From the information available it is understood that the 25 legally established private operators have agreements with SAGUAPAC to discharge fecal sludge at one of their wastewater treatment works. Therefore, it is inferred that 60% of the waste emptied is transported to treatment but the balance (the volume emptied by the 15 non-registered operators) is dumped illegally in the environment.

Treatment:

There is no dedicated fecal sludge treatment plant in Santa Cruz but discharge of fecal sludge to the SAGUAPAC wastewater treatment works stabilization ponds is permitted and the level of service provided by the plant is reportedly high (Sanz, 2013). No information on the size or capacity of the stabilization ponds was available but clearly if the private operators emptying service were to be extended beyond the current level (15% of the non-sewered population) the capacity and performance of the stabilization ponds would eventually be compromised.

Reuse/disposal:

There is no formal reuse of fecal sludge or wastewater in Santa Cruz.

A.1.5. Outcome

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

It is estimated that around fifty per cent of the fecal waste generated in Santa Cruz is safely disposed of to the environment. The majority of this is from households connected to the sewer network and from households whose pits have not yet filled up or have filled up and been covered safely. However, this leaves a large volume that is discharged unsafely to the environment. This volume is generated by households who practice open defecation or are users of unsatisfactory on-site sanitation facilities that have either not been emptied and overflow to the environment or have filled up and abandoned unsafely when full.

The current FSM service provided is poor but the large number of operators and the length of time that many of them have been operating suggests that with some timely interventions further households would quickly benefit.

References

Magnus, H.C. (2012). *Proposals for Fecal Sludge Management in peri-urban Bolivia: Final Report*

Ortuste, F. R. (2012). *Living without Sanitary Sewers in Latin America. The Business of Collecting Fecal Sludge in Four Latin American Cities.*

Sanz, Z. (2013). *Personal communication.*

WSP (2010). *Septic tank emptying services, collection and disposal of faecal sludge in peri urban zones of the City of Santa Cruz (Bolivia).* (Translated from Spanish)

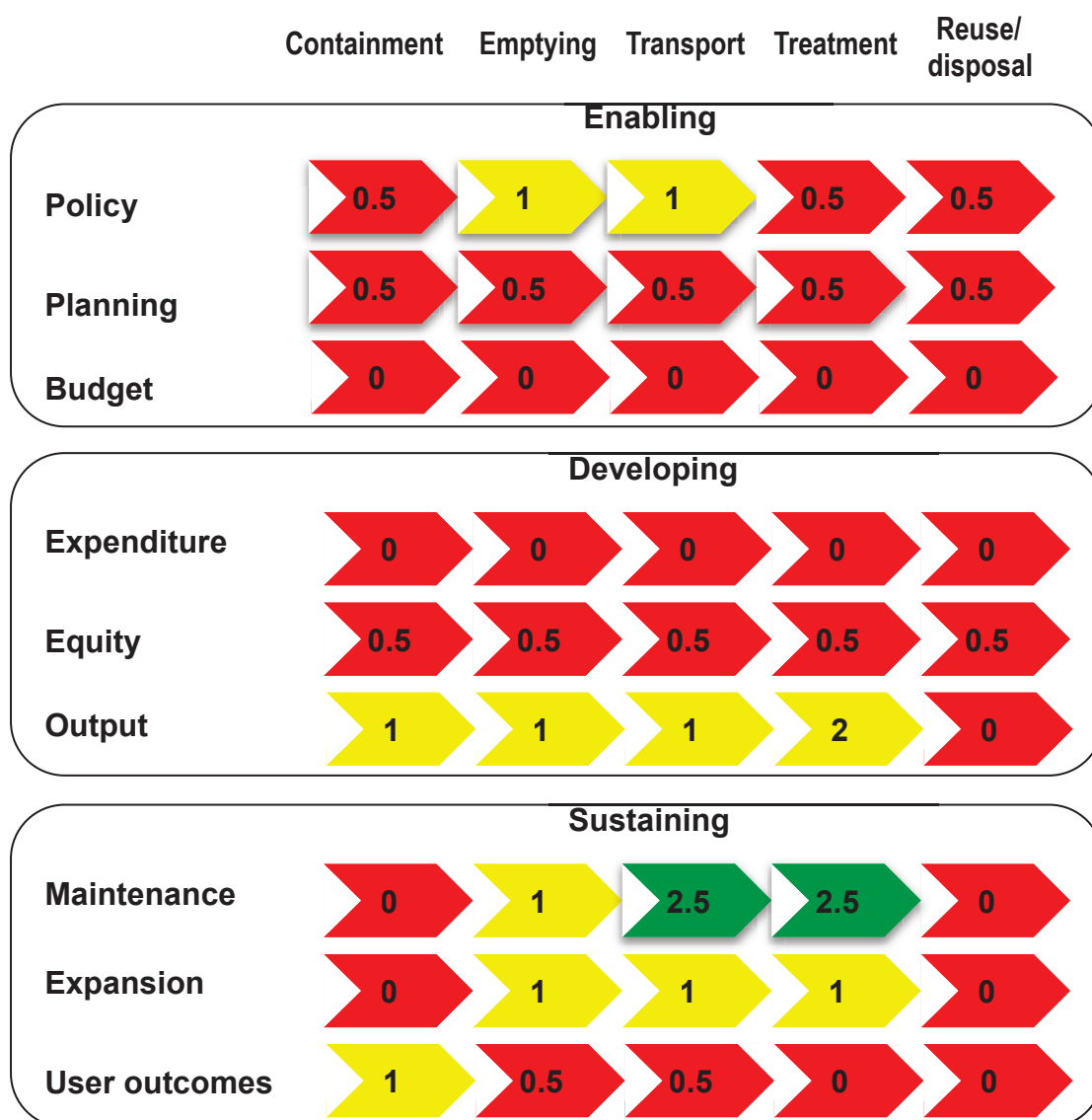


Figure 21: FSM scorecard for Santa Cruz, Bolivia

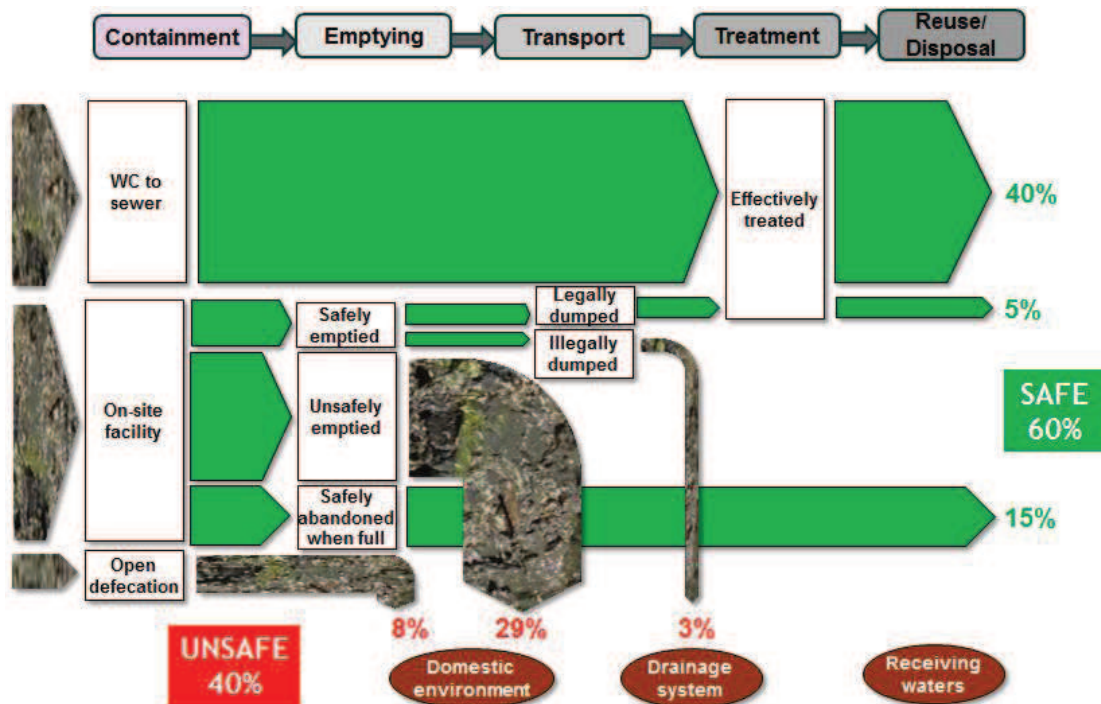
Fecal waste flow matrix	% of FW	of which safely collected	of which safely delivered	of which safely treated	Safe: 45% to 59%
Type of system					
Sewered (off site centralised or decentralised)	40%	100%	100%	100%	40%
On-site containment - permanent/emptiable	37%	21%	60%	100%	5%
On-site containment - single-use/not emptied/safely abandoned (see note 1)	15%	100%	100%	100%	15%
Open defecation	8%	0%			
Unsafe: 41% to: 55%		37%	3%	0%	
<i>Affected zones</i>		<i>local area & drainage</i>	<i>drainage system</i>	<i>receiving waters</i>	

Notes:

1. Single-use/not emptied/safely abandoned on-site containment is considered a safe disposal method but data available is poor so total 'safe' and total 'unsafe' are both shown as ranges.

2. All sources shown in waste flow diagram below.

Figure 22: Fecal waste flow matrix for Santa Cruz, Bolivia



Sources: Open defecation a nominal 8% (JMP (2012) for urban Bolivia). Sewered percentage (40%) from Ortuste (2012) Table 4.1, page 20. Therefore OSS = 52%. Percent emptied mechanically (15% of OSS) from Ortuste (2012) Table 6.10, p.43. Percent delivered to SAGUAPAC treatment plant (60% of emptied) from Ortuste (2012) text and Table 6.1, p.33. No data but inferred that sewerage and all waste treatment is 100% efficient (Sanz, 2013). No data but inferred (from Ortuste (2012) p.20) that two-thirds of remaining pits and tanks are abandoned unsafely or overflow to environment when full and one-third of remaining pits are covered safely when full.

Figure 23: Fecal waste flow diagram for Santa Cruz, Bolivia