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**ASSESSMENT OF THE POTENTIAL THREAT TO GROUND AND  
SURFACE WATER DUE TO AGRICULTURAL PRACTICES IN  
KALA OYA BASIN**

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THESIS PRESENTED BY

**SANSFICA MARLYN YOUNG**

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## **ASSESSMENT OF THE POTENTIAL THREAT TO GROUND AND SURFACE WATER DUE TO AGRICULTURAL PRACTICES IN KALA OYA BASIN**

**Sansfica Marlyn Young**  
Postgraduate Institute of Science  
University of Peradeniya  
Peradeniya  
Sri Lanka

The Kala Oya Basin of Sri Lanka covers the Northcentral and the Northwestern provinces that are mostly belonging to the dry zone of the country. Understanding the effect of the agricultural practices on water quality of the area, chemical analyses on different waters were studied from May 2005 to March 2007.

Collected samples were analyzed by the Atomic Absorption Spectrophotometer, at the Department of Geology for Na, K, Ca, Mg, Mn and total iron, while nitrate and phosphate have been measured using the spectrophotometer HACH DR 2010. Appropriate standard techniques were followed to minimize the analytical errors.

Compared to the application rate of fertilizer, the average nutrient concentrations in water are relatively low (1.5ppm nitrate and 0.5ppm phosphate) and stable. Detailed geochemical investigations of selected groundwater samples revealed a gradual rise of nitrate-N and some solutes towards the flow direction.

However, excess fertilization to the main crops is becoming a threat to some surface and groundwater bodies. Some lakes show high values (21.6ppm) of phosphate. In contrast, the phosphate values of most waters are in the range of 0 – 2.5 ppm. Nitrates show a clear high level in the agro wells (1.00 – 8.00 ppm), explaining the fact that the excess fertilizer has been seeped to the nearby water bodies. The lakes, streams and canals do not show any significant increase in nitrate which may be due to the removal of nitrogen by microorganisms in the water. Though the health risk levels of WHO limits for nitrate and phosphate does not exceed in almost all of the waters.

The results show that stream and canal waters are rich in Ca and Mg but the measured other ions are considerably low. In contrast, lake water is characterized by many dissolved ions except Ca and Mg. The highest values of Fe and Mn are found in lake waters but such ions are low in groundwater. Generally, the dissolved ions in ground waters are comparably high. The pH is more alkaline in the agricultural wells and dug wells while it is more acidic in the tube wells. Na is high in the agricultural wells and has low Ca and Mg. The conductivity is very high in some dug wells (5500 $\mu$ S/cm).

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Intense agricultural practices increase the nitrate and phosphate concentrations as well as other dissolved ions in the water of the area. The present study revealed that reducing conditions, chemical and mineralogical characteristics of the overburden soil cover and man made canal network control the nutrient accumulation into the groundwater. The riparian zones along the interconnected canal system of the basin show healthy heavy growth of nitrogenous plants resulting low values of nutrients. The natural conditions such as the basement geology and the climatic conditions may also enhance the dissolved cations in waters. Considering all the above facts, it can be concluded that the contamination potential of surface and groundwater of Kala Oya Basin is not significant but occurring in minute quantities with a low trend.

