

Executive summary Beshir Keddi Lencha

This study focuses on the water use efficiency in the Haleku irrigation project. This study is the first (documented) attempt to measure water use efficiencies in smallholder schemes in the Central Rift Valley. Different types of flow measurements in the scheme were done using flow meters and own developed flumes. Therefore, the study is an important piece of the knowledge base for the hydrology of the CRV and supports earlier tentative estimates on water use and efficiency as reported in Jansen et al. (2007).

The study focuses specifically on the conveyance efficiency of the scheme and the efficiency of water application, which both determine the overall irrigation efficiency of the scheme.

The conveyance efficiency refers to difference between the amount of pumped water from the Bulbula river and the amount of water discharged in the cultivated plots. The conveyance efficiency in different parts of the scheme was measured, i.e. in the main canal (lined and unlined part), secondary and tertiary canals. Results show that in the lined part of the main canal up to 9% of the water is already lost. The overall conveyance efficiency of the scheme ranges between 37 at the tail end of the scheme and 65% at the beginning of the scheme. The average of nine measuring points was 50%, implying that 50% of the water is 'lost' before it reaches the plots. Most of the conveyance losses in the scheme occurred through 'overtopping' of the canals, i.e. water flows outside the canal boundaries. Part of the 'lost' water may still be used by adjacent plots but these amounts are difficult to measure.

The application efficiency refers to the ration of the amount of water required to fill soil moisture content to field capacity and the amount of water actually applied in the plots. The application efficiency of 9 plots ranged between 36 and 89%. Latter value is very high, while the first value is very low. On average, the application efficiency of the nine plots was 62% which may be associated with the sandy soils. In general, application efficiencies seem a bit better than the conveyance efficiencies. Because of the high variation in efficiencies among the plots more measurements are required to confirm this observation.

Overall irrigation efficiency of the nine plots obtained by multiplying the conveyance efficiencies and the application efficiencies ranged between 17 and 55% with an average of 31%. The estimated amount of water applied to nine plots varied between 4000 and

9500 m³/ha/season depending on the crop grown and the season. The total amount of water pumped from the Bulbula is twice as high taking into account the 50% conveyance losses in the scheme before water reaches the plots.

The low efficiency of the scheme seems to be related to the pump capacity which is three times too high for the area irrigated. The design of the scheme, i.e. the capacity of the canals is inappropriate in relation to the pumping capacity. This results regularly in 'overtopping of canals' and consequently low conveyance efficiencies. The problem may be aggravated by a lack of maintenance of the canals (sediments) which reduces the capacity of the canals further. In fact, the design of the scheme is poor and solutions may be to replace the existing pump with a smaller pump or to expand the irrigated area, but then also the canal structure needs to be overhauled. Using the current pump at lower capacity reduces its energy efficiency greatly and is no option.

The over-dimension of the pump has two negative side-effects: There is never a real water problem at scheme level (as long as the Bulbula river flows), and thus there is hardly any incentive to use water efficiently and to maintain the canals. In general, farmers in irrigation systems with a low pumping capacity in relation to the irrigated area are more willing to use water efficiently and to maintain the system.

It is hard to generalize these findings to the other schemes in ATJK, but another study by Mengistu Assefa (2008) shows that the Haleku scheme was performing better than the Dodicha scheme, which suggests that other schemes may face similar problems.