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Botswana is an arid country characterized by a very low population density, a few small but rapidly growing urban areas, and a cattle population of five times the human population. Apart from the indigenous simple pit latrine, low-cost sanitation developments date back to the early 1970s, when the government undertook initial work on fiberglass aqua privies. The prototype had various technical problems and in 1976 the government, together with the International Development Research Centre (IDRC), Canada, undertook an investigation of alternative forms of low-cost sanitation by constructing and testing single pit latrines: ventilated improved pit (VIP) latrines, Reed odourless earth closets (ROEC) (a variation of the VIP latrine employing an asbestos cement seat with a chute built integrally into an offset ventilated pit), cement-block aqua privies (single chamber with soakaway), and composting toilets.

The objective of this paper is to focus upon particular technical and sociological problems that have been associated with the introduction of sanitation programs in Botswana. It was not written to detract from the overall success that the Government of Botswana has had in its implementation of such programs but rather to create an awareness of potential problems that could act as a base from which discussion could be generated with respect to the need for appropriately trained manpower within the sanitation sector.

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Fig. 1. Result of pit latrine built without foundations on black cotton soil.
Another major problem with the conventional pit latrine is the difficulty experienced in emptying it successfully. In urban areas, where plot sizes are restricted, a permanent pit is preferred. When emptying becomes necessary, the plotholder is required to add water to the pit contents to form a slurry in order to facilitate emptying by suction using the council vacuum tanker. This not only constitutes a major health hazard, because the only access to the pit is through the seat unit, but also the adding of large quantities of water to the pit accelerates erosion of the pit walls, leading to the collapse of the superstructure.

To overcome these problems, the ROEC was developed in South Africa and has been used in Botswana around the Molepolole area for more than 20 years (Fig. 2). The advantage of this latrine is in the utilization of a chute that funnels excreta and urine into a chamber to the rear of the superstructure. The problem of the superstructure collapsing into the pit is, therefore, overcome. An additional advantage is the ability to empty the pit by removing access covers at the rear of the superstructure. The chute, in conjunction with a ventilation stack, encourages vigorous air circulation within the pit, thereby removing odours and discouraging the attraction of flies. A high standard of construction is required, however, particularly in forming the joints between the cover slabs, as a close fit is required to prevent access by flies. If poorly constructed, the latrine can become a centre for unsanitary conditions. A certain degree of user maintenance is required to maintain hygienic conditions, e.g., experience has shown that the chute of the ROEC is subject to fouling by excreta. The plotholder, therefore, is required to obtain a long-handed brush to clean the chute. Observations have revealed, however, that either the brush is not obtained and cleaning is, therefore, not carried out on a regular basis or excessive amounts of water are used to clean the chute, resulting in flooding of the pit. In an effort to eliminate these problems the ROEC has been modified. In the revised design there is no chute; instead, the near end of the pit has been extended just below the superstructure so that faeces from the seat can drop directly into the pit. This modification of the ROEC has been called the ventilated improved pit (VIP) latrine (Fig. 3). The VIP latrine has a high degree of user acceptance and user maintenance requirements are low. The standard of construction, however, must remain high for reasons similar to those given for the ROEC.

Even a modified single pit latrine has certain disadvantages, the most important
being that when it is emptied the contents of the pit include fresh faeces, which if deposited in the vicinity of the latrine as a result of careless emptying can create unhygienic conditions.

Recent work carried out in Botswana has indicated that groundwater pollution can occur from pit latrines installed in areas when unsuitable ground conditions exist. In areas with fissured rock or other types of highly permeable material or where pits penetrate the water table, high nitrate levels and high bacterial counts can occur and could present a danger to human health. In areas where such hazards exist, it is important that a safe water supply is made available from an uncontaminated source if pit latrines are the only affordable method of excreta disposal.

Investigations and experimental work presently being planned in Botswana to obtain further information on pit latrine operation include optimization of the venting of pits, together with experimentation with different fly and mosquito screens, and experimentation with thin fiberglass disposable pit liners as substructures to pits constructed in areas with unstable ground conditions, such as the Kalahari sands.

Botswana has made considerable strides toward developing sound long-term sanitation strategies. A number of aspects remain unresolved but the government is committed to make progress within the sanitation sector over the next decade, bringing improved health and well-being to a small but rapidly growing population.