

GIS BASED MAPPING OF POTENTIAL AREAS FOR GEM VEINS: CASE STUDY OF KALAWANA DS

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Lack of correct identification of potential areas with gem veins, and the use of inappropriate mining methods have become the two major problems in the gem industry in the Kalawana area, as well as other areas in the Rathnapura district, Sri Lanka. The use of excavators for mining causes several negative environmental impacts. Furthermore, it discourages small scale gem miners, and eventually impacts the decline of gem industry in the area. This research focused on preparing a map of potential gem veins for the Kalawana divisional secretariat. Additionally, it also identified the most appropriate interpolation technique for minerals, like gems, from the widely used methods of Kriging, Spline and Inverse Distance Weighting (IDW). The weighted overlay technique in GIS was used to prepare the map of potential gem veins, and the criteria for assigning weights have been selected through communicating with the experts in the gem mining industry and referring the literature on gem formation. Analytic Hierarchy Process (AHP) was utilized to assign weights for the identified criteria, and the underground gem vein surface was interpolated using the three interpolation techniques Kriging, Spline and IDW. 95 ground locations for mines were observed through a field survey, and 60% of point data were used in the interpolation, while 40% of point data used to validate the interpolation technique. In this study, the most appropriate technique of interpolation was identified as the Kriging technique, when compared to the other techniques. The correlation coefficient for Kriging, Spline, and IDW were 0.9983, 0.9963, and 0.9981 respectively. The map of potential gem veins indicated that the majority of the potential veins were located close to water features, and situated on fairly levelled grounds of low altitudes. When the mapped potential areas were compared with the existing gem veins, there was an approximate 25% of overlay. To further enhance the correlation between predicted and existing gem vein locations, it is necessary to develop both the quality and quantity of the selected criteria in the weighted overlay technique. .

Keywords: *Gem vein potential, Kriging, AHP, Weighted overlay, Sri Lanka*