

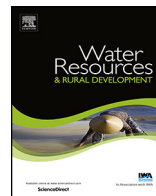


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Performance of small reservoir irrigated schemes in the Upper Volta basin: Case studies in Burkina Faso and Ghana



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ABSTRACT

A major direct use of water from West African small reservoirs is irrigation. Analyzing the performances of irrigated agriculture is therefore a useful way to measure the impact of small reservoirs on food security and livelihoods of local communities. The aim of this study was to assess the performance of two such irrigated schemes in the Upper Volta basin (one in Burkina Faso and the other in Ghana) through participatory methods, to jointly identify major constraints, and to discuss possible solutions with local communities. The agronomic and economic performance of irrigated agriculture at both sites were far from satisfactory, due to the lack of maintenance of the small reservoirs and irrigation schemes, sub-optimal crop management, and poor product marketing. These issues were analyzed with the farmers across differing sub-schemes and cropping systems and some solutions were envisaged. Our assessment showed that farmers often had difficulty obtaining quality agricultural inputs and marketing their products. The poor

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performance of irrigated crops, due to poor condition of hydraulic infrastructures, poor agronomic management, and organizational failure provided only limited incomes for local households. Nevertheless, the existence and the many uses of small reservoirs improved food security and created indirect activities that also enhanced livelihoods. The local authorities generally considered preserving water to be a priority in small reservoir management, but the degradation of irrigation schemes could happen quickly and result in scheme failures, thus reducing indirect economic activities and causing under utilization or even abandonment of the small reservoir, unless appropriate measures are taken.

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1. Introduction

The Upper Volta basin, which extends from northern Burkina Faso to upper-northern Ghana, covers the Sudano-Sahelian agro-ecological zone in which annual rainfall ranges from 500 to 1000 mm and annual evaporation can reach 2000 mm. These semi-arid climatic conditions combined with limited access to perennial rivers have led to the construction of more than 2000 small reservoirs in recent decades with the aim of providing water for local communities during the dry season, from October to June (Cecchi et al., 2009). Designed for multiple water uses, including watering livestock, fish farming and domestic uses, many of these reservoirs are associated with a small-scale irrigation scheme (Venot and Cecchi, 2011). Small reservoirs help slow down rural migration by providing income to local communities (Fromageot et al., 2006) and by reducing food insecurity and nutritional vulnerability (Savy et al., 2006). Demand for small reservoirs is high among local communities. Small reservoirs are a priority for national governments, and continue to attract funding from international development agencies. They are seen as a viable buffer against extreme weather events and changing climatic patterns (Boelee et al., 2013). In addition, they can enable crops to be grown during intra-seasonal dry-spells (Fox and Rockström, 2000). Although there is a consensus concerning the many benefits associated with these infrastructures, they have been prone to recurrent degradation and an apparent lack of maintenance (Venot and Hirvonen, 2013). Siltation, the spread of water borne diseases and deterioration of water quality have been identified as possible future threats to the sustainability of the associated agro-sociosystems (Boelee et al., 2009). Moreover, when it comes to irrigation, small reservoirs are often reported to perform well below expectations (Barbier et al., 2011; Faulkner et al., 2008; Mdemu et al., 2009). Infrastructural, environmental, water use and organizational problems on the one hand, and agriculture challenges on the other hand, are reported to be the main constraints by agricultural extension agents, who also identified institutions and governance as determining issues (Venot and Hirvonen, 2013). There is thus a need for a better understanding of this apparent contradiction (high demand, low performance) that accounts for local realities and expectations, and identifies realistic medium term expectations in collaboration with local actors.

The aim of this paper is to assess agronomic and economic irrigation performances of two irrigated schemes supplied by small reservoirs in Center-West Burkina Faso and Upper-East Ghana. Participatory research was chosen so the farmers themselves could identify the main constraints and envisage performance enhancing solutions (Douthwaite et al., 2009). We then discuss the integrated management of such small reservoirs and how irrigated agriculture sustained by small reservoirs has contributed to the development of local communities.

2. Materials and methods

2.1. Boura (Burkina Faso) and Binaba 2 (Ghana) small reservoirs

Both small reservoirs are located in the same agro-climatic zone, which is characterized by 900–1000 mm average annual rainfall during one rainy season (June–October) and about 2000 mm of

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