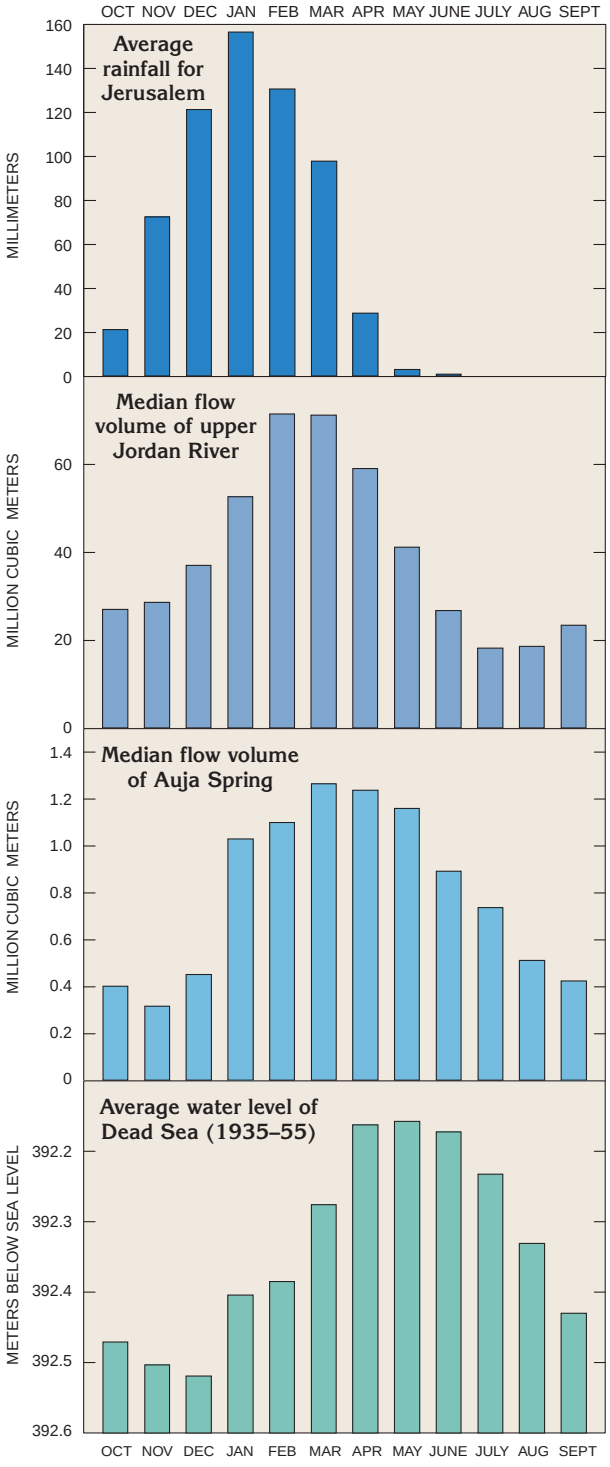
Dead Sea



Comparisons of the timing of seasonal rainfall, runoff, and Dead Sea water-level changes illustrate the hydrology of this region. Typically peak rainfall precedes peak runoff by one month, and peak Dead Sea water level for undeveloped conditions by four months. These time lags represent the time to satisfy the extreme moisture deficit from the dry season, storage deficits in manmade and natural impoundments, and the travel time of streamflow and shallow groundwater from areas of excess rainfall to the Dead Sea. This seasonality and time lag also is evident in the Auja Spring that discharges from the Eastern Mountain groundwater basin.

LONG-TERM FLUCTUATION OF DEAD SEA WATER LEVEL AND REGIONAL CLIMATE

The water level of the Dead Sea has been monitored continuously since 1930, and has declined over 21 m from 1930 to 1997. Such a large decline raises questions of whether there are precedents for this water-level change and whether they can be explained by normal variances in climate. Fortunately, evidence of historical Dead Sea water-level changes may be found from several independent sources.

METHOD OF RECONSTRUCTING HISTORICAL DEAD SEA WATER LEVEL

Over 1000 years of historical water-level records were reconstructed using evidence from rainfall and tree ring widths, sedimentology, history, archeology, botany, and morphology.

Tree ring and rainfall evidence: Periods of wider or narrower average width of the tree rings of a Juniperus phoenica (cut and measured in 1968) were found to correlate well with periods of rising or falling average rainfall in the watershed for the period 1846–1968, when concurrent rainfall records were available. Based on this correlation, changing average ring widths for a period extending back to A.D. 1115 were evaluated and found to agree with other indicators of Dead Sea water level.

Sediment evidence: Aragonite, a calcium carbonate mineral, precipitates directly from Dead Sea waters at its surface, and leaves a crust that becomes a thick stripe where the level is steady for several years. Aragonite stripes form a definite record of historical Dead Sea water levels, and may be date-associated where they occur on archeological ruins, such as Qumran at about 330 m below sea level. At several lower elevations, the aragonite stripes are thick and composed of several layers, indicating recurring steady Dead Sea water levels. Intervals between these stripes are evidence of the steep rise or fall in water level during rainy or drought periods.

History and archeology: Periods of habitation and abandonment of many archeological sites along the western shore of the Dead Sea were dated according to concurrent history, coins, pottery, and ruins. Plotting these sites according to their chronology and elevation, various points on the historical hydrograph were confirmed. History records periods when the Dead Sea could be forded on the sill (400 m below sea level) of the Lynch Straights in the early 19th century, and in the 18th, 17th, and 14th centuries. History also records periods of extreme drought or abundant harvests.

Reference: Klein, C., 1985, Fluctuations of the level of the Dead Sea and climatic fluctuations in the country during historical times: International Association of Hydrological Sciences, Symposium, Scientific basis for water resources management, September, 1985, Jerusalem, Israel, p. 197–224.