

Abstract

South-East Kenya is vulnerable to increased siltation and pollution of drainage channels and dams as well as to high risk of crop failure under fluctuation of rainfall regimes. This increases the cost of water for the production of food and energy supply. A study conducted in Muooni Dam Catchment shows that both anthropogenic factors and environmental externalities perturb efficient use of water by farmers in the dam site. Land-use activities going on in Muooni Dam Catchment along with El Niño floods and droughts have an impact on the active water storage capacity of Muooni Dam. Under the effects of farmland degradation and the trade effects of the global climate change, they have resulted in relentless changes of the catchment microclimate. This study reveals that these factors have affected water availability in Muooni Dam at a decreasing rate of 6.2% per year. The latter thwarts any prospect of high yields and good incomes among smallholder farms, and hampers sustainable supply of bio-energy and hydro-electricity. Due to increased farming water costs and high crop water requirements, farmers use excessive multiple cropping to cope with water stress and poor incomes. They often substitute staple crops by eucalyptus and other alien trees to avoid high risk of crop failure. For efficiency, farmers were urged to adopt an "Economic order quantity (EOQ) or a "Limit average cost" (LAC) or at least a "Minimum efficient scale" (MES) of their water demand under the above normal (NOR), normal (NOR) and below normal (BNOR) rainfall regimes, respectively, using efficient farming technologies and hydro-political strategies. "Hydro-economic inventory" is thus a prerequisite for implementation of an «Integrated watershed management» to ensure sustainable food production and energy supply.