

Abstract:

The study was carried out at Kathekakai settlement scheme, Machakos District to evaluate effects of vegetative macro contour line on soil moisture content and crop performance. In addition, the study also looked at land use and land cover changes in the area, farmer perception on soil erosion and, soil and water conservation technologies as well natural resource change. The research methods used in this study included: baseline survey, focus group discussions and farmer interviews, landsat imagery map analyses and establishment of vegetative macro contour line. The latter comprised of three treatments, namely, terraced vegetative macro contour line with maize-dolichos intercrop and ditch (TVMDD), un-terraced vegetative macro contour line with maize-dolichos intercrop and vegetative macro contour line (UVMD) and terraced vegetative macro contour line with maize mono crop and ditch (TVMD), arranged in a Randomised Complete Block Design (RCBD). Observations were made on soil moisture content and crop performance under these treatments. Analysis of Variance (ANOVA) was conducted and means separated at $P < 0.05$. The result confirm that soil erosion is a major challenge at Katheka-kai settlement scheme, and that most farmers rely more on advice from other farmers (65%) than experts (40%) to control runoff. Lack of training (30%) was identified as key constraint to investment in soil and water conservation measures. Farmers also reported that natural resources (e.g. forests and water resources) had declined with time, a situation they associated with increasing population usually leading to land clearing either for agricultural or development activities. According to landsat imageries, savanna grassland, forest cover, cultivated land and built-up areas increased by 15.8, 2.7, 1.8 and 0.5% whereas rocky areas, bareland and water bodies decreased by 12.8, 7.4 and 0.5% between 1988 and 2009 respectively. However, rocky and bare land became forested, a situation that was associated to population growth that made people to settle on any available land. Results on soil moisture content indicated higher soil moisture levels along the ditch than all other slope positions within the bench. Although there were no significant differences between treatments, terraced benches recorded 15% and 13% higher soil moisture in TVMDD and TVMD treatments. respectively compared to UVMD treatment. Furthermore, the upper and lower slope positions gave significantly ($P < 0.05$) higher soil moisture content compared to middle position. Besides, biomass yield and crop performance trend on the bench terrace was similar to that observed for soil moisture. While no significant differences were observed for biomass yield and plant height, TVMDD had plants taller by 60% than those in UVMD treatment. Moreover, TVMDD and TVMD treatments gave 9 and 2% higher biomass yield respectively compared to UVMD treatment. Additionally, upper and lower slope positions tended to have taller plants and higher biomass yield than the middle slope position. The results show some degree of effective soil moisture conservation associated with the ditch which seems to serve as a water harvesting site. The findings thus, signifies the possibility of enhancing productivity through establishment of terraced vegetative macro contour line. For this reason, the technology ought to be considered when advising on and implementing agricultural activities.