

Investment title: OI workshop - dealing with trash (OPP1148684)

Investment period: 30th March to 31st July 2016

Program Officer: Sun Kim

Investment Total: \$201,066.00

1. Overview

Pit latrines and in particular ventilated improved pit latrines (VIPs) are the most basic form of improved (acceptable) sanitation. However when the pit becomes full the facilities are no longer functional. Options include reverting to open defecation, abandoning the facility and building a new one or emptying the pit and safely disposing of the contents. The first two options are not considered as acceptable to the users from a health perspective. The majority of pit latrines have been constructed with no thought given to the emptying process. In addition, the latrines are often used for solid waste disposal and contain up to 25 % non-faecal material (trash). The viscosity of the sludge in the pits varies from water-like to thick (spadable) clay. The safe and efficient removal of the pit contents is an essential stage in the process chain leading to safe and sustainable faecal sludge management. A number of initiatives have attempted to address the problem but have not found universal application due to issues such as maneuverability, suction power, clogging due to detritus and reliability.

The objective of this project was to assemble a team of experts to investigate the challenges and to develop concepts and mock-ups of possible equipment to overcome these challenges.

2. Team selection

The project team was selected based on the experience of the person with regards to pump design and operation, particularly in the field of sanitation. These core team members met up with local experts in each of the locations visited. A list of the core team members is provided in Table 1.

Table 1: List of core team members

Title	Surname	First name	Organisation	Country	Email
Ms.	**Ashinhurst	Holly	The Bill & Melinda Gates Foundation	USA	Holly.Ashinhurst@gatesfoundation.org
Prof	Buckley	Chris	Pollution Research Group, UKZN	South Africa	buckley@ukzn.ac.za
Mr	*Choksey	Jonathan	Mott MacDonald	United Kingdom	jonathan.choksey@mottmac.com
Mr.	*Davis	Jason	Ashland Pump	United States	Jdavis@ashlandpump.com
Prof	de los Reyes III	Francis	North Carolina State University	USA	fdelosr@ncsu.edu
Mr	*Gras	Xavier	Practica	Madagascar	xavier@practica.org
Mr.	Gurski	Thomas	Carbyne Enterprises, Inc.	United States	tom@carbyne-enterprises.com
Mr	*Heeger	Jan	Netherlands Red Cross	Nederland	jheeger@redcross.nl
Mr	Inman	JR	Northwest Cascade / FloHawks Septic	USA	jr@nwcascade.com
Mr	*Innes	Alex	AGI Engineering, INC.	USA	alex@agieng.com
Mr	Kim	Sun	Bill & Melinda Gates Foundation	USA	sun.kim@gatesfoundation.org
Ms.	Kneller	Heidi	Spirulida	USA	knelheidi@gmail.com
Mr	*Malinga	Samuel	Water For People, Uganda	Uganda	smalinga@waterforpeople.org
Ms.	*Neethling	Jeanette	Partners in Development	South Africa	jeanette@pid.co.za
Mr.	Pramanik	Martin	MAWTS	Bangladesh	pramanikmartin@yahoo.com
Mr	Shaw	Jon	Jon Shaw and Associates	USA	Jonshawandassociates@gmail.com
Mr.	Van Heerden	Dale	Mvezo Plant & Civils	South Africa	dale@mvezo.co.za
Mr.	**Vonjy	M	Practica	Madagascar	vonjy@practica.org
Ms.	Williams	Jennifer	The Bill & Melinda Gates Foundation	USA	jennifer.williams@gatesfoundation.org

Note: * Attended the Africa events only **Attended India events only

3. Project approach

In order to obtain a common understanding of the challenges facing pit emptying contractors, field visits were undertaken to 3 countries in Africa (Zambia, Tanzania and South Africa) prior to the first Workshop in April 2016, and to India (Bangalore and surrounds) prior to the second Workshop in June 2016. Further reports on these events are available from the PRG on request.

3.1 Africa events

The African field trips and workshops was held from 18th to 29th April 2016. The core team travelled to Lusaka, Dar es Salaam and Durban to view pit emptying operations in these countries and to meet with local pit emptying contractors and researchers in order to obtain an indication of the challenges in emptying the pits (in particular the presence of trash and the difficulties in obtaining access). During these field visits, the team members were asked to complete observation sheets that were then used to guide discussions. On completion of the field visits, the team were brought together to workshop the outcomes and develop some possible designs for pit emptying devices.

3.2 Indian events

For the Indian event, the core team members changed slightly with some original members not being able to attend due to other commitments and new members being added. The field trips and workshops were held from the 12th to 19th June 2016 and were based in Bangalore. All field trips were arranged together with the BORDA organisation, CDD (Consortium for DEWATS Dissemination). Discussions were held with local pit emptying contractors and researchers involved in sanitation issues.

3.3 Workshop facilitation

The workshops were facilitated by Jon Shaw (Jon Shaw and Associates) and involved a number of steps.

Step 1: Defining the problem statement

Step 2: Refining the scope of the project and the invariables

Step 3: Defining objectives, deliverables and benchmarking opportunities

Step 4: Reviewed BMGF OI requirements and their impact to the solution space

Step 5: Generating ideas through a number of techniques including general brainstorming, structured group prompts, systematic inventive thinking (SIT), and concept mapping

Step 6: Developing a morphological chart to create contextual relationship for the ideas and down-select

Step 7: Breaking into sub-teams, each with a different emphasis area to test the feasibility of the solutions and generating a ROM business case

Step 8: Performing some simple simulations in the laboratory (Durban only)

Step 9: Feasibility analysis and prioritisation of the solutions by the whole team

This process was followed at both the African and Indian events.

4. Workshop and Field Visit Outcomes

The main outcomes of the workshops were:

1. Trash is the main challenge faced by pit emptying contractors in Africa. Indian pits do not contain trash.
2. Access to the pits is a problem particularly in informal settlements, where houses are built very close to one another and access roads are very narrow.
3. Topography impacts on the accessibility

On completion of both workshop, the team members came up with some possible designs for pit emptying devices. These devices had to meet the following criteria:

- Develop solutions (for potential funded development) for emptying wet and dry pits/tanks that are affordable for the service providers (utilities, private businesses) for the bottom of the pyramid
- Solution able to empty >95% of the pits/tanks in the target markets
- Function in a safe and environmentally sound manner
- Provide a basis for a viable business model including manufacturing and maintenance, ownership and operation

Team reports on these designs are available from the PRG on request.

5. Organisational and Administrative Aspects

5.1 Logistical arrangements

The PRG were tasked with the organisation of the workshops and field visits. Countries were identified that would provide the core team members with the opportunity to view a variety of pit latrines in different contexts such as:

- (i)Ease of access to the pit latrines (topography, terrain etc.)
- (ii)Type of sludge (wet, dry, difficult to pump)
- (iii)Access to the sludge in the pits
- (iv)Degree of trash content

It was also important for the team members to meet with local pit emptying contractors to obtain an understanding of the challenges related to emptying the pits as well as the transportation and disposal of the sludge.

Visits were therefore arranged to Lusaka in Zambia, Dar es Salaam in Tanzania, Durban, South Africa, and Bangalore, India, with the workshops being held in Durban and Bangalore.

The UKZN local travel agent (BCD Travel) arranged all the accommodation and conferencing aspects for both events. Flights for the African events were also arranged through BCD Travel, but the flights

to India were arranged directly by the Foundation due to the need to organize business class flights and insufficient funds in the UKZN budget to cover this cost. On-the ground transportation was arranged by local organisations in each country through relationships that had been formed between the PRG and these organisations.

5.2 Lessons learned

- Start the process of identifying team members early as it takes time to find people with the relevant expertise who can spare two weeks of their time to participate
- The VISA application process for some countries was time consuming and difficult – investigations into this process early on in the planning stages would be useful
- It is important to have a reliable team of people on the ground in each of the locations to ensure that the delegates are exposed to the full range of conditions and challenges. Formal agreements should have been established prior to the event which would have assisted in a smoother organisational process

6. Feedback from Project partners

6.1 Feedback from Jon Shaw and Associates

“...I felt like Jon Shaw and Associates, UKZN and BMGF partnered exceptionally well through the entire arc of the workshop and I must express my tremendous gratitude to UKZN’s Chris Buckley and Susan Mercer for their grace, diligence and trust. The BMGF engagement was outstanding, and I am very thankful for the generous support of Jennifer Williams, Holly Ashinhurst and Sun Kim. The attendees- all of them- were an inspiring, intelligent and energetic group. I could not have asked for a better team to work with- I do and will miss this group of people.

I have learned that I need to push more up front with the BMGF to better understand their objectives and design the best workshop to support. I think this just boils down to some additional time and effort scoping and prodding at what success looks like and developing clearer success criteria so that we collectively better understand when events are meeting the need and when we need to make adjustments.

We effectively spent several weeks growing a tremendous body of knowledge and momentum with a small, very effective and dedicated team- and then we sent them home. What could we do with that team if they came back together every month or so over the course of a year? With the right scope and support, such a team could prove incredibly effective. Something to consider”....

6.2 Feedback from the PRG

“...From the PRG side, the whole experience was very exciting. To have taken a group of people that did not know one another into developing country situations delving into pit latrines of poor citizens started out as a crazy idea. However, with a lot of help from a range of people in different countries the whole proved to be very successful. The assistance of all the back-stopping people that arranged transportation, accommodation, finance, logistics etc. was essential and never wavered. The assistance from all employees of Borda in the different countries was essential to the success of the workshop their input cannot be over appreciated. The attitude and input from the individual workshop members and guests at the different stops ensured the success of the workshop. We all combined as a team and worked and played in a mutually supportive manner.

The facilitation of the workshop was top class. I think for most of the participants facilitated workshops are not a novel experience, however in my estimation everyone came away from the workshop with an extraordinary high opinion of the Facilitator (Jon Shaw) and the way he continually introduced new techniques to squeeze an additional 20 concepts out of every participant. He pushed us hard, but tempered the experience with a continual stream of good-humored encouragement. The whole experience for Jon must have been exhausting.

In a way, the workshop closed with a bit of an anti-climax in that concepts for Omni Ingestors were developed and actions will be taken. Feedback on the outputs would be satisfying for all participants and bring a sense of closure. I would like to suggest that if finances are available and IP issues allow, a follow-up event should be held in which the prototypes developed from the workshop can be seen in operation and progress discussed”...

7. Conclusions and Way Forward

This project brought together a core team of experts that worked well together and generated a significant number of ideas and possible solutions. The local experts provided invaluable input into the discussions and the field visits were essential in order for the participants to have a common understanding of the challenges.

The teams worked closely over these few weeks to generate solutions, but no plan has been made to take these ideas further at this stage. Some possible follow up options include:

- A further workshop or meeting be held to consolidate the findings of these two workshops and develop a plan to move forward based on the outcomes;
- The recruitment of post-graduate students to undertake more in-depth studies into one or two of the proposed solutions.