World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:18, No:03, 2024

Impacts of Land Use and Land Cover Change on Stream Flow and Sediment Yield of Genale Dawa Dam III Watershed, Ethiopia

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Abstract : Land Use and Land Cover change dynamics is a result of complex interactions betweenseveral bio- physical and socio-economic conditions. The impacts of the landcoverchange on stream flow and sediment yield were analyzed statistically usingthehydrological model, SWAT. Genale Dawa Dam III watershed is highly af ectedbydeforestation, over grazing, and agricultural land expansion. This study was aimedusingSWAT model for the assessment of impacts of land use land cover change on sediment yield, evaluating stream flow on wet &dry seasons and spatial distribution sediment yieldfrom sub-basins of the Genale Dawa Dam III watershed. Land use land cover maps(LULC) of 2000, 2008 and 2016 were used with same corresponding climate data. During the study period most parts of the forest, dense forest evergreen and grass landchanged to cultivated land. The cultivated land increased by 26.2%but forest land, forest evergreen lands and grass lands decreased by 21.33%, 11.59 % and 7.28 %respectively, following that the mean annual sediment yield of watershed increased by 7.37ton/haover16 years period (2000 – 2016). The analysis of stream flow for wet and dry seasonsshowed that the steam flow increased by 25.5% during wet season, but decreasedby29.6% in the dry season. The result an average annual spatial distribution of sediment yield increased by 7.73ton/ha yr -1 from (2000_2016). The calibration results for bothstream flow and sediment yield showed good agreement between observed and simulateddata with the coef icient of determination of 0.87 and 0.84, Nash-Sutclif e ef iciencyequality to 0.83 and 0.78 and percentage bias of -7.39% and -10.90%respectively. Andthe result for validation for both stream flow and sediment showed good result withCoef icient of determination equality to 0.83 and 0.80, Nash-Sutclif e ef iciency of 0.78and 0.75 and percentage bias of 7.09% and 3.95%. The result obtained fromthe model based on the above method was the mean annual sediment load at Genale DawaDamIIIwatershed increase from 2000 to 2016 for the reason that of the land uses change. Sotouse the Genale Dawa Dam III the land use management practices are neededinthefuture to prevent further increase of sediment yield of the watershed.

Keywords : Genale Dawa Dam III watershed, land use land cover change, SWAT, spatial distribution, sediment yield, stream flow
Conference Title : ICWEEM 2024 : International Conference on Water, Energy and Environmental Management
Conference Location : Barcelona, Spain
Conference Dates : March 04-05, 2024