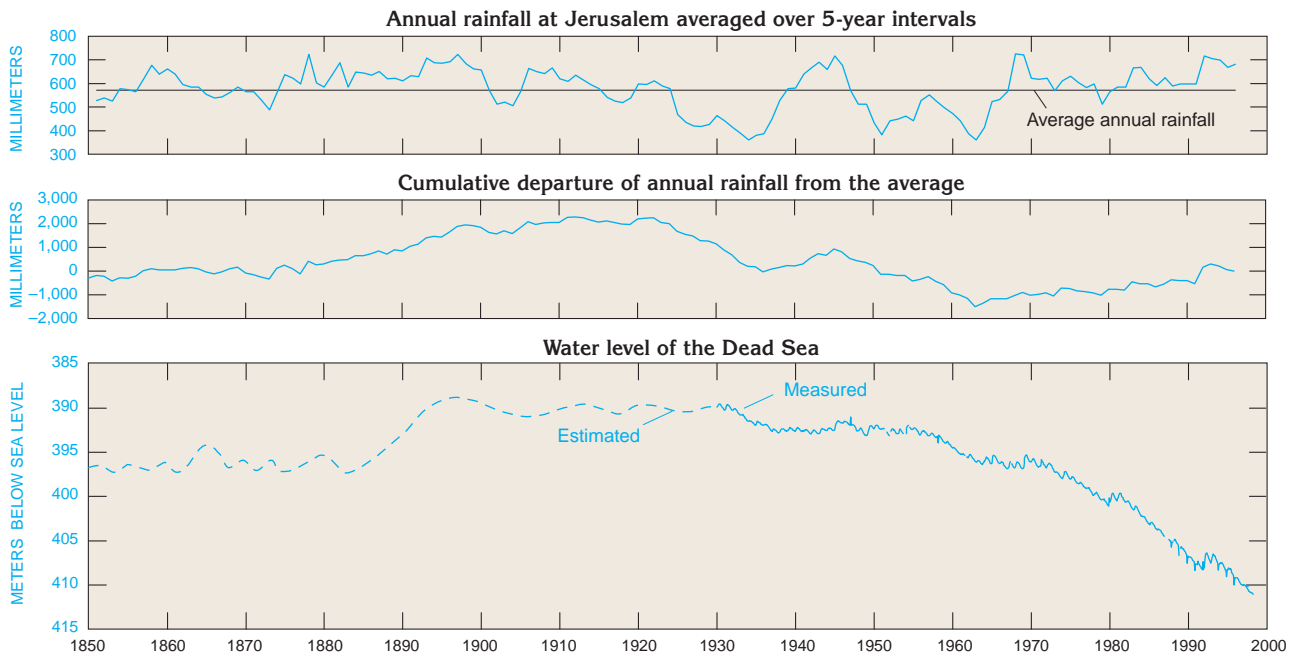


Dead Sea



Water-level trends of the Dead Sea respond to measured rainfall trends in the watershed, except for the last three decades, when the effects of water use dominate the water-level trend.

Long-term fluctuations of the Dead Sea water level are caused by periodic fluctuations in rainfall over the watershed. The year-to-year water level is steady when the volume of water leaving the Dead Sea by evaporation is equal to the volume flowing in from perennial streams, flash floods in the wadis, and springs and seeps draining the groundwater. The water level rises following seasons of abundant rainfall and declines during drought years, as shown above in the graph of water level and rainfall from 1850 to 1997. In this graph, rainfall patterns in Jerusalem are assumed to be indicative of Mediterranean-based rainfall patterns over the Dead Sea watershed. When the annual rainfall is above average for several years, there is a cumulative effect (shown in the cumulative departure curve) leading to a rise in water level, such as occurred from about 1882 to 1895. The cumulative effect of below average rainfall periods leads to declining water levels as seen in 1930–36, and 1954–63.

EFFECTS OF DEVELOPMENT OF WATER RESOURCES ON DEAD SEA WATER LEVEL

During the last four decades, water resources in the Dead Sea watershed have been intensively developed to meet growing demands for this precious resource. Increasing amounts of water were diverted from surface and groundwater sources in the watershed to meet domestic, agricultural, and industrial needs. Since 1964, only a fraction of the flow from the water-rich areas of the upper Jordan River leave

Lake Tiberias to move toward the Dead Sea. Most of this water and water from the Yarmouk and Zarqa Rivers is diverted for uses inside and outside the watershed. Under current conditions on an average annual basis, the combined inflow from all sources to the Dead Sea has been estimated as only one-half to one-fourth that of the inflow prior to development. Water also is pumped from the Dead Sea itself into evaporation ponds constructed in the shallow southern basin.

The influence of rainfall and water-resources development on Dead Sea water levels is illustrated in the graph above. Until around 1970, Dead Sea water levels and rainfall showed a correlation. For example, a falling trend in Dead Sea water levels during 1954–63 corresponds to a period of below-normal rainfall. This downward trend was interrupted by above-normal rainfall that produced a rise in water levels during 1964–69. Since about 1970, however, the historical correlation between rainfall and Dead Sea water levels appears to deviate. Although rainfall generally increased during this period, water levels declined steeply, corresponding to decreased inflows from the Jordan River. Although the effects of rainy years in 1980, and especially 1992, are still evident, their influence on Dead Sea water levels is moderated. Development of water resources will result in a more pronounced impact of droughts on Dead Sea water levels. Thus, Dead Sea water levels continue to offer a record of the integrated effects of historical climate and water-resources development in this watershed.