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Water productivity (WP) in reservoir irrigated schemes in the Upper East Region (UER) of Ghana

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Improving WP is one important strategy for meeting future water scarcity driven particularly by increasing human population and the emerging issues of climate and land use change. In spite of the fact that understanding of WP is a prerequisite to improvement strategies in any water system, little is known on existing levels of WP in many irrigated areas in the sub-Saharan Africa (SSA) region. To address this problem, a soil water balance analysis was applied to assess water use and WP for 2005/06 dry season irrigated crops at scheme level for two sites, a small and medium reservoir, in the UER of Ghana. Climatic data was collected and reference crop evapotranspiration (ETo) estimated using FAO-Pennman Monteith approach . Water flow data in diversion canals, sub-laterals and drainage channels were measured with Flumes, V-notch weirs, bucket method for low flows and water level discharge relationship. The Soil-Water-Atmosphere-Plant (SWAP) model was used to simulate soil water balances at field scale for six farmer's sample-plots in the study sites. Soil samples were collected from representative soil profiles in each sample plot and analysed for physical and chemical properties. Soil hydraulic properties and parameters of van Genuchten pedotransfer functions (PTFs), an input to SWAP, were estimated from physical soil properties using the Rosetta model. Crop yield data from sample plots were measured during harvesting and WP determined as a ratio of obtained yield to water utilized. Comparisons of WP between the two sites are made and compared to results of other studies done elsewhere. Finally, potential for improving WP with reference to similar irrigated schemes in semiarid environments are explored.