wash plus

Briefing Note November 2013

Downstream of the Toilet: Transforming Poo into Profit

Workers from the local service provider, Aina, disinfect equipment used to extract and transport sludge to the burial site. The availability of water at the burial site is critical to ensure hygienic conditions.

Background

The Joint Monitoring Programme (JMP) defines an improved sanitation facility as one that hygienically separates human excreta from human contact. Yet sanitation is much more than toilet technologies that physically isolate the user from his/her excrement. Indeed, it was not the invention of the toilet per se, but the safe removal of fecal matter from the public environment that triggered the massive public health gains of the late 19th century.

Although sewerage connected to a centralized treatment facility remains the gold standard for transporting and treating fecal waste, capital investments needed to construct and maintain sewerage schemes are prohibitively expensive in many urban and peri-urban communities in Asia and sub-Saharan Africa. Half of Asia's population is expected to live in urban areas by 2020, while Africa is likely to reach 50 percent urbanization in 2035. These trends necessitate the emergence of alternative service delivery options to manage fecal sludge downstream of the toilet in ways that are less resource intensive, yet environmentally safe and economically sustainable for resource-poor environments.

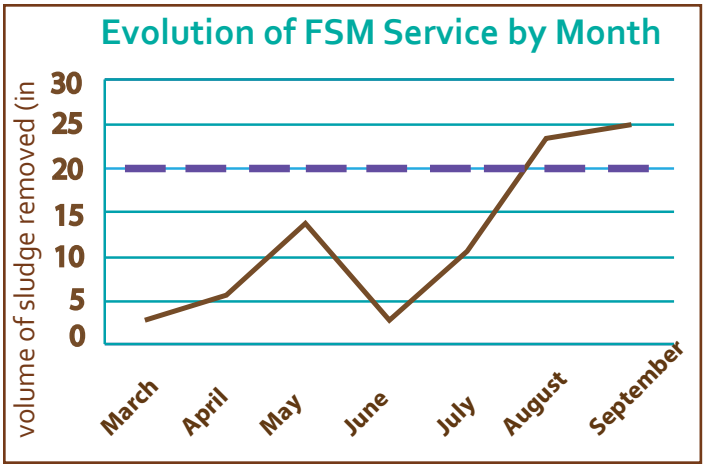
...trends necessitate the emergence of alternative service delivery options to manage fecal sludge downstream of the toilet in ways that are less resource intensive, yet environmentally safe and economically sustainable for resource-poor environments.

Learning by Doing in Peri-Urban Madagascar

Ambositra is a sprawling regional capital of 40,000 people situated in the central highlands of Madagascar. While the cities' 12 neighborhoods are considered to have 100 percent latrine coverage, they lack centralized sewerage and wastewater treatment facilities. Eighty-two percent of the estimated 3,500 household toilets in Ambositra are dry pit latrines with storage volumes of 12m^3 on average, and 17 percent drain into an on-site septic tank with 3m^3 of storage capacity. A 2011 household survey estimates that more than 600 household latrines become full each year. Traditional fecal sludge management (FSM) practices consist of either rebuilding the latrine (more than 60 percent of the pit latrines are handled in this manner) or hiring day laborers to manually remove the sludge and dispose of the waste in a river or rice field.

USAID FROM THE AMERICAN PEOPLE

PRACTICA FOUNDATION



Note: The dashed line indicates profitability.

To address this gap in environmentally sound waste management practices, WASHplus engaged the international NGO Practica (www.practica.org) to design and pilot a private-sector service delivery model to sustainably manage fecal sludge generated in the city using low-cost decentralized technologies. Working closely with the commune authorities, the project selected and trained a local entrepreneur, developed a sludge burial site, experimented with a range of manual extraction methods and tools, and engaged in a social marketing campaign to promote the service. At the half-way mark of this 12-month effort the operator has reached a level of profitability (treating 20 cubic meters of sludge per month), yet challenges remain before the service is able to operate completely independently of donor support.

Lessons Learned

The Gulper, one size doesn't fit all: Solid waste, sticks, and random nonbiodegradable items common in pit latrines cause havoc with manual suction extraction tools such as the Gulper. WASHplus has found that the Gulper alone is ineffective to empty pit latrines in Ambositra, though this type of toilet was used by more than 70 percent of the clients who contacted the service provider. Practica has experimented with ways to increase the effectiveness of the tool, including varying the screen size and shape at the bottom of the device and adding a manual declogging mechanism around the shaft. Despite these modifications, it appears that manual extraction methods using rustic tools are more effective to desludge pit latrines, though care must be taken to ensure hygienic working conditions.

Partial pit emptying: In cases where the majority of the potential clientele have pit latrines with large volumes it is important to base tariff structures on a price per unit volume of sludge treated, rather than per pit. The project found that most customers with pit latrines hire the service to remove only 1 to 3 m^3 of sludge, rather than the entire pit.

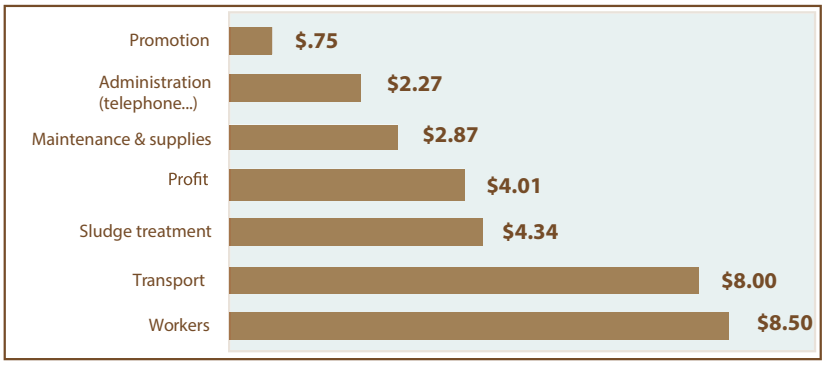
Burial, a cost-effective method to begin a service: When the environmental conditions are appropriate, a planned burial site is a practical solution for disposing of fecal sludge. Burial is low-tech, making it easily understood and easily maintained (assuming a local operator has access to water and washing facilities). A burial system allows a desludging service to start with a much smaller initial capital investment than is needed for other treatment processes. This translates into less up-front risk for an investor while allowing the operator to assess critical business parameters such as willingness to pay under actual market conditions.

Social drivers: A satisfaction survey of the first 30 clients showed that 86 percent are satisfied with their service, and 67 percent considered the service to be affordable. Seventy-six percent of clients cited an immediately overflowing latrine as the motivating factor to hire the service. The same survey reported that the three most valued aspects of the service in order of importance are: cleanliness, the efficiency of the service provider, and affordable cost.

Low cost, but still expensive: An August 2013 survey revealed that 72 percent of nonclient households were aware of the FSM service, though 58 percent indicated that it was too expensive. The service is currently unable to operate profitably at a price of less than US $31 per m^3. Transportation is the largest driver of the cost, accounting for almost 30 percent of the tariff. The project

Tools and equipment needed for FSM, such as this trailer, are manufactured by local workshops using readily available materials.

Breakdown of Costs of the $31/m^3 Fee



Note: The cost of environmental monitoring and potential economic benefits of tree plantations are not included.

is considering alternative methods of transportation that would reduce the price point to make the service more available for customers at the base of the pyramid.

Challenges and Perspectives

When environmental health deserves a subsidy: In Ambositra, a desludging service with the capacity to treat 30m3/month and a burial site sufficient to treat the volume of sludge generated in one year requires a minimum of $4,500 in capital investment to set up. At current tariff levels, a local service provider would need to operate for more than three years to recover this investment, making the activity unattractive for the risk-averse small-scale entrepreneurs typical in Madagascar. In such an environment, subsidies are indispensable to attract private operators to engage in desludging services.

Entrepreneurial interest in sludge management is low: Despite WASHplus's requiring minimal up-front investment, only three small-scale companies responded to the public call for proposals for entrepreneurs interested in receiving support to begin an FSM business. Although, the selected entrepreneur has demonstrated full engagement and interest in the service delivery aspects of the business, it has proven unwilling to invest significant capital to grow the market beyond the efforts funded by the project.

Using the Gulper to extract sludge from a row of pit latrines at an office building in Ambositra. WASHplus has found that traditional tools (ex. shovels and baskets) are more effective to remove sludge from dry pit latrines than suction pumps models such as the Gulper.

Sludge drying may be a promising way to reuse biosolids: Ambositra is a region dominated by patty rice cultivation and smallholder farms. Farmers generally use more advanced techniques here than in other parts of the island, and there is local demand for fertilizer produced from the dried sludge. WASHplus engaged the National Center for Environmental Research to determine the drying rates of concentrated pit latrine sludge given the local environmental conditions. Experiments found that it took 25 days to dry a 5 cm-thick sludge layer during the rainy season, thus a drying bed surface area of 430 m^2 is optimum to dry 30 m^3 of sludge each month in Ambositra.

Endnotes

1. United Nations Development Group. 2003. Indicators for Monitoring the Millennium Development Goals. New York: United Nations.
2. Black M. and B. Fawcett. 2008. The Last Taboo: Opening the Door on the Sanitation Crisis. London: Earthscan.
3. United Nations, Department of Economic and Social Affairs, Population Division. 2012. World Urbanization Prospects, the 2011 Revision: Highlights. New York: United Nations.

The WASHplus project supports healthy households and communities by creating and delivering interventions that lead to improvements in water supply, sanitation, and hygiene (WASH) and indoor air pollution (IAP). This five-year project (2010–2015), funded through USAID's Bureau for Global Health (AID-OAA-A-10-00040) and led by FHI 360 in partnership with CARE and Winrock International, uses at-scale programming approaches to reduce diarrheal diseases and acute respiratory infections, the two top killers of children under age five globally.

For more information contact:
Jonathan Annis, Sanitation and Innovation Advisor
WASHplus Project
jannis@fhi360.org
www.washplus.org