Editorial: What happens when the pit latrine is full?

SHIT-IN-A-PIT, known more politely as 'on-site sanitation', constitutes a disease time bomb, especially in the informal settlements or slums of developing country towns and cities. Every so often that time bomb explodes, resulting in outbreaks of diarrhoeal diseases, the most feared of these being cholera. Having once exploded, the bomb remains viable – the root cause is still present and being added to day by day.

In the typical population densities of urban slums, a sludge volume of between 5,000 and 10,000 cubic metres is produced every year per square kilometre of inhabited land. This overflows – or is deliberately caused to overflow – from full pit latrines. It contaminates soil, homes, surface water, and groundwater, with inevitable impacts on human health.

Faecal sludge is a major problem, in part caused by the relative success of efforts to contain faeces safely in pits below ground. And yet it can also represent a set of opportunities. There are business opportunities associated with the design, development, and deployment of the technologies needed to empty pits. There are further opportunities if faecal sludge can be exploited for its nutrient value in agriculture, or its energy content.

As in many areas of endeavour, problems such as that of pit emptying attract some individuals with an inventor's or engineer's turn of mind. The problem is perceived as primarily one of technology, and clever devices are developed which can make possible the process of removing very liquid material, highly compacted solids, or pit contents intermediate in texture between these two extremes. The technical challenge is not trivial, but it may well be that it is the (relatively) easy part of the problem.

Even given the technology – equipment which can get access to tight spaces in slums and remove excreta and solids such as rags, corn cobs, and stones from pits – we are still a long way from a total solution. Who will operate the equipment? Will they be able to operate profitably? Where will they dispose of the pit contents? Will households be able to afford the services of viable pit-emptying enterprises? It becomes clear that viable business models and business plans are needed in order to translate the possibility of regular pit emptying into reality. This is the interface between households and the private sector pit emptiers.

Once competent businesses are established and emptying pits at an affordable price, suitable disposal and treatment facilities are needed. This is where the private sector pit emptiers interface in turn with the town or city authorities which operate waste transfer stations and sewage treatment works. Access to such facilities needs to be affordable, and at least as convenient as fly-tipping, with the corresponding environmental health implications.

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There are few examples of successful faecal sludge management systems – from toilet through to treatment – at least at any scale. Maybe there are alternatives though; given the limitations of space in urban slums, it is rather surprising how few organizations are examining alternatives such as urine separation and dry composting of faeces; co-composting of human excreta with organic solid waste (it is estimated that about 70 per cent of waste is compostable); or regular daily or weekly removal of excreta with local treatment, obviating the need for pit latrines. Some are doing these things, but not yet many, and not yet at scale.

In this theme issue of *Waterlines* David Still and colleagues describe the very real technical challenges of pit emptying, drawing on experience in South Africa. We are introduced in this paper to pit-emptying technologies quaintly named the 'Gobbler', the 'NanoVac', and the 'eVac'. Steve Sugden, who worked extensively on the 'Gulper' and the 'Nibbler', also reviews the 'Vacutug', the 'MAPET', and the 'Dung Beetle'. More importantly he goes on to discuss the business dimensions of pit emptying – the nature and constraints of the market in which pit emptying has to work. Aftab Opel and M. Khairul Bashar continue this theme in their analysis of Vacutug performance in Dhaka, Bangladesh. Finally, Kevin Tayler and colleagues explore the mismatch between demand and supply in regard to mechanical septage management in Indonesian cities. Together all four papers reinforce the message that the problems of faecal sludge management require systematic solutions which pay due attention to technology, economy and demand, business models and business planning, and public policy and institutions.

Also in this issue Job Wasonga and Betty Ojeny describe an innovative approach to improving WASH facilities in Kenyan schools – an approach with potential for wider replication and modification.

In a non-theme article, Nick Robins and colleagues remind us that although Africa's groundwater resources are abundant when considered at continental and sub-regional scale, there are countries and more local areas where it is very difficult if not impossible to provide for local water demands from groundwater alone. Groundwater is a finite and sometimes very limited resource. As populations continue to grow and impose ever greater pressures on resources, there must be no place for complacency about the adequacy of groundwater resources.

Finally, we owe a big debt of gratitude to Julie Fisher who has been producing the *Webwatch* feature in *Waterlines* since 2001. She has brought to the task her expertise in information management relating to water supply and sanitation, and the communication and dissemination of research in international development. Her oversight of the WEDC International Conferences has also meant she has been aware of practitioner research all over the world. It is now time to hand over the baton, and we are welcoming Steve Jones, a PhD student from Royal Holloway, whose research focuses on the financing of water and sanitation services in Mali. Thank you Julie, and welcome Steve!

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