E2-11: Hydro-geochemistry of the right bank of Samanalawewa reservoir

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Identification of leakage path through the right bank of Samanalawewa reservoir using water quality data was reported. Further attempts were made to study the chemical data in order to obtain hydrogeological information about the right bank.

In the study, ionic ratios such as Mg/Ca, Na/K, SO_4/Cl & HCO_3/Cl of ground water samples are considered. Mandal *et al* (1981) reported that Mg/Ca ratio was in the range of 0.5 - 0.7, for water flowing through limestone aquifers. Ratios in the range 0.7 - 0.9 were commonly associated with dolomitic aquifers and ratios exceeding 0.9 were found in fresh water from silicate aquifers. The Na/K ratio in rain water was less than 10 and increased from 50 to 70, in ground water because of the absorption of K on clay or other silicates. The concentration of SO_4 or Cl also varied according to the nature and depth of the aquifer.

The ionic ratios were computed from the resuls of water quality analyses carried out since Sept. 1993, on samples collected at monthly intervals from 27 piezometric holes at various depths in the vicinity of leakage zone on the right bank and based on these ratios, the samples were classified into 5 main categories. Ionic ratios especially Mg/Ca in samples RBS: 5, 7, 8, 15 & 16 were in the range 0.5 - 0.54, indicating that the samples were from limestone aquifers. The ratios of samples RBS: 11, 19 & 20 represented dolomitic (grouted zone) aquifers and that of samples RBS: 9, 12 & 14 exceeded 0.9 indicating the samples were from silicate aquifers. In the above samples stable electrical conductivity with time revealed the stable ionic concentrations in aquifers and ionic ratios endorsed the predicted geology of the zone.

However the ratios obtained in deep ground water samples RBS: 4,6 & 10 were not representative of deep aquifers as predicted by the geology of the area. For instance, the Mg/Ca ratio was in the range 0.37 - 0.44, which is

also the same as that of leakage water. Further observed decrease in ionic concentrations, and drop in electrical conductivity of the above 3 samples throughout the years indicate a continuous mixing of aquifer water with water of low ionic concentration in that zone. Considering the above facts, the path of leakage flow was identified as a specific zone below the grout curtains originating from a specific area in the exposed river bed of Walawe Ganga.

The mixing diagram drawn for the investigation of mixing relationship between the reservoir water and aquifers along the leakage zone, revealed the rate of mixing. Results of such studies are presented and proposed clay blanketing method for the mitigation of the leak is discussed.