Managing Seawater Intrusion using Multiple-depth Monitoring Wells

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ABSTRACT

Local water resources are scarce in the San Diego area, California. Nearly all water used along this semiarid coast is imported from hundreds of miles away. As the local population increases and externally supplied water decreases, governmental agencies are looking to expand use of scant ground-water resources. Water managers, however, are concerned that additional pumpage near the coast will induce seawater intrusion. To help managers detect any intrusion, the U.S. Geological Survey constructed several deep monitoring sites between the production wells and the ocean. Each site includes five piezometers, installed to different depths between the water table and about 1,500 feet. Ground-water levels in each piezometer are monitored continuously via transducers and the data are transmitted via satellite to the Internet. Levels are used to determine if a hydraulic gradient has been established from the coast to the pumping wells, indicating possible seawater intrusion. Water samples are collected from the piezometers to determine if seawater is present at any of the five depths. To detect possible intrusion between the sampled depths, the deepest piezometer is logged with an electromagnetic induction geophysical tool, which measures changes in salinity throughout the entire 1500-foot thickness. Managers are using the ground-water-level, water-quality, and salinity data from the multiple-depth wells to detect seawater intrusion and then to adjust pumpage in order to minimize adverse effects. More information is available on the project website http://ca.water.usgs.gov/sandiego.

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