

Abstract

Watershed models such as the Soil and Water Assessment Tool (SWAT) have been widely used to simulate watershed hydrologic processes and the effect of management, such as agroforestry, on soil and water resources. In order to use model outputs for tasks ranging from aiding policy decision making to research, models should be scientifically sound, well calibrated and validated, and hence defensible. Lack of good quality hydrologic and water quality data for model calibration and validation is one of the main weaknesses to watershed modeling. Therefore, it is important that quality model calibration and validation data be collected if the results of this branch of science in aiding policy making and research are to be more trusted. The goals of this study are to: 1) give a brief description of a rapid watershed erosion and reservoir sedimentation measurement technique using the “state-of-the-art” acoustic profiling system to provide long-term reservoir sedimentation rate information and the sediment data needed for model calibration and validation, and 2) present SWAT model case study results of the impact of converting cropland along streams to forested stream buffers on soil loss and water quality at Cobb Creek, one of the three main sub-watersheds within the Fort Cobb Reservoir Watershed (FCRW) (830 km²) located in Caddo and Washita counties, Oklahoma, USA. The FCRW is one of the watersheds under USDA's Conservation Effects Assessment Project, a national project to quantify environmental effects of USDA and other conservation programs. Fort Cobb Reservoir and the contributing stream segments are listed on the Oklahoma list of water bodies that do not meet water quality standards based on sedimentation and trophic level of the lake associated with phosphorus loads. Currently, there is an existing twinning pilot project between FCRW and Thika River Watershed located in Kenya, in which these technologies are intended to be transferred to. The long-term goal is to get funding for a project that will create a regional or continental rapid watershed and reservoir sedimentation assessment laboratory in Nairobi, Kenya or any other suitable country. These techniques will complement the goals of bodies such as World Agroforestry Center (ICRAF), UNEP, and FAO, and various government agencies whose overarching goal is to ensure food security for the increasing world population under a sustainable environment, and institutions of higher learning that endeavor to build capacity in developing countries.