

Impact of Irrigation on Poverty and the Environment in Ethiopia: An introduction to this Special Issue

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Agriculture is the mainstay of Ethiopian economy, and it is highly reliant on rainfall. High rainfall variability and drought affect agricultural production in a significant part of the country, and hence directly affect the Ethiopian economy. Little progress was made in improving the productivity of farming systems in Ethiopia throughout the past 20 years. During this time, annual productivity increase was very low, and almost growth in production was due to the expansion of cultivated land, and not increased productivity of land or water. Thus, extensification rather than intensification of agricultural production appears to be the norm. Water storage per capita in Ethiopia lags far behind that of other countries, despite abundant supplies. Due to lack of runoff storage structures coupled with unimodal nature of the rain, most parts of the country produce only one crop per year. Irrigation development also lags far behind potential. Ethiopia is said to have an estimated irrigation potential of 3.7 million hectares. However, the total estimated area of irrigated agriculture in the country in 2005/2006 was about 0.6 million hectares, approximately 18 percent of the potential. Of this total, almost 80% is estimated to be traditional small scale schemes. The total current irrigated land area, hence, accounts for about 5 percent of the total cultivated land.

Unreliable rainfall, recurrent drought and limited use of the available water resources have contributed adversely to the economy of Ethiopia. Because of this, irrigation development is now identified in government policy documents as an important tool to stimulate sustainable economic growth and rural development. It is considered as a cornerstone of food security and poverty reduction.

In this context, there is a great need for basic information on the functioning

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of various types of irrigation from various performance related perspectives in order to improve the outcome of planned development. The Impact of Irrigation on Poverty and the Environment in Ethiopia Project was a multi-year research and capacity building project applying new methodologies for assessing the impacts of irrigation on poverty and environment and finding ways to enhance the positive impacts. The project was funded by the government of Austria, and was led by the International Water Management Institute (IWMI), which worked in partnership with the Ethiopian and Austrian institutions. The motivation for the research was the provision of much needed detailed information regarding the performance of irrigation in Ethiopia to inform development plans, and consequently various studies were done on different aspects of irrigation such as characterization, performance, institutions and support services that impact on poverty, economy, environment and health. This special issue contains articles presenting representative results from the project. They encompass four important areas for consideration when either rehabilitating schemes or planning and developing new irrigation: the importance of irrigation with respect to the national economy, national level potentials and causes of underperformance, scheme level performance particularly related to equity of benefits, and effects of irrigation development on the incidence of malaria. In the first article, *Importance of Irrigated Agriculture to the Ethiopian Economy: Capturing the direct net benefits of irrigation*, Fitsum and colleagues quantified the actual and expected contribution of irrigation to the Ethiopian economy based on the context of proposed development. An important conclusion of this study was that the contribution of irrigated agriculture to overall agricultural Gross Domestic Product (GDP) could grow to 9% under current development scenarios, but that this contribution could be significantly higher if a variety of measures to ensure high productivity of irrigation schemes are implemented to complement irrigation infrastructure development. These measures include such things as enhancing i) provision of agricultural inputs including high value crops, ii) agricultural extension systems to support irrigation; iii) market access conditions and marketing infrastructure, and iv) management of the schemes to increase the efficiency of small and large schemes.

In the second article, *Characterization, Assessment of the Performance and Causes of Underperformance of Irrigation in Ethiopia*, Seleshi and colleague present an overview of one of the important outputs of the project, which is the national irrigation database. This is a Geographical Information system (GIS) database that was used to map existing and potential irrigation for Ethiopia, which is now in the hands of the Ethiopian Government agencies to use for their own planning purposes. This article goes on to introduce some simple performance indicators that are possible to assess with limited data but still give valuable information regarding not only physical performance (area irrigated compared to plans), but also bring an important social angle (beneficiary numbers compared to plans) into irrigation performance assessment. Further analyses of the causes of underperformance including both hardware and software and key problems that can help prioritize efforts for improvement have been identified.

In the third article, *Assessment of Irrigation Performance along the Canal Reach of Community Managed Scheme in Southern Ethiopia*, Belete and colleagues make a detail look into the performance of one irrigation scheme in SNNPR. This article describes a detailed case study including mapping of the scheme that had never been done, demonstrates the use of a set of performance indicators and derives important recommendations about how to improve performance. This work encompasses the important aspect of how schemes develop over time, and how farmers cope with the pressures and opportunities that arise. Interestingly, the downstream farmers who are the most disadvantaged by poor water allocation that strongly favors those closest to the source of water, were using water most efficiently and thus able to produce outputs comparable to others.

The fourth article, *Entomological Studies on the Impact of a Small-scale Irrigation Scheme on Malaria Transmission around Ziway, Central Ethiopia*, by Solomon and colleagues is a study of malaria in which research methods included extensive sampling for larval and adult mosquitoes. Despite the strong contrast in methods and topic from the other papers, these authors are also addressing an issue central to understanding the performance of irrigation and the impacts on poverty, but with an environmental health perspective. This study demonstrated that due to poor maintenance, irrigation schemes create conducive breeding grounds for

malaria vector mosquitoes and hence increase the risk of malaria transmission. They concluded that proper water management and control measures through environmental management could help to reduce mosquito-breeding sites and malaria transmission in and around irrigation schemes.

Overall, the articles present some new ideas of how irrigation in Ethiopia can be assessed, and include a variety of practical information and recommendations to help improve success of investments in rehabilitation and construction of new irrigation schemes.