

**SALINE-FRESH WATER RELATIONSHIPS AT THE COYUCA SAND-BAR  
AQUIFER, GUERRERO**

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**ABSTRACT.**

The Coyuca Sand Bar is located 10 km Northwestern away from Acapulco, Guerrero. It is 16 km long, 200-500 m wide and separates the Coyuca Lagoon from the Pacific Ocean. The local water table aquifer comprises a sequence of well-sorted, medium to coarse sand alternating with fine sand deposits with thickness of approximately 45 m. This sequence lies over impervious granitic and metamorphic rocks. The objective of this study was to define the saline-fresh water relationships in the local aquifer in order to implement a local self-supplying water system set apart from the hurricane-vulnerable Acapulco's water supply system. Locating fresh-water sites represented a dual complexity due to the presence of sea water (specific conductance SC = 54.8 mS/cm) at one edge and of lagoon water (SC = 4 mS/cm) at the other edge. At the same time the narrow aquifer geometry limits severely the fresh water exploitation. Exploratory survey included a TDEM (Time Domain Electromagnetic) surveys and two 25-m deep fully slotted exploratory wells. The saline-fresh water interface was directly identified through electric well logs and salinity profiles (*i.e.*: specific conductance of groundwater vs. depth). Profiles also include temperature and pH variations with depth and were performed by introducing a Hydrolab DataSonde® inside each exploratory wells. Results showed the presence of a fresh water horizon (< 1.0 mS/cm) with a thickness of 7 m. The diffusion zone was found to be at a depth between 10 through 14 m. A 7-m deep pumping well 5 m apart from each exploratory well was constructed for both performing hydraulic tests and stressing the diffusion zone/saline-fresh water interface under different pumping scenarios. A safe abstraction rate was determined by field observations and a modified Dagan and Bear (1968) approach and it was used for designing the suitable water works for fresh water supply. Finally, sixteen 7-m deep pumping wells, 4-inch diameter, were constructed with an abstraction rate of 0.5 lps each, totalising 8 lps.

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