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Title	The ABR Concept: A holistic approach to managing wastewater from low-income communities and institutions
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The ABR Concept: A holistic approach to managing wastewater from low-income communities and institutions

Municipalities in South Africa face the challenge of providing sanitation to all people by 2010: In serviced areas, this is accomplished by connections to trunk sewers and centralised treatment works. In rural areas, conventional pit latrines, and several dry toilet options have proved to provide adequate sanitation. However, it is acknowledged that there is a lack of technology available for the management of wastewater in dense low-income communities such as semi-formal communities on the fringes of urban developments and poorly resourced institutions e.g. rural schools and primary healthcare clinics.

The Water Research Commission of Southern Africa funded a project to investigate the applicability of an anaerobic baffled reactor (ABR) to treat wastewater generated by dense peri-urban communities. It was soon realised that the ABR alone could not treat a conventional domestic wastewater to an acceptable quality, but that the ABR could form part of a holistic wastewater management system.

The ABR functions as a high rate septic tank, with superior solids retention, shock resistance, and overall better treatment efficiency. It is unable to remove nutrients, and has exhibited insufficient pathogen deactivation for either discharge or reuse. The proposed water management concept has 6 stages: The first stage is wastewater generation stage, which is linked to potable water supply level and toilet superstructure design. It is proposed that the ABR concept is applied in cases where the users have a limited water supply (for example the case of free basic water in eThekweni Municipality). The ABR will perform best on a concentrated feed, and therefore, the wastewater should originate from the toilet only (blackwater), which should be of a pour-flush or low-flush variety. The second stage is the blackwater collection system which in a community would be a condominium-type sewer, and in an institution, an appropriately designed toilet block. An appropriate greywater collection and reuse system is also required. The pre-treatment stage (stage 3) includes a solids trap and the ABR itself, and the fourth stage, a post-treatment step in the form of a constructed wetland, or membrane unit. The reuse of the effluent generated for irrigation purposes is the fifth stage of the process. Finally, it is necessary to have an inspection system involving both the users and the appropriate municipal authority to monitor system maintenance and effluent microbiological quality.

- The ABR concept offers a number of advantages:
- The treatment requires no energy input and no maintenance

- Maintenance of the sewer and solids trap can be limited by the cooperation of the users
- Nutrients present in the wastewater become a resource for agriculture
- Low sludge production from the anaerobic process means that it is technically possible to operate with no process residue
- Biogas production may be harnessed to provide an energy source to the community

Community education and participation are essential at each of the six stages in order that the system is not upset through negligence or abuse; elimination of non-biodegradable solids and dilute wastewater will reduce the risk of blockage and hydraulic overload respectively in the first 3 stages, and awareness of health risks will ensure the safe management of the fifth stage.