

**POTENTIAL FOR INLAND DISPERSAL OF INJECTION WELL  
EFFLUENT IN COASTAL CARBONATE AQUIFERS:  
EVIDENCE FROM CARIBBEAN YUCATAN COAST**

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The conventional model for diffuse flow coastal aquifers indicates that fresh water and shallow saline water move coastward, with a compensatory deeper inflow of saline water. Abstraction wells are usually situated inland, while disposal wells into the shallow saline water may be located nearer the coast. The injected effluent is assumed to be attenuated as it slowly (m/year) flows coastward, and therefore is anticipated to have limited effect on the coastal waters and no impact on the inland supply wells. In contrast to such diffuse flow conditions, dissolution in carbonate aquifers leads to the development of organized conduit systems with rapid water flow. In the Caribbean Yucatan aquifer the vast majority of flow (>99%) occurs via the conduit system. Flow within these conduits is strongly influenced by sea level fluctuations, with rapid (100's m/day) net saline inland flow observed during periods of high mean sea level. These rapid saline inflows occur along at least an 80 km segment of the Caribbean coast. When buoyant nutrient-rich effluent is injected into such an aquifer it will rise to the fresh-saline interface, and eventually become integrated into the conduit flows. Depending on mean sea level, it may then be transported rapidly and un-attenuated inland towards the supply wells, or coastward to discharge onto the barrier reef. Coastal disposal wells are common around the world; however this research suggests that the sustainability of this practise bears review in coastal carbonate aquifers.