

Stream Sediment Geochemistry and Mineral Potential of Lower Walawe and Mau Ara Basins

H.P Marasinghe

Uva Wellassa University, Badulla, Sri Lanka

and

P. N. Ranasinghe

Department of Oceanography and Marine Geology, University of Ruhuna, Matara

Introduction

Regional geochemical maps are considered to be a national asset for resource evaluation and environmental management. This project covered a considerable portion of the lower Walawe Ganga and Mau Ara which represent the geologically and environmentally important Highland - Vijayanlithotectonic boundary of Sri Lanka. Stream sediments remain the dominant sampling medium in regional geochemical exploration, in areas where relief permits development of distinct drainage systems (Fletcher, 1997). In addition, human activity can often strongly influence the stream sediment composition that can be used to identify pollution sources. In this study, distribution of selected major, trace and rare earth elements (REE) were studied to identify potential mineral enrichments in the Lower Walawe Basin.

Methodology

44 sample locations were selected within lower Walawe and Mau Ara streams. Chemical components were analyzed using various analytical methods. Element concentrations in stream sediments were measured in powdered samples using hand held X-ray Fluorescence Spectrophotometer (XRF) and totally digested samples using Atomic Absorption Spectrophotometer (AAS) (Ranasinghe et al, 2008). Stream sediment geochemical maps were prepared using Arc-GIS 9 software and data analysis was done using SPSS 13 software.

Results and Discussions

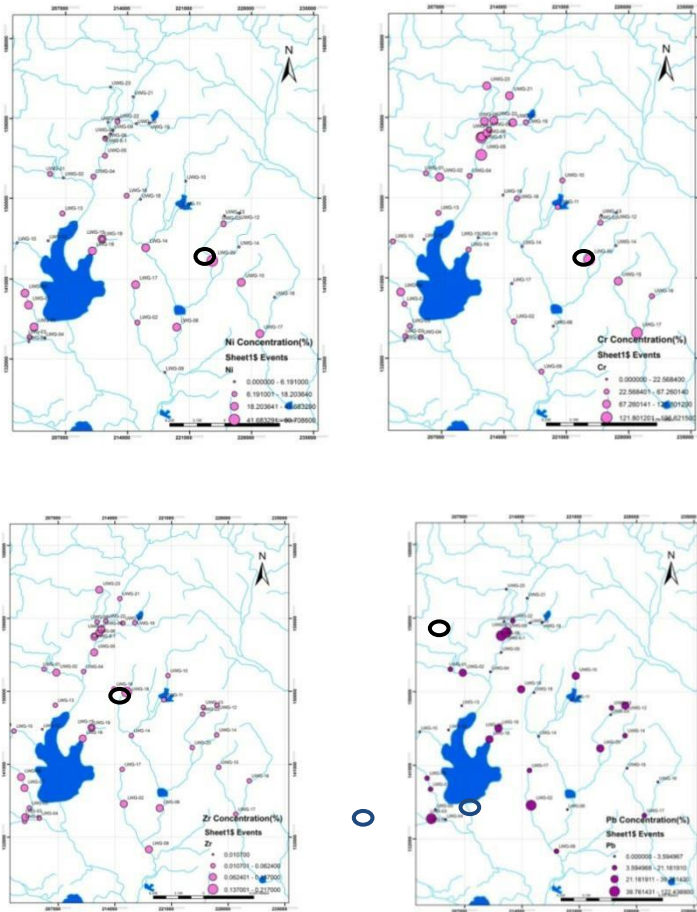
A comparison of special element concentrations in studied area with upper crustal and mean stream sediment values are given in Table 1. Results show that Cr, Ni, Y, Zr and Pb at some sampling locations are well above the upper crustal values and mean sediment levels while other elements are below the above global average values. When examined the individual distribution maps of above elevated elements, UWG 18 and UWG 20 locations are enriched with respect to Zr, Y and Cr, Ni elements (Figure 1). However, enrichment of Zr and Y at UWG 18 is mainly due to hydro dynamical heavy mineral accumulation in the area. UWG 20 location is a confluence point of two streams and enriched Cr and Ni concentrations indicate potential metallic mineral source upstream of above location. Elevated Pb concentrations at UWG 5-1, UWG 6, LWG 1 and LWG 2 locations could be due to natural sources because there is very low potential for anthropogenic Pb pollution in the area. Also these locations are situated at the vicinity of gem and gold mining areas.

Conclusions

This study reveals the enrichment of Cr, Ni and Pb in several locations in the lower catchment of the Walawe and Mau Ara basins. Analysis of geographical and geological features of the locations suggests that these elevated levels could be due to natural sources rather than anthropogenic or hydrodynamic enrichments. Therefore, detailed high resolution sampling around these localities is suggested to identify potential mineralization.

Table1. Element concentrations above the upper crustal values and global mean stream sediment values.

| Element | Mean upper crustal abundance (a) (ppm) | Mean stream sediment (b) (ppm) | Concentration in study area (ppm) |
|---------|---|-----------------------------------|--------------------------------------|
| Cr | 92 | 5- 80 | 7-197 |
| Ni | 47 | 5- 50 | 2-61 |
| Pb | 17 | - | 2-122 |
| Y | 21 | - | 10-154 |
| Zr | 193 | 50- 600 | 107-2170 |



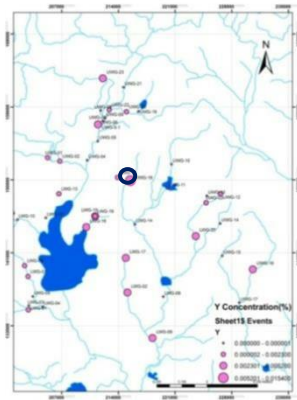


Figure 1. Distribution maps of Cr, Ni, Y ,Zr and Pb in stream sediment of Lower Walawe and Mau Ara basins. Circles show locations with elevated element concentrations.

References

Fletcher, W.K., 1997. Stream sediment geochemistry in today's exploration world. Proceedings of Exploration 97-4th Decennial International Conference on Mineral Exploration, 249– 260.

Ranasinghe, P.N., Fernando, G.W.A.R., Dissanayake, C.B., Rupasinghe, M.S., 2008. Stream sediment geochemistry of the Upper Mahaweli River Basin of Sri Lanka Journal of Geochemical Exploration, 99, 1- 28.