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An international partnership to help poor people gain sustained access to improved water supply and sanitation services

# **A Review of Fecal Sludge Management in 12 Cities**

## **Annexure A.3 Managua, Nicaragua**

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FINAL DRAFT

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

## A.3 Managua, Nicaragua

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

### A.3.1. Summary

Population (millions)	2
Percentage of households using on-site sanitation or open defecation	61%
Percentage of total fecal waste (sewage and fecal sludge) safely managed	33% to 52%
Percentage of sewage safely managed	82%
Percentage of fecal sludge from OSS safely managed	1% to 30%
FSM Framework	Poor
FSM Services	Poor
City Type	1

A sewer network serves nearly forty per cent of households in Managua and the waste transported in this system is treated in a wastewater treatment plant. This leaves over half the city's households reliant on various on-site sanitation systems and a tiny minority of these households benefit from an FSM service.

### A.3.2. Institutional framework

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

In Nicaragua institutional responsibility for FSM is unclear and the situation in Managua is no different, although there are indications of improvement in the city as the organisational structure has been put in place. The restricting factor is that there is a limited legal framework within which the FSM organisations responsible can operate.

Both the institutional and legal framework covering water and sanitation in Nicaragua is mainly geared towards drinking water but it is starting to develop for sanitation. ENACAL, Nicaragua's state water and sewerage utility, is the mandated provider of sanitation services, while the INAA is the regulatory agency responsible for the control of drinking water and sanitary sewerage services in Managua. Other ministries involved in FSM include the Ministry of Health (MINSAL) and the Ministry of Environment and Natural Resources (MARENA). The former has oversight of sanitary conditions in fecal sludge management while the latter is responsible for environmental oversight with respect to pollution of soils, subsoils, aquifers and surface water bodies. However, specific regulations and norms and standards for FSM are currently lacking. In order to address this issue, FSM-focused regulations, norms and standards are currently being drafted and it is envisaged that this will help engender a more supportive enabling environment in the future. In the short-term, and combined with these ongoing initiatives, a focus on FSM-specific investment along with improved planning of these investments is required to enable the current small-scale service to develop.

The Managua City Government does not play an active role in the city's FSM service; their role being limited to registering the private companies who carry out mechanical pit emptying, issuing licences and collecting taxes – the Municipality do not monitor the operational performance of the companies.

### **A.3.3. The FSM scorecard**

*Description of key points in SDA scorecard....*

In Managua, the private sector provides a limited pit-emptying and transportation service, which delivers fecal sludge to an ENACAL-run treatment plant. The success of this private sector led activity is indicated by the slightly higher scores for emptying and transport in the maintenance element of the sustaining building block. However, looking both down and across the scorecard it is evident that this is the only bright point on an otherwise low-scoring FSM scorecard.

Overall, the service delivery is weak across all parts of the chain and in all three elements of the FSM framework. The poor enabling environment being the root cause of the lack of a functioning at-scale FSM service.

### **A.3.4. FSM along the sanitation service chain**

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

#### **Containment:**

It is estimated that 4% of the population of Managua practice open defecation while 39% 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 "simple [pit] latrines or septic tanks or chambers" and the quality of these containment systems is highly variable: a relatively recent World Bank study (WSP 2008 in Ortuste, 2012) of a sample of Managua households reported that a large majority of the on-site sanitation facilities were found to be inadequate and many were unhygienic.

#### **Emptying:**

Ten privately operated companies in Managua provide emptying services. Five of these are formally registered with ENACAL to deliver fecal sludge to the treatment works. The companies are well established and have been in business for between 10 and 45 years; they were originally set up to provide plumbing and water vending services but have expanded into the pit-emptying business.

However, only 2% of the households using on-site sanitation type facilities use these privately run mechanical pit-emptying services. This leaves a large percentage of on-site sanitation users whose pits are not 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.

There are reportedly no manual pit emptiers in Managua.

#### **Transport:**

From the information available it is understood that six of the emptying companies discharge fecal sludge at ENACAL's wastewater treatment plant, which infers that the other four companies dispose of their waste by illegal dumping. Therefore, less than 2% of the waste generated from households using on-site sanitation reaches the city's treatment plant.

#### **Treatment:**

There is no dedicated fecal sludge treatment plant in Managua but discharge of fecal sludge to the ENACAL-run wastewater treatment plant is permitted. The treatment consists of "thickening, digestion, pressing and drying in sheds". No information on the size or capacity of the treatment plant is available but clearly if the private operators emptying service were to be extended beyond the current level (less than 2% of the non-sewered population) the capacity and performance of the treatment would need to be upgraded.

**Reuse/disposal:**

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

**A.3.5. Outcome**

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

Overall, and making allowances for poor operation and maintenance of the sewer network and dysfunctional treatment, it is suggested that at least half of the fecal waste generated in Managua is unsafely reused/disposed of to the environment. The majority of this waste is from households not connected to the sewer network who use some form of on-site sanitation. The small scale FSM service in Managua serves around only 2% of the on-site sanitation users and therefore has limited impact on public health or the environment.

**References**

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

WSP (2008). *Poverty and Sanitation: An Analysis of the Linkage between Poverty and Access to Basic Sanitation in Latin America.*

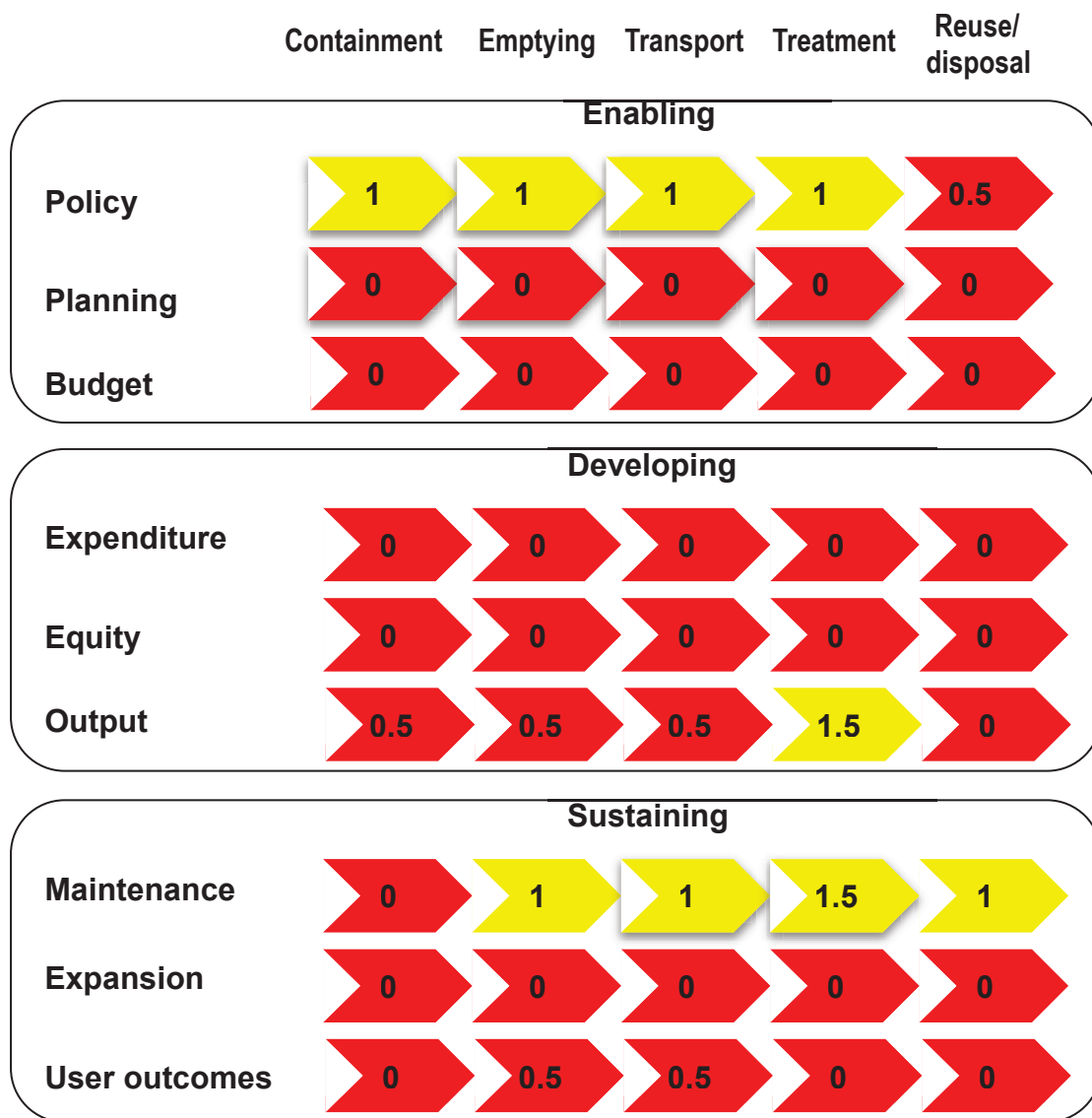


Figure 27: FSM scorecard for Managua, Nicaragua

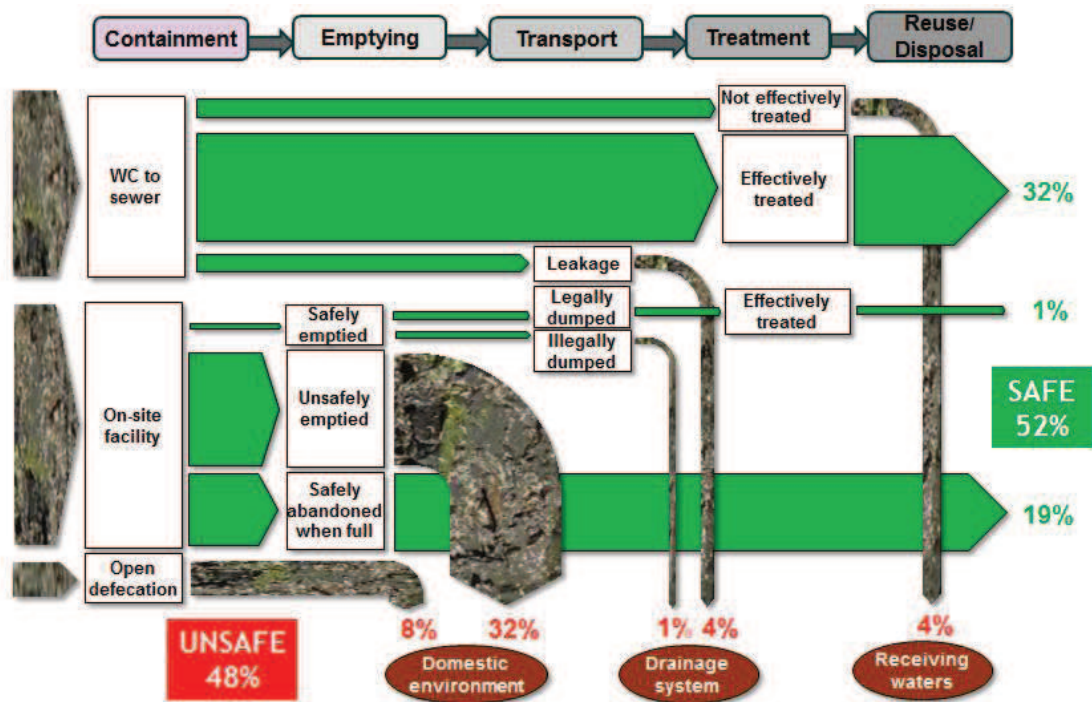
Fecal waste flow matrix	% of FW	of which safely collected	of which safely delivered	of which safely treated	Safe: 33% to 52%
Type of system					
Sewered (off site centralised or decentralised)	40%	100%	90%	90%	32%
On-site containment - permanent/emptiable	33%	3%	50%	100%	1%
On-site containment - single-use/not emptied/safely abandoned (see note 1)	19%	100%	100%	100%	19%
Open defecation	8%	0%			
<b>Unsafe: 48% to: 67%</b>		<b>40%</b>	<b>5%</b>	<b>4%</b>	
<i>Affected zones</i>		<i>local area &amp; 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 28: Fecal waste flow matrix for Managua, Nicaragua



Sources: Open defecation: 4% for urban Honduras (JMP (2012)).  
 Sewered: 39% from Ortuste (2012) Table 4.1, page 20. Assume nominal 10% dysfunctional sewerage and nominal 10% for dysfunctional treatment.  
 Emptied mechanically: 2% of OSS from Ortuste (2012) Table 6.10, p.43  
 Delivered to ENACAL treatment plant: 60% of emptied mechanically (1% of OSS) from Ortuste (2012) p.33, Table 6.1 and also see text on page 33.  
 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 are covered safely when full.

Figure 29: Fecal waste flow diagram for Managua, Nicaragua