Chapter 3
Performance of Small-Scale Irrigation Schemes Under Climate Change in Low- and Middle-Income Countries: A Systematic Review of the Evidence

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ABSTRACT

Small-scale irrigation schemes (SSIS) in developing countries have been crucial, but the evidence about their performance has not been sufficiently analyzed. This chapter documents such evidence by reviewing and classifying the performance indicators. It also assesses literature on whether there are discernible trends in the efficiency of SSIS, identifies and classifies SSIS constraints, and characterizes various channels through which SSIS might affect poverty. Objectives are achieved via a systematic review of literature from 1990 to 2017. Results indicate a lack of standardization of irrigation performance indicators, and there is evidence that irrigation has boosted agricultural performance. Even though SSIS were associated with higher productivity than rain-fed agriculture, they performed below their full potential due to undervaluation of irrigation water by irrigation authorities, farmer characteristics, costs, institutional setups, the policy environment, and design, cultural, community, and environmental issues. SSIS are important tools for poverty reduction, and relevant policy implications are outlined.

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INTRODUCTION AND BACKGROUND

In spite of the fact that small-scale farming contributes significantly to most economies of the developing world, it relies mainly on rain-fed agriculture. This reliance causes this type of farming to be vulnerable to extreme weather events such as droughts, among others (World Bank, 2013). Droughts are in turn likely to perpetuate the incidence of hunger and poverty, compromising the Sustainable Development Goal (SDG) of poverty elimination by 2030.

Unfavourable climate change (droughts), as presented by Maruyama et al. (2014), impact negatively on crop productivity. In Africa, and according to Alhassan et al. (2013), rain-fed agricultural crop output will have decreased by 50% by the year 2020 due to negative effects of climate change. As a solution to the adverse consequences of drought and the reliance on erratic patterns of rainfall that affect an increasing number of developing countries, irrigation is said to reduce the variance in output, yields and employment (Lipton, Blackman, De Zoysa, Qureshy, & Waddington, 2003; Svendsen, Ewing, Msangi, & others, 2009). As supported also by Akudugu et al. (2016), agriculture in Africa is dominated by smallholder farmers whose farms are rain-fed, and with the current trends of unpredictable rainfall patterns, their livelihoods are under threat.

Accordingly, governments across Africa, Asia and Latin America relentlessly invest in irrigation schemes intended to transform agriculture (Yedra, Mesa-Jurado, López-Morales, & Castillo, 2016). The main objective of investing in small-scale irrigation schemes (SSIS) is to reduce poverty amongst farming communities, with the knowledge that such investments have spillover effects on the greater economy. According to Lipton et al. (2003), of the 1.2 billion people defined as poor in developing countries, three-quarters of them reside in rural areas, and investment in irrigation is suggested as a solution to poverty. Irrigation has the potential to lead to poverty reduction as a result of increased yields, planting of higher value crops, increased food supplies, higher calorie intakes and better nutrition levels. This potential is also evident in Asia, as argued by Hussain and Hanjira (2004), because improving agriculture and enhancing agricultural productivity through investment in irrigation is an important strategy for rural poverty reduction, as the majority of rural poor people depend on agriculture. It is therefore, imperative that resource-use efficiency, especially in the face of climate change, is supported and achieved through SSIS.

Performance assessment of SSIS is necessary as it makes explicit the level of actual achievement against set production and productivity targets. Understanding the factors contributing to current productivity levels can lead to improving
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