Abstract

Irrigated agriculture is faced with challenges that include sediment loading in the river basins and dams. The management of sediments in river basins and waterways has been an important issue for water managers throughout history. Water managers are faced with similar challenges caused by siltation of water reservoirs and irrigation water conveyance systems. As a copping strategy to counter the low irrigation application efficiency for surface irrigation systems, designs of settling tanks are typically oversized with an aim of having enough detention time for the sediment particles to settle. To settle discrete particles an optimum settling tank is important so as not to have problems over overdesigning and consequently costly projects. The optimum hydraulic design parameters for a settling basin were calibrated using a physical model prepared in the Civil Engineering laboratory at Jomo Kenyatta University of Agriculture and Technology. Using a dataset from a model a quartic equation was developed to calculate turbidity drop in a small-scale settling basin when the flow rate is known. Finally, a quadratic equation was developed for calculating optimum surface area required for settling discrete particles for different flow rates. For this research the optimum design surface areas were Q1 = 2.42m2, Q2 = 3.04 m2, Q3 = 3.75 m2, Q4 = 4.20 m2 and Q5 = 4.71 m2 corresponding to 5.7, 8.7l/min, 9.9 l/min, 10.5 l/min and 11.1 l/min respectively.