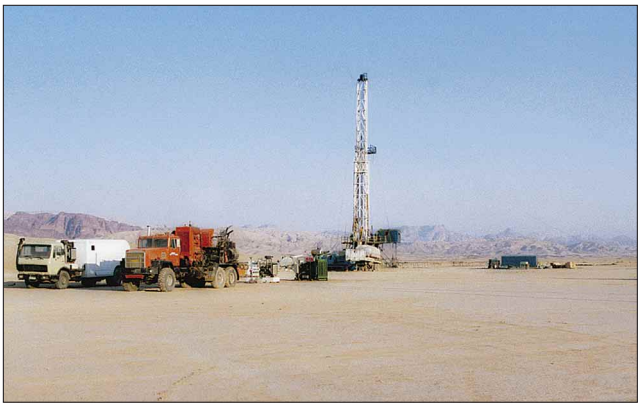
Groundwater

Groundwater from wells and springs is the most important source of water supply in the region, providing more than half of the total water consumption. Groundwater is contained in openings in water-bearing rock units called aquifers. The volume of the openings and the other water-bearing characteristics of the aquifers depend on the mineral composition, texture, and structure of the rocks. Groundwater generally moves very



Drilling deep water-supply well, South Jordan Desert

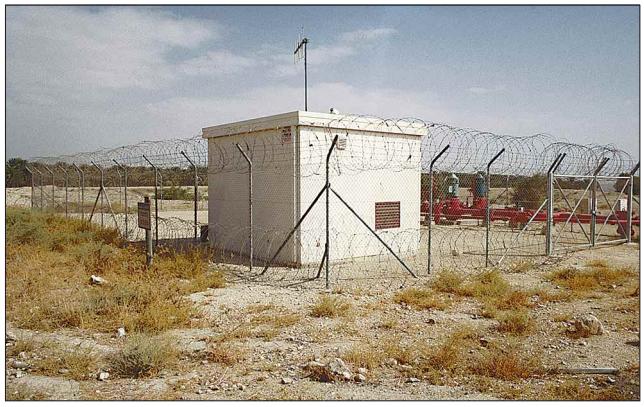
slowly and follows the least resistive (most permeable) pathway from the point of recharge (where water enters the aquifer) to the point of discharge (where water leaves the aquifer). Shallow groundwater generally moves at rates up to one meter per day or greater. An exception is in aquifers that have conduit-like openings, such as basalt and karstic (cavernous) limestone, where water may move much faster. Deeply circulating groundwater moves extremely slowly—sometimes as little as a meter or less per century.

The flow of groundwater may be inhibited by non-water bearing rock units called aquicludes. Aquicludes typically consist of clay, silt, or shale which do not transmit water readily, although they may hold much water in pore spaces. Aquicludes influence patterns of flow in aquifers by restricting groundwater movement. Confined aquifers occur where an aquifer is filled by water and is overlain by an aquiclude. Unconfined aquifers occur where an aquifer is not overlain by an aquiclude.

Geologic structure (lithology) also controls flow patterns in aquifers, either by providing barriers restricting flow or by providing a less-resistive pathway for flow. The geologic structure and topography determines if the groundwater will be discharged as springs or remain underground until tapped by wells.

The importance of an aquifer as a source of water may change from one area to another because of changes in demands for freshwater, variations in groundwater quality, and differences in the hydrogeologic characteristics. Lithologic changes in a formation may result in its being an aquifer in some locations and an aquiclude in others. The most productive aquifers of the region are in Quaternary sand and gravel in the Coastal Plain; Cretaceous limestone in the Mountain Belt, eastern and western escarpments of the Jordan Rift Valley, and Jordan Highland; basalt of the Jordan Highland and Plateau; and sandstone of the South Jordan Desert. Other aquifers include water-bearing zones of limestone and sandstone of lower productivity. Water occurs in pore spaces in the sand and gravel, pore spaces and cavernous zones in the limestone and sandstone, and in fractured zones in the basalt.

Freshwater supplies may be obtained from wells drilled to shallow depths in the Coastal Plain and Jordan Rift Valley; and from deeper wells (as much as 650 m) in the Mountain Belt, Jordan Highland and Plateau, and the desert regions. Generally, water depths are greatest in the mountain ranges and desert regions, and shallowest in valley floors and in the Coastal Plain.



Fenced enclosure and wellhouse, Jordan Valley, north of Jericho

In addition to wells, springs provide a source of water supply from aquifers and form the headwaters of many streams and wadis. Springs occur where the water table intersects the surface topography and are common where geologic structures, such as faults, provide an outlet for groundwater discharge. Springs represent visible discharge from aquifers; invisible or concealed discharges include seepages, evaporation, transpiration to plants, and hidden springs. Under natural conditions, aquifers discharge water in an amount proportional to total annual infiltration (recharge). For more information on springs see page 24.