Influence of land use/cover on water quality in the River Sironko catchment area, Eastern Uganda.

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Abstract:
Ten sampling stations located on RiverSironko catchment area were used to assess the contribution of selected land uses to the nutrients and Physico-chemical water quality levels of river Sironko for a period of six months from November 2019 to April 2020. This was done so as to capture wet and dry seasons. The data was also used to examine whetherland use size, altitude and discharge had an impact on water quality in the catchment area. The catchment area was divided into the upper, middle and lower reaches. Based on visual interpretation of Google Earth map and field observation data, polygons for the reference land use classes of forest, agriculture, sand mining, industrialization, and urbanisation that contributed their run off to the catchment were created using "heads up" digitizing tools in Google Earth program and sizes were calculated. The water quality parameters from land uses were compared with land use size, altitude and discharge usingPearson correlation coefficients generated from STATA Version.14in each of the three reaches to show the magnitude of impacts of land uses. Results indicated that water quality levels in the upper reaches were better than in the middle and lower reaches of the catchment area. Land use size had a significant negative correlation with TDS at p(0.0135) but with significant positive correlation with D.O at p(0.0056) in the middle reaches. In the lower reaches, land use size had a significant correlation with nutrients at p(0.0344 – 0.0015). In the upper reaches, altitude and discharge influenced water quality more than land use size. We recommended that, all homesteads and business establishments must have toilets at least 10m away from the river banks.
Key words: *E-Coli, protected area, river reaches, land use area.*

I. Introduction

Rivers are a main source of water for human's domestic use, animal consumption and support aquatic biodiversity. NEMA (2004), emphasized that all natural aquatic resources in Uganda belonged to the government as this would enable it manage them well. Communities and individuals who own land in Sironko catchment area extending up to the river banks use it according to their wish leading to un controlled spontaneous distribution of land use activities such as agriculture, sand mining, urbanisation, industrialization, and forestry among others along the river most of which seem to cause deterioration and impairment to the river water quality (Kasangaki*et al.,* 2008) evidenced by siltation, drying up of some river tributaries and water color changes. Previous studies such as one by Kobing*et al.,* (2009) ontwo rivers in Kenya, Raburu et al., (2002) on river Nyando in Kenya, Bagalwa*et al.,* (2014) on tributary Rivers feeding L.Albert in DRC and Uganda, Kasangaki*et al.,* (2007) on Bwindi forest streams in Uganda have assessed the spatial and temporal trends of water quality levels in relation to different land uses. These have concentrated on different environments from the Mount Elgon region in Eastern Uganda and have not only concentrated on one or two land uses but also have covered partial catchments. No research has yet been carried out on River Sironko to show how different land uses are affecting the water quality levels over time and space yet the situation seems to be deteriorating with time more than ever before. If this situation of land use impact is not checked early enough, ecosystems will deteriorate further and diseases will affect humans (Hyman, 2018). SDGs for (2030) number six (6), emphasize clean water and sanitation by protecting water resources which is best done by controlling the nature of land uses in catchment areas so that the most inappropriate land uses that affect water quality can be eliminated or modified. This elimination or modification can only be done when data about impact of each land use on water quality in the whole catchment area of Sironko is available.