Determine the Presence of Gold and its Distribution in Upper Nilwala River Basin, Southern Part of Sri Lanka

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Introduction

Gold (Au) is a chemical element, bright yellow dense, soft, malleable and ductile metal. The properties remain when exposed to air or water. It occurs often in free elemental (native) form, as nuggets or grains, in rocks, in veins and in alluvial deposits.

Investments made on gold prospecting are only second to oil exploration. This research was carried out to find gold in upper Nilwala River and possible areas that gold can be found. In this study, distributions of indicator elements of gold were studied to identify potential gold enrichments in the upper Nilwala River Basin.

Materials and methods

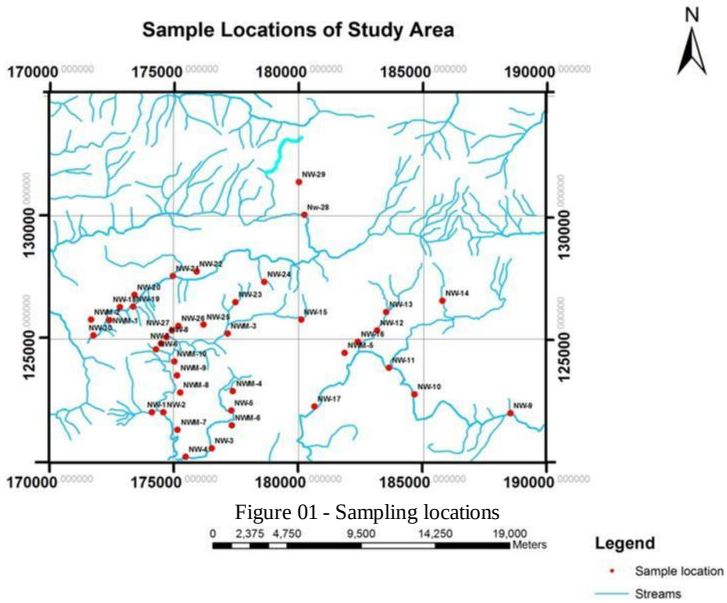

Figure 01 - Sampling locations

Stream sediment samples were collected mainly from the placer deposits see figure 1. Samples were taken at about 1 –2 feet depth on placer deposit or river bed by using a shovel. Also gem pit sediment samples were collected near to the gem bearing layer. Samples were collected using the hand pit method (Fletcher *et al.*, 1997). A total of 1–2 kg of raw samples was taken from each location. Then all samples were transferred to neatly labeled polyethylene bags. About 1 kg of sediment samples were separated by using cone and quarter method. Then heavy sediments of it were separated by panning method . Then it was dried in a hot air oven. Each sample was stored in a labeled sample bags to use for mineralogical analysis carried out using an optical microscope. From remaining dried 1 kg samples were homogenized and near 100 g of samples were again separated using cone and quarter method. Then separated sample fractions were crushed by using vibrating cup mill to less than 63 µm.

Optical microscope was used to identify the minerals occur in the heavy sediment sample. Using corn and quarter method substantial amount of heavy sediments were separated for the testing. Using a magnet all the magnetic minerals of the sample was separated. 5X5 equal squares were marked on the glass slid. Then glycerol liquid was applied on the top of that slid. After that heavy sediments were put on to the slid creating a fine layer. Finally both magnetic and nonmagnetic minerals were analyzed. Couples of samples were selected. Magnetic separation was done for those samples. Then for the nonmagnetic section Bromoform test was done. Then the heavy particles were separated. After that the samples were analyzed using an optical microscope.

The grinded sediments (<63 µm) were tested using X-ray florescence spectroscopy (XRF) to identify chemical composition and major elements for each sample.

Results and Discussion

XRF results of the samples show the gold occurrence at five locations. Gold concentration is shown in bellow table 1.

Table 01: The gold concentration in gold found areas.

Sample No	Gold Amount/ppm
NW-2	75
NW-8	15
NWM-4	45
NWM-8	1375
NWM-10	5145

Gold nuggets were observed under the microscopic survey where the highest gold concentration observed for XRF see figure 2.

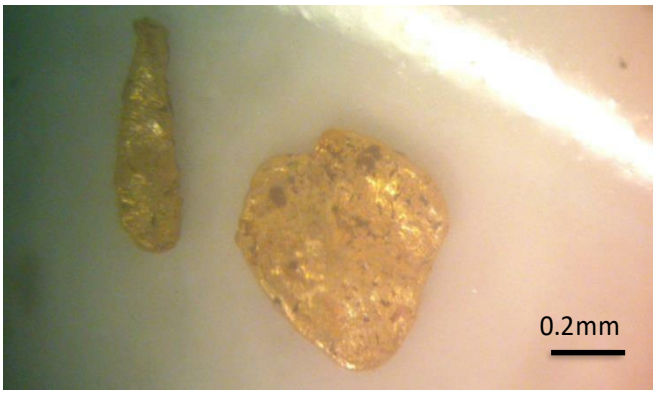

Figure 2 - Gold Nuggets observed at NWM-10.

Six major indicator minerals of gold were selected. Those are As, Pb, Se, Co, Ni and Cu. Bellow table shows sample locations which have highest indicator minerals,

Table 02: Highest amount of indicator element found areas with their indicator minerals.

Sample No	Indicator Elements
NWM-5	As, Se, Ni, Cu
NWM-6	As, Se, Ni, Cu
NW-23	As, Ni, Cu
NW-28	Se, Co, Cu
NWM-1	Pb, Ni, Cu
NWM-9	As, Ni, Co

Therefore it can be inferred that gold can be found at these sample locations as well.

Conclusions

This study reveals the enrichment of gold at several locations in the upper Nilwala River basin. Gold present in these areas mainly in the form of dust and small nuggets. There is a high possibility to find gold in sample location NWM-5, NWM-6 and in sample NW-23, NW-28, NWM-1 and NWM-9.

Acknowledgement

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References

Fletcher, W.K. (1997). Stream sediment geochemistry in today's exploration world. Exploration Geochemistry, 32, 1-3. Retrieved may 22, 2014, from the World Wide Web: http://www.dmec.ca/ex07dvd/Decennial%20Proceedings/Expl97/03_05___.pdf

Geochemistry and Mineralogy of Chaliyar river sediments with special reference to the occurrence of placer gold. Retrieved from the World Wide Web: http://dyuthi.cusat.ac.in/purl/34