

Empowering water-stressed communities in northern Peru through applied geosciences

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ABSTRACT

In the arid province of Talara in northern coast Peru, the Project "Hydrogeophysics for Community Monitoring of Groundwater in Degraded Dry Forest Quebradas" addresses water stress in the town of Lobitos and its surrounding areas. The overall aim is to empower local communities with the knowledge and capability to conduct near-surface geophysical surveys for exploration of groundwater resources.

Our project team assembled low-cost geophysical instruments for vertical electrical resistivity sounding (VES) and seismic refraction surveys following the design of Clark and Page (2011). We also developed simple to use software tools for analyzing the geophysical data. With these instruments and software we trained 17 people (8 women) from four socioeconomically marginalized communities and public institutions in the region to carry out the geophysical surveys, covering theoretical aspects, in-field instrument use and data interpretation. Figure 1 shows an example VES dataset and interpreted two layer resistivity model.

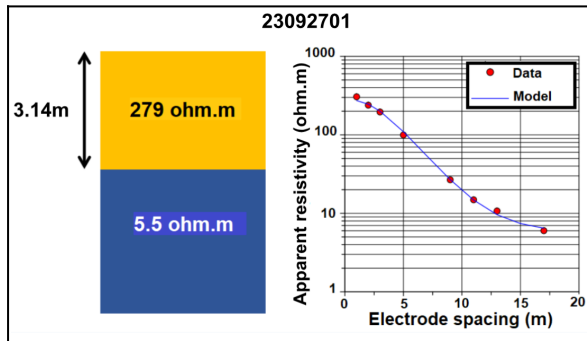


Figure 1: Example VES data and interpreted model for survey reference 23092701 (for location see Figure 2 and Figure 3).

The VES and seismic surveys were conducted on the watershed of Quebrada Monte in Lobitos as a test and training site (Figure 3). Results revealed a shallow water table (<10 m) and a sudden drop or estimated “salinity threshold” approximately 3.5 km inland from the sea (1.0 to 5.5 ohm.m, Figure 2). The seismic refraction surveys provided independent evidence of a relatively shallow contrast in subsurface properties. This useful knowledge and training is the first step in empowering local communities with the ability to make informed decisions on potential groundwater use for humans, regenerative

livestock grazing and ecosystem restoration within their own arid watersheds.

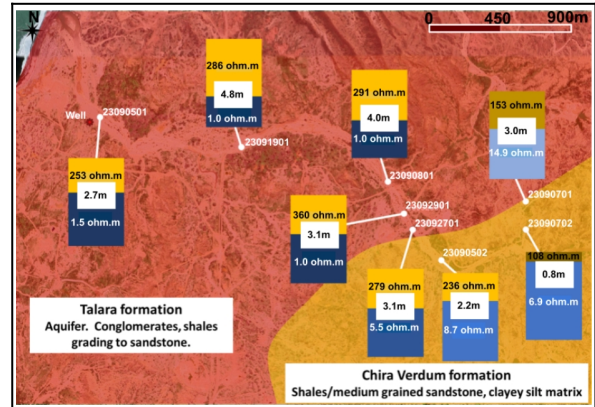


Figure 2: Summary of interpreted VES surveys data within Quebrada Monte (Lobitos district, Talara, Peru), overlaid on Google Earth satellite map imagery (Airbus, 2024) with geological transition (red and yellow shades) obtained from existing regional geological maps (Palacios and Alban, 1999; INGEMMET, 2013).

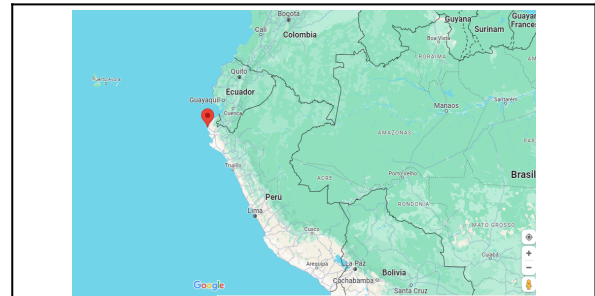


Figure 3: Location of Quebrada Monte study area in Lobitos, Peru (Google Maps, 2024).

Twenty national and international students contributed in organizing community workshops, testing equipment and creating educational materials. A final workshop secured commitment by stakeholders for future stages and community monitoring jobs to ensure lasting local impact.

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