Contribution of rainwater harvesting technologies to rural livelihoods in Zimbabwe: The case of Ngundu ward in Chivi District

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Abstract

Water has long been regarded as the main limiting resource for crop production in the drought-prone region of sub-Saharan Africa in which Zimbabwe is located. However, the introduction of novel agricultural technologies such as rain-water harvesting (RWH) is seeking to mitigate the effects of these perennial droughts. The successful adoption of such technologies has the potential to alleviate problems faced by resource-poor 'subsistence' farmers. Thus this paper examines the contribution of RWH technologies to rural livelihoods in Zimbabwe and consequently to the sustainability of agriculture and rural livelihoods thereof. The methods employed included a questionnaire survey; key informant interviews and field observations. Benefits of RWH technologies found include an increase in agricultural productivity, enhancing household food security and raising of incomes. The technologies also assisted in improving environmental management through water conservation, reduction of soil erosion and resuscitation of wetlands in the study area. The major constraints facing technology adopters were water distribution problems, labour shortage, water-logging during periods of high rainfall and risk of injury to people and livestock as a result of some of the technologies. However, in an area like Chivi where there are frequent droughts and consequently food shortages among smallholder farmers, the benefits of RWH technology adoption seem to outweigh the costs. It was therefore concluded that RWH technologies are suitable for smallholder farmers in semi-arid areas if they are properly tailored to the conditions of the locality where they are promoted.

Keywords: rain-water harvesting, livelihoods, sustainable agriculture

Introduction

Rain-water harvesting (RWH) technologies are a range of techniques used for collecting, storing and conserving rainfall and surface runoff in arid and semi-arid regions (Boers and Ben-Asher, 1982). Examples of these techniques include tied ridges, infiltration pits and fanya juus which are all aimed at achieving sustainable agriculture. According to Reijntjes et al. (1992) sustainable agriculture is farming that is ecologically sound, economically viable, socially just and acceptable. Sustainable agriculture aims to achieve *permanence*, which includes adopting technologies that 'maintain soil fertility indefinitely whilst utilising renewable resources that minimise environmental pollution' (Geier, 1999). In sub-Saharan Africa the potential of RWH for improved crop production received great attention in the late 1970s and early 1980s in response to widespread droughts that left a trail of crop failures posing serious threats to human and livestock life (Hatibu and Mahoo, 1999; Ngigi, 2003) especially in communal areas, which are characterised by a high population density and appalling household food insecurity. Since then, a number of water conservation projects have been established to combat the effects of drought by improving crop production and in some areas rehabilitating abandoned and degraded land.

Whilst policy-makers in Zimbabwe conscientiously recognised the conspicuous consequences of water shortage in semi-arid areas, they had not considered runoff as a solution to water scarcity. Traditionally, drought-tolerant crops were seen as the only solution to erratic rainfall in the drought-prone areas on one hand, and, on the other, the solution to soil erosion was the safe disposal of 'hazardous' runoff away from croplands. Subsequently, this led to soil and water conservation programmes that focused primarily on water disposal, in areas affected by water shortage. However, since the introduction of RWH technologies these perceptions have changed. Meanwhile, despite the apparent benefits of RWH technologies, they are not yet widely adopted in Zimbabwe (Motsi et al., 2004; Mugabe, 2004), Southern Africa (Rockström, 2000; Ngigi, 2003; Fox et al., 2005) and elsewhere (Li et al., 2004; Prasad et al., 2004; Abu-Zreig et al., 2000) and are a subject of ongoing research (see Walker et al., 2005; Sepaskhah and Fooladmand, 2004). Nevertheless, in recent years, RWH technologies, both traditional and those developed at research stations, have been introduced in some communal areas in Zimbabwe, by non-governmental organisations (NGOs) in collaboration with Agricultural Research and Extension Services (AREX) and technology developers – mostly research stations (Kronen, 1994; Motsi et al., 2004). The crux of the problem then is that RWH technologies are relatively recent technologies in Zimbabwe whose contribution to rural livelihoods is not yet clearly understood. To date, some farmers have been using RWH for crop production, while little is yet known on how they have benefited from the technologies. Thus this paper is aimed at examining the contribution of RWH technologies to rural livelihoods in Zimbabwe.

Methodology

Study area

The research was carried out in Chivi district in Masvingo Province (Fig. 1). The district is home to 155 442 people (CSO, 2003)

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