Demonstrating new sanitation technologies in the Eastern Cape

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Providing safe and accessible water supply and sanitation services profoundly affects poor people's daily lives. In order to provide people with the dignity they deserve, while working within the constraints provided by South Africa's water scarce environment, calls for the development of alternative sanitation technologies. One such a technology, the Earth Auger, is currently being demonstrated in the Eastern Cape through a collaborative project by the Water Research Commission and the Department of Science and Technology.

Background

WATER RESEARCH

Providing sustainable sanitation to the percentage of South Africa's population that remains unserved is one of the most complex issues on the municipal agenda. In 2011, the Bill and Melinda Gates Foundation announced their Reinvent the Toilet Challenge to promote research into new generation sanitation solutions that are innovative, off the grid, affordable for poor users and sustainable.

A Memorandum of Understanding (MOU) between the South African Department of Science and Technology (DST) and the Bill and Melinda Gates Foundation was signed in March 2014 to demonstrate potential Gates technology innovations of relevance to South Africa. DST appointed the Water Research Commission to facilitate and coordinate this programme.

The Earth Auger Sanitation System

One of the first technologies selected to demonstrate was the Earth Auger Sanitation System. The Earth Auger is a hybrid sanitation system: a urine diverting dry toilet, and a composting toilet. A composting toilet makes use of naturally occurring bacteria that use the solids as an energy source – as food – and in the process, convert the solids to a more stable form. Composting happens faster and with greatly reduced odours if done aerobically (with oxygen); a urine diverting dry toilet helps with this in that the urine (and any other water) is separated from the solids by the way that the toilet seat/vertical chamber is made.

There are a number of ways that the Earth Auger enhances composting, drying and odour reduction. Firstly, a cover material is added (like sawdust, ash etc.). These materials absorb odours as well as absorb moisture. Secondly, each 'flush' turns an auger that mixes the faecal matter with the cover material. This action makes the composting happen faster by maintaining aerobic conditions, breaking up chunks of materials and continually moving the materials.

Eventually, composting slows because the bacteria have used the solids that are easily broken down. It is easy to tell the solids have changed form, as the material that comes out the end has a typical musty odour of rich earth rather than a faecal smell.



The black vent tube outside the toilet also helps drying. As the sun hits this black tube, the air inside heats up, rises and pulls air down through the toilet seat and through the horizontal chamber. Any odours that are produced are carried away.

For the South African demonstration project the Earth Auger toilets were housed in normal prefabricated superstructures designed for on-site sanitation.

Demonstration project

With the interest and support of the Chris Hani DM, 200 Earth Auger sanitation units have been installed to demonstrate the technology in the field. The site selected for the demonstration was at Ida Village, Indwe, in Chris Hani District Municipality (Eastern Cape).



Positioning of the water dispenser, toilet sink and urinal

While any new toilet technology will have some adjustments to be made to be suitable for widespread application, it is anticipated that alternative solutions such as the Earth Auger will go a long way towards addressing South Africa's sanitation challenges. User behaviour and acceptance of the technology, as well as creating a value for the byproducts are key aspects to be observed and learned from. The advantages offered by the earth auger is that we move away from the concept of a hole in the ground, towards sanitation which provides beneficiation. The bulking reduces smells and flies, and the products are not overly offensive and look like soil. The design and construction is much easier and can contribute to reduced capital costs and speed of installation. It is hoped that it can find application in a variety of settlement challenges in the future.



The superstructure with air vent.