C-09: Identification of leakage path on the right bank of Samanalawewa Reservoir using water quality monitoring data

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Samanalawewa Reservoir is a recently constructed rock fill dam with clay core, across the Walawe Ganga at its confluence with Belihul Oya. After impounding, from March 5, 1992, a water burst occurred in October, 1992 on the right bank, at an elevation of 390 M when the reservoir water level was at an elevation of 438 9M, about 21 M below the full supply level of 460 M E1.

Various possibilities regarding the leakage path in the ground, could be considered, such as through microfissures in the grouted zone and/or outside grouted zone i.e. above or below the grouted areas, or outside the southern end of the grouted zone.

Water quality chemical analysis was carried out since July 1992, with water samples collected once a month from 34 piezometric holes at various depths in the vicinity of the leakage zone and Stiff's diagrams (a pattern diagram of chemical composition of water) have been plotted for each sample. The Stiff's diagrams of all water samples were grouped into 4 main categories and the diagram of the leakage water sample at the outlet point, was identified with that of deep holes along a specific zone. This leakage flow was endorsed by electrical conductivity measurements of the water samples. With the available geological and hydrogeological information also taken into consideration, it is shown that the leakage water originates from a specific zone in the exposed river bed of Walawe Ganga between 700 m to 1700 m upstream of the dam and seeps through the specific zone of deep ground under the grouted area.

Calcium, magnesium, sodium, potasium, sulphates, carbonates, chloride and hydroxide contents in water samples have been analysed using microprocessor controlled Spectrophotometer DR 2000, digital flame anlayser and an Electrical conductivity meter was used to measure conductivity.