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**Study on shallow water circulation mechanisms using Time domain electro-magnetic(TDEM) data, case study from Nelumwewa thermal spring**

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Nelumwewa thermal spring is located in North Central province in Sri Lanka close proximity to Highland-Vijayan complexes boundary. It is located in the middle of manmade irrigation tank. Possible thermal water paths at shallow depths were examined using electromagnetic exploration techniques. Data from pioneered Magnetotellurics(MT) and Transient electromagnetic (TEM) survey conducted in 2012, shallow earth resistivity pseudo section was created for the span of 8 -10 km width and up to 125m depth. Up to 30 m from surface, moderately low resistivity conditions (30-70  $\Omega\text{m}$ ) were in the resistivity cross section which could cause by irrigated water over the area. It is observed that the signature of low permeable layer ( $> 1000 \Omega\text{m}$  resistive) inhibit the thermal water contact with ground water. Close to thermal spring area, low resistive ( $<20 \Omega\text{m}$ ) water bearing fracture like feature slanted toward main low resistive zone ( $<5 \Omega\text{m}$ ) can be located which can be considered as main thermal water circulation path. This could be the main ground water mixing zone studied resistivity cross section. According to resistivity signatures, any other water bearing fractures cannot be located from this resistivity data. Main thermal water bearing zone is located directly below the sounding site No06 ( $\approx 4$  km NW direction from thermal spring) which could be considered as confined thermal water reservoir from ground water table. This results have indicated possible thermal water bearing zone and thermal fluid circulation path of Nelumwewa thermal spring system which could be used for future exploration. This study suggests combination of other geophysical methods to study the area for understand the 3D nature of thermal water circulation mechanism.

**Keywords:** Geothermal, Sri Lanka, MT, TEM, Nelumwewa