

**GEOSTATISTICAL ESTIMATION OF SALTWATER CONTAMINATION IN  
ISRAEL'S COASTAL AQUIFER.**

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**ABSTRACT.**

A prelude to the accurate numerical modeling of saltwater intrusion in coastal aquifers is the accurate depiction of the aquifer initial salinity distribution. In phreatic coastal aquifers that lie below agricultural areas, high aquifer salinity results from both seawater intrusion near the coast, and saltwater contamination inland originating from agricultural activities. These two sources, while both critical to aquifer management require different treatment not only in flow modeling, but also in the determination of initial conditions.

We develop a three-dimensional map of salinity in Israel's coastal aquifer based on a coupled model for seawater intrusion near the coast and saltwater contamination inland. Israel's coastal aquifer lies below active agricultural land, much of which is watered by brackish water. The initial salinity distribution of the aquifer inland from the coast is determined using sequential indicator simulations to predict several feasible initial chloride distribution fields, which we will simultaneously solve. Such a technique allows us to assess the uncertainty of our final results.

The determination of the saltwater/freshwater interface and salinity distribution close to the coast is determined by two techniques whose efficiency we compare.

The first is based on a long time scale simulation where the aquifer is assumed to have pristine (no seawater intrusion) conditions before the start of local pumping. The evolution of the saltwater interface is then numerically modeled in response to local pumping starting from the mid 1950's. The second method is a geostatistical model, which combines sparse measurements of salinity near the coast with saltwater interface location estimates based on an analytic model for the interface as a function of geostatistically determined head.

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