Application of Geology and GIS in the Exploration of Gem Deposits in Haldumulla Divisional Secretariat Division, Badulla District, Sri Lanka

W.A.D.T.L. Wijesinghe, J.M.C.K. Jayasundara, R.M.N.P.K. Jayasinghe and P. Francis

Gem and Jewellery Research and Training Institute, Kaduwela, Sri Lanka

Sri Lanka has a very long history for gem industry. Geologically, ninety percent of the Sri Lankan rocks are high grade metamorphic type and higher percentage of them has attributed for many of the gem deposits. These gem minerals are found as either primary or secondary deposits. Application of GIS based analysis and predictions of mineral potential areas have attracted huge attention for its versatility of mapping and making predictions of mineral potential areas. Haldumulla Divisional Secretariat in Badulla District was selected as the study area covering 39 GN divisions and 183 villages. This area lies on both Highland and Vijayan complexes and chiefly underlain by Biotite Hornblende Gneiss, Marble, Chanockitic Biotite Gneiss, Charnockitic Gneiss, Garnet Sillimanite Biotite Gneiss and Quartzite. In addition, geological structures like Bintenna Synform, Koslanda Fault and Shear zones were identified within the area. Based on field experience and literature, eight parameters were recognized as causative influences for occurrences of gem deposits, namely; geology, mineralogy, distance to geological structures, distance to internal drainage system, elevation, slope, paddy area, and flood area. Distribution of each factor within the study area was obtained as raster layers (referred to as factor maps). Overlay Method and Weights of Evidence Method (WOE) were used to integrate the factor maps to produce a gem potential map in GIS environment. Kotabakma gem field, Gampha gem field, Weli oya gem field and Nikapotha gem field were identified as high gem potential areas in the area studied. Confirmatory field visits on selected areas of the identified gem fields were made to confirm the information on the map. The final gem potential map will help gem miners to extract gem deposit in Haldumulla DS area and it will upgrade gem industry in Sri Lanka.

Keywords: Gem minerals, Raster layers, Factor maps, Geological structures, Gem potential Map, Haldumulla