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Domestic rainwater harvesting to improve water supply in rural South Africa

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Abstract

Halving the proportion of people without sustainable access to safe drinking water and basic sanitation, is one of the targets of the 7th Millennium Development Goals (MDGs). In South Africa, with its mix of developed and developing regions, 9.7 million (20%) of the people do not have access to adequate water supply and 16 million (33%) lack proper sanitation services. Domestic Rainwater Harvesting (DRWH), which provides water directly to households enables a number of small-scale productive activities, has the potential to supply water even in rural and peri-urban areas that conventional technologies cannot supply. As part of the effort to achieve the MDGs, the South African government has committed itself to provide financial assistance to poor households for the capital cost of rainwater storage tanks and related works in the rural areas. Despite this financial assistance, the legal status of DRWH remains unclear and DRWH is in fact illegal by strict application of the water legislations. Beyond the cost of installation, maintenance and proper use of the DRWH system to ensure its sustainability, there is risk of waterborne diseases. This paper explores challenges to sustainable implementation of DRWH and proposes some interventions which the South African government could implement to overcome them.

Keywords: Domestic rainwater harvesting; Rural South Africa; Water supply; Sustainable

1. Introduction

South Africa is one of the signatories of the Millennium Development Goals. With its mix of both developed and developing regions, 3.7 million people have no access to any form of water supply infrastructure and an additional 5.4 million people who have some access have to be brought up to a basic level of service (Info, 2006). Domestic rainwater harvesting (DRWH) is an alternative for South Africa to meet the Millennium Development Goals of halving, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation (MDG 7, Target 1), and provide free the first six kilolitres of water consumed monthly to poor households (households with less than USD 112 income/month). Rainwater harvesting (RWH) describes the small-scale concentration, collection, storage, and use of rainwater runoff for productive purposes. DRWH is one of the broad categories of RWH where water is collected from rooftops, courtyards and similar compacted or treated surfaces, stored in underground tanks (UGTs) or aboveground tanks (AGTs) and used for domestic purposes, garden watering and small-scale productive activities. DRWH is not new in the region, rooftop RWH is a major source of drinking water in the rainy season especially in KwaZulu-Natal and the Eastern Cape (Duncker, 2000). The practice is currently spreading in rural South Africa, especially with the financial assistance provided by the Department of Water Affairs and Forestry (DWAF) to resource poor households for the capital cost of rainwater storage tanks and related works. There is a direct link between the provision of clean water, adequate sanitation and improved health (Gleick, 1996), and often inadequate water supply is pointed as a factor contributing to poor sanitation. Improving the quantity

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and quality of water supply improves the level of sanitation. Sanitation is an important public health measure which is essential for the prevention of diseases. With regard to sanitation services, in South Africa, 16 million people (3.9 million households) are without adequate sanitation services (Info, 2006). Water plays a major role in laying the foundation for economic growth, not only by increasing the assurance of supply, but also by improving water quality and therefore human health (Phillips et al., 2006). There are two categories of storage reservoirs for DRWH, surface or aboveground tanks (common for roof collection) and sub-surface or underground tanks (common for ground catchment systems). As the level of adoption increases some critical aspect of DRWH such as the health implication, the sizing of the storage tank and the management strategy need consideration. Apart from the most spoken advantage of enabling small-scale productive activities (brewing, small-scale food production, household construction, etc.); DRWH also has the adverse potential impact to spread a number of water related diseases if proper measures are not taken. The immune systems of HIV-positive people are susceptible to a wider range of common illnesses and diseases than individuals whose immune systems are not compromised by HIV and AIDS (Ashton and Ramasar, 2002). As funds are made available for the widespread of DRWH, there is a need to explore its potential to improve the rural water supply. This paper presents the current state of DRWH in South Africa and seeks to highlight the challenges to overcome for its sustainable implementation.

2. The RWH Pilot programme

As part of the efforts of the South African government to halve the number of food insecure households, financial assistance is provided for the implementation of storage tanks. During the Demonstration Phase of its Pilot Programme, DWAF has constructed, through implementing agents, 64 underground tanks (UGTs) (Fig. 1) in 26 villages distributes in 4 provinces, namely Eastern Cape, Limpopo, KwaZulu-Natal and Free State. (De Lange, 2006).

Results of the DWAF RWH Demonstration Phase, November 2005–July 2006, and subsequent analysis and planning for expansion, has shown that the total cost of delivering a homestead rainwater tank of 30 m^3, is not expected to exceed ZAR 22,800 (Table 1) during the expansion and roll-out phases. The isolated cost of material and labour for the construction of the rainwater tank, which amount to ZAR 13,000 is unaffordable for the populace.

In its RWH pilot programme, DWAF only considers UGTs which collect rainwater from the ground, and totally disregards aboveground tanks (AGTs) which collect rainwater from rooftops. Furthermore, it is inappropriate to use the same tank size for different locations since the rainfall, the water requirement and the availability of alternative water sources differs from one site to another. Even though water stored in UGTs in not potable, some households use it as drinking water after putting in some drops

Table 1
Total DWAF investment per household (De Lange, 2006)

Description	Cost in Rand	Cost in USD
Material and labour per 30 m^3 rainwater tank	13,000	1806
Facilitation, sustainability inputs, household training and production establishment, coordination with local authorities, construction and project implementation management, etc.	7000	972
Value added tax @14%	2800	389
Total	22,800	3167

USD 1 = ZAR 7.2 (FNB, 2006).

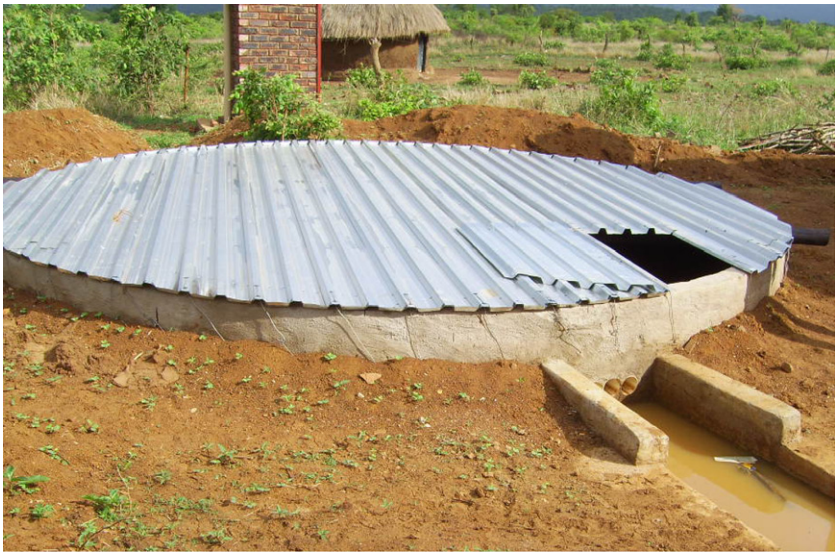

Fig. 1. 30 m^3 RWH underground tank constructed by under the DWAF demonstration phase (Picture by Papenfus).