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Groundwater Supply: The role of geology in determining groundwater distribution and exploration techniques for target optimization of wells

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Subsurface rocks are reservoirs, not only for oil and gas, but can accommodate large quantities of water. These aquifers are the source of twenty percent (20%) of all potable water in Trinidad and Tobago. In Tobago most groundwater is derived from bedrock (igneous and metamorphic rock), while some wells produce from alluvium and sedimentary aquifers. Conversely, Trinidad a large proportion of groundwater in Trinidad is derived from alluvium and sedimentary rock with minor contributions from bedrock.

Structural features and stratigraphy have played a major role in the distribution of groundwater across the islands. Lineaments, for example, channel rainwater through bedrock to aquifers. Water chemistry is affected by the rock formation, the residence time within a reservoir, elevation of recharge and saltwater intrusion. Exploration techniques are similar to the processes employed in the oil & gas industry and are used to evaluate a site's suitability for drilling a water well. This includes taking an inventory of existing water resources, assessment of structural features and the review of available lithological, geophysical, and electrical logs.

Field visits are also important to record observations on vegetation, topography, and land use. Should information derived from analyses of available hydrogeological data and fieldwork be insufficient, additional geophysical exploration is necessary. Geophysical survey methods include resistivity and magnetics. Wells are drilled to a depth of less than 1,500 ft, with coastal wells being shallower to avoid the fresh water-sea water interface. In the dry season, coastal wells may be affected by sea water influx due to a decrease in the freshwater hydrostatic head. If sea water influx occurs, the well is shut-in for some time before resuming production to ensure a retreat of the sea water interface. Exploration techniques facilitate an understanding of geology and has ensured the replenishment of the groundwater well stock.