Water resources and rural development 6 (2015) 78–91

Contents lists available at ScienceDirect

Water resources and rural development

journal homepage: www.elsevier.com/locate/wrr

Technical and institutional attributes constraining the performance of small-scale irrigation in Ethiopia

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ARTICLE INFO

Article history:
Received 19 May 2014
Revised 16 October 2014
Accepted 19 October 2014
Available online 23 October 2014

Keywords:
Irrigation management
Water
Productivity
Incentives
Communities

ABSTRACT

Small-scale irrigation is playing an important role in adapting to climate change, achieving food security, and improving household incomes. The Ethiopian Government considers irrigated agriculture as a primary engine of economic growth and plans to increase the current level of irrigation infrastructure three-fold by the end of 2015. However, there has been concern regarding the performance and management of existing small-scale irrigation. Based on the assessment of 52 small-scale irrigation schemes, and three case study sites, we describe the challenges and interventions required to improve irrigation water management in Ethiopia. Though most schemes are operational, many do not operate at full capacity, due to design failures, excessive siltation, poor agronomic and water management practices, and weak local institutions. In addition to low returns, there is competition for irrigation water between upstream and downstream users, vegetable growers and cereal growers, and between farmers with large irrigable plots and those with small plots. Despite these challenges, our field assessment revealed that small scale irrigation increases crop yields, improves crop diversification, and reduces the risk of crop failure. We emphasize in this paper the need for incentives to improve productivity and minimize conflicts, while enhancing innovation capacity, developing scheme-specific intensification strategies, and promoting collective

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http://dx.doi.org/10.1016/j.wrr.2014.10.005
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action. We also describe how benefits from water investments could be substantially increased by overcoming design constraints, strengthening water user associations, and protecting catchments.
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1. Introduction

According to recent FAO estimates (FAO, 2009), farming, industrial and urban water demands in developing countries will increase 40% by 2030. Climate change is likely to intensify the water scarcity and lead to greater competition for water between countries and across watersheds and basins. The poor and vulnerable populations of sub-Saharan Africa, including Ethiopia, will likely face the greatest risk, due to the low adaptation capacity to climate shocks (Intergovernmental Panel on Climate Change (IPCC), 2007). The spiral of water scarcity and variability commonly reduces crop and livestock productivity and farm incomes, while increasing the vulnerability of communities to climatic and market shocks (Amede et al., 2014). The negative effects of water scarcity have been aggravated by expanding agricultural needs, land degradation, poor water management practices, and limited institutional and household capacities to store and efficiently utilize available water resources (Amede et al., 2014). Moreover, limited knowledge and weak financial capacity have limited community investments in water resources and constrained access to other farm inputs. In addition, water use in agriculture must be balanced with the water needed to support ecosystem services (de Fraiture et al., 2007).

Despite the availability of a large volume of fresh water – including 12 river basins with an annual runoff volume of 122 billion m^3 and an estimated 6.5 billion m^3 of groundwater potential (Awlachew and Ayana, 2011), Ethiopia is prone to recurring droughts and food insecurity. Irrigated agriculture is largely characterized by local, traditional, small-scale practices. In 2005/2006, the total reported area of irrigated agriculture in the country was 626,116 ha, of which traditional irrigation, modern small-scale irrigation, medium–large–scale irrigation schemes accounted for 77%, 9% and 14%, respectively (Awlachew and Ayana, 2011). Yet, the potentially irrigable area in Ethiopia is estimated to be about 5.3 Mha (Awlachew and Ayana, 2011). The Ethiopian government in its 5-year Growth and Transformation Plan (GTP) (2011–2015) considers irrigated agriculture to be a primary engine of economic growth and plans to increase the irrigated area from 2.5% in 2011 to 15.6% by 2015 (http://planipolis.iiep.unesco.org/upload/Ethiopia/EthiopiaGTP.pdf). Similarly, there is a move to increase the medium and large scale irrigated agriculture from 127,243 to 785,583 ha (Ministry of Finance and Economic Development (MOFED), 2010). The near future contribution of irrigation to agricultural GDP in Ethiopia is expected to rise to 12%, while the contribution to overall GDP will be about 4% (Ministry of Finance and Economic Development (MOFED), 2010). Hagos et al. (Ministry of Finance and Economic Development (MOFED), 2010) indicate that irrigation in Ethiopia generates an average income of approximately US$ 323 ha^{-1} under smallholder-managed irrigation systems, compared with an average income of US$ 147 ha^{-1} for rainfed systems.

Several donors have supported the development of small-scale irrigation in Ethiopia since the 1990s, including the International Fund for Agricultural Development (IFAD). Capitalizing on a small grant 'Small-scale irrigation on special country programme' in Oromia and Southern Nations, Nationalities and People's Region (SNNPR) of Ethiopia, between 1987 and 1996 a Special Country Programme (SCP) Phase II, was conducted to "improve food security and incomes amongst poor rural households, by enhancing their resilience to drought, through intensification, diversification and commercialization of smallholder agriculture." SCP II has operated in the Tigray, Oromia, Amhara, and SNNPR regions of Ethiopia between 1999 and 2004. The project was developed to improve and expand traditional small-scale irrigation schemes, enhance agricultural support services, and strengthen the local and national institutions responsible for small-scale project implementation (Annual Progress Report for F.Y, 2012). This collaboration was strengthened with a new phase, Participatory Small-scale Irrigation Development Programme (PASDIP), between 2004 and 2012, implemented in food-deficit districts, with high population densities and the potential to support sustainable small-scale irrigation (Annual Progress Report for F.Y, 2012).

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