Integrated geophysical and geochemical study of Tattapani thermal spring: Implications for Geothermal Power Generation

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This study investigates the potential for geothermal power generation in the Tattapani thermal spring using geological, geophysics, and geochemical techniques. Based on the resistivity survey four distinctive lithological units, with the high resistivity unit representing weathered dolomite/limestone and the low resistivity unit being related to hydrothermally altered rocks were delineated. The thermal spring is concentrated on the right bank of the river Poonch at a depth of 30m below the surface, increasing in depth in the Northeast direction. Fresh groundwater is mostly concentrated in sandstone and dolomite and lies above the thermal plumes, which are highly prone to contamination. The thermal spring is characterized by the source of recharge being surface runoff and perennial Poonch river. The heat source is Precambrian shield rock derived heat from the mantle source for thermal convection cell. The thermal spring oozes along a discontinuity, weaker zones faulty zone between Cambrian Abbottabad Fm and Paleocene Patala Fm acting as a conduit for thermal convection cell. A pilot drilling is recommended below to a deeper level of 500 m for actual thermal temperature, geotechnical study, and assisted by gravity for a detailed basin analysis of the Tattapani thermal regime. Overall, this study provides valuable insights into the subsurface properties and potential of the Tattapani thermal spring for geothermal power generation.

Keywords: Tattapani, Geothermal, Resistivity, Magnetic, Geochemical, Tectonic Regime