

Developing Methods for Projecting Faecal Sludge Quantities and Qualities

Faecal sludge stored underground in onsite sanitation systems is very heterogeneous; thus, estimating quantities and qualities, which are needed for management and treatment solutions, is difficult. Here is a sneak peek into recent MEWS group research to develop and test an appropriate methodology. [Nienke Andriessen¹](#), [Linda Strande¹](#)

Key developments

In 2018, together with the Consortium for DEWATS Dissemination (CDD) Society, the MEWS group implemented the quantities and qualities (Q&Q) methodology in Sircilla, a town of 76'000 residents in India. Measurements were made of the build-up of the sludge blanket *in situ* over time and the accumulation rate of what is actually collected and transported for treatment. Different methods for measuring sludge volumes were compared, including emptying the containments and using a core sampling device (Photo). The study results are currently being prepared for publication with the help of Prerna Prasad from CDD, an Eawag Partnership Program Fellow [1]. One of the key outcomes is that the method for measuring sludge volume should be selected according to the study goal and availability of resources.

A large Q&Q study was done in Lusaka with the University of Zambia to help city authorities with faecal sludge management planning. At 421 onsite containments across the city, sludge volume was measured *in situ* with a Volaser [2] and samples were collected using a cone-shaped device for pit latrines and a core sampler for septic tanks (Photo). One key finding was the confirmation that containment type (septic tank vs pit latrine) is an important predictor of faecal sludge Q&Q.

The MEWS group also collaborated with the Z_GIS Centre at the University of Salzburg to explore if remote sensing devices can gather data, such as land use, roof type, distance to green space, distance to water bodies and distance to treatment, and whether such data could be used to predict faecal sludge Q&Q [3]. The findings were cross-checked with data from the Q&Q study in Lusaka. The main findings were that Earth observation data could be useful to inform the sampling plan designs of future Q&Q studies, and assist decision-makers decide on focus areas for sanitation planning. None of the indicators had a statistical relation to quantities; however, building density, building size, street condition and building use were predictors of qualities (e.g. total solids content).

The findings of our work and how they can be applied are discussed in the book chapter, Estimating quantities and qualities (Q&Q) of faecal sludge at community to city-wide scales, in the IWA publication *Methods for Faecal Sludge Analysis* [4]. In-depth analysis of the information and data collected from different cities around the world (~1'000 data points) is being done to determine whether broader, fundamental patterns about faecal sludge can be inferred. This manuscript is currently in preparation, stay tuned!

Conclusion

In the future, these results may be used to spark discussions about improving methods to estimate accumulation rates, e.g. to think about how each of the components of the accumulation rate formula [$FS \text{ volume in situ} / (\#users * \text{time since last emptying})$] can be measured more accurately. The Q&Q method will continue to be refined as more empirical knowledge is generated. MEWS looks forward to receiving feedback from people who implement the methodology described in the forthcoming book chapter. •

References

- [1] P. Prasad et al., *Field-testing of methods for the estimation of quantities and qualities (Q&Q) of faecal sludge in Sircilla, India* (in preparation).
- [2] N. Andriessen and L. Strande, Volaser: In Situ Measurements of Volumes of Faecal Sludge for Estimations of Accumulation Rates, *Sandec News*, 21 (2020), 22.
- [3] J. Nödel, *Indicator-based city zoning using Earth observation for sanitation management in Lusaka, Zambia*, MSc thesis, University of Salzburg, Salzburg, Austria, (2020).
- [4] L. Strande et al., 'Estimating quantities and qualities (Q&Q) of faecal sludge at community to citywide scales', in K. Velkushanova, et al. (eds), *Methods for Faecal Sludge Analysis: IWA Publishing*, (2020).



A core sampler is being used to take a sample from a septic tank in Lusaka.

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