

C  
363.7  
477

**EFFECTS OF FERTILIZER APPLICATION IN UP-COUNTRY**

**TEA LANDS ON DOWNSTREAM POLLUTION**

**A PROJECT REPORT PRESENTED BY**

**RANKOTH GEDARA ASHOKA WIJAYAWARDHANA**

to the Board of Study in Environmental Science of the  
**POSTGRADUATE INSTITUTE OF SCIENCE**

*in partial fulfillment of the requirement*

*for the award of the degree of*

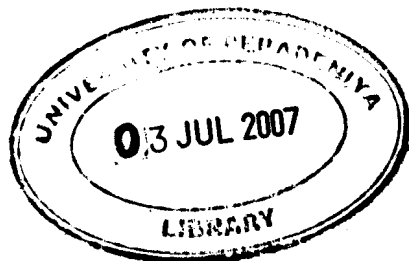
**MASTER OF PHILOSOPHY IN ENVIRONMENTAL SCIENCE**

of the

**UNIVERSITY OF PERADENIYA**

**SRI LANKA**

**2006**



**607463**

# **EFFECTS OF FERTILIZER APPLICATION IN UP-COUNTRY TEA LANDS ON DOWNSTREAM POLLUTION**

**R.G.A. WIJAYAWARDHANA**

Soils and Plant Nutrition Division  
Tea Research Institute of Sri Lanka  
Talawakelle  
Sri Lanka

## **ABSTRACT**

Tea industry in the upcountry of Sri Lanka uses large amount of synthetic fertilizer as tea plants respond to high levels of nutrients. The possible water pollution by chemical fertilizer application in the upcountry tea lands is an issue appealing to the industry. However, the lack of experimental evidence on downstream pollution due to application of fertilizer, an investigation was carried to reveal the potential of pollution threat for upcountry tea lands of Sri Lanka. This study was conducted for two monsoon periods during March 2003 to February 2004.

In order to assess how the water quality varies with the fertilizer application, the study area was categorized into four groups by considering the type of vegetation and magnitude of pollution. In this study, 24 sampling points were selected from Kotmala Oya tributaries and mainstream and 8 sampling points from Belihul Oya mainstream. Firstly, 24 sampling points of Kotmala Oya were statistically analyzed using two approaches to examine the possible trend due to fertilizer application. The 16 sampling points that are located in the tributaries were categorized into four groups; Forest, Tea, Tea with less Anthropogenic Activity and Tea with High Anthropogenic Activity. As the second approach, eight sampling points located in the main stream were analyzed separately and observed the trend in the downstream direction of Kotmala Oya. Finally the two main streams were compared for the measured parameters to observe any possible reasons from the uninhibited areas and the anthropogenic activity in the areas of the tea plantations.

## II

The concentration of the  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{NO}_3^-$ ,  $\text{PO}_4^{3-}$ ,  $\text{SO}_4^{2-}$  and  $\text{Cl}^-$  were found to be below the recommended standards set by the World Health Organization (WHO) and Sri Lanka Standards Institution (SLSI) for drinking water. It was found that the concentration of all the parameters in the tributaries of the four vegetation zones showed an increasing trend in the downstream in the order of (Forest) T1 < (Tea) T2 < (Tea + Less Anthropogenic Activity) T3 < (Tea + High Anthropogenic Activity) T4.

The rate of contribution of different cations and anions from various vegetations types to the mainstream were found to be different. As the volume of water increased in the downward direction, it diluted the concentration of the constituents coming from various sources. However, the study showed that the concentration of the ions increased in the downward direction with the increase in the flow volume rate. This observation revealed that the contribution of cations and anions gradually adding into solution in the downward direction. Forest areas showed the minimum concentration and the highest concentration was found in the final observation point of the mainstream. However, all the parameters were not significantly increasing in the downward direction of Belehul Oya main stream though the flow rate volume increased. This situation revealed that the nutrient addition due to anthropogenic activity was higher compared to the natural biological and geological processes.