**Dead Sea**

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*For the novel, see* [*Dead Sea (novel)*](http://en.wikipedia.org/wiki/Dead_Sea_(novel))*.*

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| **Dead Sea** | |
| A view from the [Israeli](http://en.wikipedia.org/wiki/Israel) side looking across to [Jordan](http://en.wikipedia.org/wiki/Jordan) | |
| **Coordinates** | [31°30′N 35°30′E﻿ / ﻿31.500°N 35.500°E﻿ / 31.500; 35.500](http://tools.wmflabs.org/geohack/geohack.php?pagename=Dead_Sea&params=31_30_N_35_30_E_type:waterbody)[Coordinates](http://en.wikipedia.org/wiki/Geographic_coordinate_system): [31°30′N 35°30′E﻿ / ﻿31.500°N 35.500°E﻿ / 31.500; 35.500](http://tools.wmflabs.org/geohack/geohack.php?pagename=Dead_Sea&params=31_30_N_35_30_E_type:waterbody) |
| [**Lake type**](http://en.wikipedia.org/wiki/Lake#Types_of_lakes) | [Endorheic](http://en.wikipedia.org/wiki/Endorheic_basin) [Hypersaline](http://en.wikipedia.org/wiki/Hypersaline_lake) |
| [**Primary inflows**](http://en.wikipedia.org/wiki/Inflow_(hydrology)) | [Jordan River](http://en.wikipedia.org/wiki/Jordan_River) |
| [**Primary outflows**](http://en.wikipedia.org/wiki/Discharge_(hydrology)) | *None* |
| [**Catchment area**](http://en.wikipedia.org/wiki/Drainage_basin) | 41,650 km2 (16,080 sq mi) |
| [**Basin**](http://en.wikipedia.org/wiki/Drainage_basin) **countries** | [Jordan](http://en.wikipedia.org/wiki/Jordan) [Israel](http://en.wikipedia.org/wiki/Israel) |
|  | |
| **Max. length** | 55 km (34 mi) |
| **Max. width** | 18 km (11 mi) |
| **Surface area** | 810 km2 (310 sq mi) North Basin |
| **Average depth** | 118 m (387 ft) |
| **Max. depth** | 377 m (1,237 ft) |
| **Water volume** | 147 km3 (35 cu mi) |
| **Shore length1** | 135 km (84 mi) |
| **Surface elevation** | −427 m (−1,401 ft) |
|  | |
| **References** |  |
| 1 Shore length is [not a well-defined measure](http://en.wikipedia.org/wiki/Coastline_paradox). | |

The **Dead Sea** ([Arabic](http://en.wikipedia.org/wiki/Arabic_language): البحر الميت‎ [*al-Baḥr al-Mayyit*](http://upload.wikimedia.org/wikipedia/commons/f/f3/ArDeadSea.ogg) ([help](http://en.wikipedia.org/wiki/Wikipedia:Media_help)·[info](http://en.wikipedia.org/wiki/File:ArDeadSea.ogg)), [Hebrew](http://en.wikipedia.org/wiki/Hebrew_language): יָם הַ‏‏מֶּ‏‏לַ‏ח, *Yām HaMélaḥ*, "Sea of Salt", also [Hebrew](http://en.wikipedia.org/wiki/Hebrew_language): יָם הַ‏‏מָּוֶת, *Yām HaMā́weṯ*, "The Sea of Death"), also called the **Salt Sea**, is a [salt lake](http://en.wikipedia.org/wiki/Salt_lake) bordering [Jordan](http://en.wikipedia.org/wiki/Jordan) to the east and [Israel](http://en.wikipedia.org/wiki/Israel) and the [West Bank](http://en.wikipedia.org/wiki/West_Bank) to the west. Its surface and shores are 423 metres (1,388 ft) below [sea level](http://en.wikipedia.org/wiki/Sea_level), Earth's [lowest elevation](http://en.wikipedia.org/wiki/Lowest_elevations) on land. The Dead Sea is 377 m (1,237 ft) deep, the deepest [hypersaline lake](http://en.wikipedia.org/wiki/Hypersaline_lake) in the world. With 33.7% [salinity](http://en.wikipedia.org/wiki/Salinity), it is also one of the [world's saltiest bodies of water](http://en.wikipedia.org/wiki/List_of_bodies_of_water_by_salinity), though [Lake Assal (Djibouti)](http://en.wikipedia.org/wiki/Lake_Assal_(Djibouti)), [Garabogazköl](http://en.wikipedia.org/wiki/Garabogazk%C3%B6l) and some hypersaline lakes of the [McMurdo Dry Valleys](http://en.wikipedia.org/wiki/McMurdo_Dry_Valleys) in [Antarctica](http://en.wikipedia.org/wiki/Antarctica) (such as [Don Juan Pond](http://en.wikipedia.org/wiki/Don_Juan_Pond)) have reported higher salinities. It is 8.6 times saltier than the ocean. This salinity makes for a harsh environment in which animals cannot flourish, hence its name. The Dead Sea is 55 kilometres (34 mi) long and 18 kilometres (11 mi) wide at its widest point. It lies in the [Jordan Rift Valley](http://en.wikipedia.org/wiki/Jordan_Rift_Valley), and its main [tributary](http://en.wikipedia.org/wiki/Tributary) is the [Jordan River](http://en.wikipedia.org/wiki/Jordan_River).



The Dead Sea has attracted visitors from around the [Mediterranean basin](http://en.wikipedia.org/wiki/Mediterranean_Basin) for thousands of years. Biblically, it was a place of refuge for [King David](http://en.wikipedia.org/wiki/David). It was one of the world's first health resorts (for [Herod the Great](http://en.wikipedia.org/wiki/Herod_the_Great)), and it has been the supplier of a wide variety of products, from balms for [Egyptian](http://en.wikipedia.org/wiki/Ancient_Egypt) [mummification](http://en.wikipedia.org/wiki/Mummy) to [potash](http://en.wikipedia.org/wiki/Potash) for [fertilizers](http://en.wikipedia.org/wiki/Fertilizer). People also use the salt and the minerals from the Dead Sea to create [cosmetics](http://en.wikipedia.org/wiki/Cosmetics) and herbal [sachets](http://en.wikipedia.org/wiki/Sachet_(scented_bag)). In 2009, 1.2 million foreign tourists visited on the Israeli side.

The Dead Sea [seawater](http://en.wikipedia.org/wiki/Seawater) has a [density](http://en.wikipedia.org/wiki/Density) of 1.240 kg/L, which makes swimming similar to floating.

**Etymology and toponymy**

In Hebrew, the Dead Sea is [*Yām ha-Melaḥ*](http://upload.wikimedia.org/wikipedia/commons/e/eb/He-Dead_Sea.ogg) *(*[*help*](http://en.wikipedia.org/wiki/Wikipedia:Media_help)*·*[*info*](http://en.wikipedia.org/wiki/File:He-Dead_Sea.ogg)*)*, meaning "sea of [salt](http://en.wikipedia.org/wiki/Salt)" ([Genesis](http://en.wikipedia.org/wiki/Book_of_Genesis) 14:3). In prose sometimes the term *Yām ha-Māvet* (ים המוות, "sea of death") is used, due to the scarcity of aquatic life there. In [Arabic](http://en.wikipedia.org/wiki/Arabic_language) the Dead Sea is called [*al-Bahr al-Mayyit*](http://upload.wikimedia.org/wikipedia/commons/f/f3/ArDeadSea.ogg) ("the Dead Sea"), or less commonly *baḥrᵘ lūṭ* (بحر لوط, "the Sea of [Lot](http://en.wikipedia.org/wiki/Lot_(Bible))"). Another historic name in Arabic was the "Sea of [Zoʼar](http://en.wikipedia.org/wiki/Neve_Zohar)", after a nearby town in biblical times. The Greeks called it *Lake Asphaltites* ([Attic Greek](http://en.wikipedia.org/wiki/Attic_Greek) ἡ Θάλαττα ἀσφαλτῖτης, *hē Thálatta asphaltĩtēs*, "the Asphaltite sea"). The Bible also refers to it as *Yām ha-Mizraḥî* (ים המזרחי, "the Eastern sea") and *Yām ha-‘Ărāvâ* (ים הערבה, "Sea of the [Arabah](http://en.wikipedia.org/wiki/Arabah)").



Satellite photograph showing the location of the Dead Sea

**Geography**

The Dead Sea is an [endorheic lake](http://en.wikipedia.org/wiki/Endorheic_basin) located in the [Jordan Rift Valley](http://en.wikipedia.org/wiki/Jordan_Rift_Valley), a geographic feature formed by the [Dead Sea Transform](http://en.wikipedia.org/wiki/Dead_Sea_Transform) (DST). This left lateral-moving [transform fault](http://en.wikipedia.org/wiki/Transform_fault) lies along the [tectonic](http://en.wikipedia.org/wiki/Tectonics) [plate boundary](http://en.wikipedia.org/wiki/Plate_tectonics) between the [African Plate](http://en.wikipedia.org/wiki/African_Plate) and the [Arabian Plate](http://en.wikipedia.org/wiki/Arabian_Plate). It runs between the [East Anatolian Fault](http://en.wikipedia.org/wiki/East_Anatolian_Fault) zone in [Turkey](http://en.wikipedia.org/wiki/Turkey) and the northern end of the [Red Sea Rift](http://en.wikipedia.org/wiki/Red_Sea_Rift) offshore of the southern tip of [Sinai](http://en.wikipedia.org/wiki/Sinai_Peninsula).

The [Jordan River](http://en.wikipedia.org/wiki/Jordan_River) is the only major water source flowing into the Dead Sea, although there are small perennial springs under and around the Dead Sea, forming pools and [quicksand](http://en.wikipedia.org/wiki/Quicksand) pits along the edges There are no outlet streams.

Rainfall is scarcely 100 mm (4 in) per year in the northern part of the Dead Sea and barely 50 mm (2 in) in the southern part. The Dead Sea zone's aridity is due to the [rain shadow](http://en.wikipedia.org/wiki/Rain_shadow) effect of the [Judean Hills](http://en.wikipedia.org/wiki/Judean_Mountains). The highlands east of the Dead Sea receive more rainfall than the Dead Sea itself.

To the west of the Dead Sea, the Judean Hills rise less steeply and are much lower than the mountains to the east. Along the southwestern side of the lake is a 210 m (700 ft) tall [halite](http://en.wikipedia.org/wiki/Halite) formation called "[Mount Sodom](http://en.wikipedia.org/wiki/Mount_Sodom)".

**Natural history**

There are two contending hypotheses about the origin of the low elevation of the Dead Sea. The older hypothesis is that it lies in a true rift zone, an extension of the [Red Sea Rift](http://en.wikipedia.org/wiki/Red_Sea_Rift), or even of the [Great Rift Valley](http://en.wikipedia.org/wiki/Great_Rift_Valley_(geographical_concept)) of [eastern Africa](http://en.wikipedia.org/wiki/East_Africa). A more recent hypothesis is that the Dead Sea basin is a consequence of a "step-over" discontinuity along the Dead Sea Transform, creating an extension of the crust with consequent subsidence.

Around three million years ago, what is now the valley of the Jordan River, Dead Sea, and [Wadi Arabah](http://en.wikipedia.org/wiki/Arabah) was repeatedly inundated by waters from the [Mediterranean Sea](http://en.wikipedia.org/wiki/Mediterranean_Sea). The waters formed in a narrow, crooked bay which was connected to the sea through what is now the [Jezreel Valley](http://en.wikipedia.org/wiki/Jezreel_Valley). The floods of the valley came and went depending on long scale [climate change](http://en.wikipedia.org/wiki/Climate_change). The lake that occupied the Dead Sea Rift, named [Lake Sedom](http://en.wikipedia.org/w/index.php?title=Lake_Sedom&action=edit&redlink=1), deposited beds of salt that eventually became 3 km (2 mi) thick.

Approximately two million years ago, the land between the [Rift Valley](http://en.wikipedia.org/wiki/Rift_valley) and the Mediterranean Sea rose to such an extent that the ocean could no longer flood the area. Thus, the long bay became a lake.

The first such prehistoric lake is named "Lake Amora", which was a [freshwater](http://en.wikipedia.org/wiki/Freshwater) or [brackish](http://en.wikipedia.org/wiki/Brackish) lake that extended at least 80 km (50 mi) south of the current southern end of the Dead Sea and 100 km (60 mi) north, well above the present [Hula Depression](http://en.wikipedia.org/wiki/Hula_Valley). As the climate became more arid, Lake Amora shrank and became saltier. The large, saltwater predecessor of the Dead Sea is called "Lake Lisan".



Pebbles cemented with [halite](http://en.wikipedia.org/wiki/Halite) on the western shore of the Dead Sea near Ein Gedi.

In [prehistoric times](http://en.wikipedia.org/wiki/Prehistory), great amounts of sediment collected on the floor of Lake Amora. The sediment was heavier than the salt deposits and squeezed the salt deposits upwards into what are now the [Lisan Peninsula](http://en.wikipedia.org/wiki/Lisan_Peninsula) and [Mount Sodom](http://en.wikipedia.org/wiki/Mount_Sodom) (on the southwest side of the lake). Geologists explain the effect in terms of a bucket of mud into which a large flat stone is placed, forcing the mud to creep up the sides of the pail. When the floor of the Dead Sea dropped further due to tectonic forces, the salt mounts of Lisan and Mount Sodom stayed in place as high cliffs (see [salt dome](http://en.wikipedia.org/wiki/Salt_dome)).

From 70,000 to 12,000 years ago, the lake level was 100 m (330 ft) to 250 m (820 ft) higher than its current level. This lake, called "[Lake Lisan](http://en.wikipedia.org/wiki/Lake_Lisan)", fluctuated dramatically, rising to its highest level around 26,000 years ago, indicating a very wet climate in the [Near East](http://en.wikipedia.org/wiki/Near_East). Around 10,000 years ago, the lake level dropped dramatically, probably to levels even lower than today. During the last several thousand years, the lake has fluctuated approximately 400 m (1,300 ft), with some significant drops and rises. Current theories as to the cause of this dramatic drop in levels rule out [volcanic activity](http://en.wikipedia.org/wiki/Volcano); therefore, it may have been a seismic event.

**Climate**

The Dead Sea's climate offers year-round sunny skies and dry air. It has less than 50 millimeters (2 in) mean annual rainfall and a summer average temperature between 32 and 39 °C (90 and 102 °F). Winter average temperatures range between 20 and 23 °C (68 and 73 °F). The region has weakened [ultraviolet radiation](http://en.wikipedia.org/wiki/Ultraviolet), particularly the UVB (erythrogenic rays), and an atmosphere characterized by a high [oxygen](http://en.wikipedia.org/wiki/Oxygen) content due to the high [barometric pressure](http://en.wikipedia.org/wiki/Atmospheric_pressure). The sea affects temperatures nearby because of the moderating effect a large body of water has on climate. During the winter, sea temperatures tend to be higher than land temperatures, and vice versa during the summer months. This is the result of the water's mass and [specific heat capacity](http://en.wikipedia.org/wiki/Specific_heat_capacity). On average, there are 192 days above 30C (86F) annually.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Climate data for Dead Sea** | | | | | | | | | | | | | |
| **Month** | **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec** | **Year** |
| **Record high °C (°F)** | 26.4 (79.5) | 30.4 (86.7) | 33.8 (92.8) | 42.5 (108.5) | 45.0 (113) | 46.4 (115.5) | 47.0 (116.6) | 44.5 (112.1) | 43.6 (110.5) | 40.0 (104) | 35.0 (95) | 28.5 (83.3) | 47.0 (116.6) |
| **Average high °C (°F)** | 20.5 (68.9) | 21.7 (71.1) | 24.8 (76.6) | 29.9 (85.8) | 34.1 (93.4) | 37.6 (99.7) | 39.7 (103.5) | 39.0 (102.2) | 36.5 (97.7) | 32.4 (90.3) | 26.9 (80.4) | 21.7 (71.1) | 30.4 (86.7) |
| **Average low °C (°F)** | 12.7 (54.9) | 13.7 (56.7) | 16.7 (62.1) | 20.9 (69.6) | 24.7 (76.5) | 27.6 (81.7) | 29.6 (85.3) | 29.9 (85.8) | 28.3 (82.9) | 24.7 (76.5) | 19.3 (66.7) | 14.1 (57.4) | 21.9 (71.4) |
| **Record low °C (°F)** | 5.4 (41.7) | 6.0 (42.8) | 8.0 (46.4) | 11.5 (52.7) | 19.0 (66.2) | 23.0 (73.4) | 26.0 (78.8) | 26.8 (80.2) | 24.2 (75.6) | 17.0 (62.6) | 9.8 (49.6) | 6.0 (42.8) | 5.4 (41.7) |
| [**Precipitation**](http://en.wikipedia.org/wiki/Precipitation_(meteorology)) **mm (inches)** | 7.8 (0.307) | 9.0 (0.354) | 7.6 (0.299) | 4.3 (0.169) | 0.2 (0.008) | 0.0 (0) | 0.0 (0) | 0.0 (0) | 0.0 (0) | 1.2 (0.047) | 3.5 (0.138) | 8.3 (0.327) | 41.9 (1.65) |
| **Avg. precipitation days** | 3.3 | 3.5 | 2.5 | 1.3 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 1.6 | 2.8 | 15.6 |
| **%** [**humidity**](http://en.wikipedia.org/wiki/Humidity) | 41 | 38 | 33 | 27 | 24 | 23 | 24 | 27 | 31 | 33 | 36 | 41 | 31.5 |
| *Source: Israel Meteorological Service* | | | | | | | | | | | | | |

**Chemistry**



Halite deposits (and teepee structure) along the western Dead Sea coast.



Beach pebbles made of halite; western Dead Sea coast.

Until the winter of 1978–79, when a major mixing event took place, the Dead Sea was composed of two stratified layers of water that differed in temperature, density, age, and salinity. The topmost 35 metres (115 ft) or so of the Dead Sea had a salinity that ranged between 300 and 400 [parts per thousand](http://en.wikipedia.org/wiki/Concentration) and a temperature that swung between 19 °C (66 °F) and 37 °C (99 °F). Underneath a zone of transition, the lowest level of the Dead Sea had waters of a consistent 22 °C (72 °F) temperature and complete saturation of [sodium chloride](http://en.wikipedia.org/wiki/Sodium_chloride) (NaCl). Since the water near the bottom is [saturated](http://en.wikipedia.org/wiki/Saturation_(chemistry)), the salt precipitates out of solution onto the [sea floor](http://en.wikipedia.org/wiki/Seabed).

Beginning in the 1960s, water inflow to the Dead Sea from the Jordan River was reduced as a result of large-scale irrigation and generally low rainfall. By 1975, the upper water layer was saltier than the lower layer. Nevertheless, the upper layer remained suspended above the lower layer because its waters were warmer and thus less dense. When the upper layer cooled so its density was greater than the lower layer, the waters mixed (1978–79). For the first time in centuries, the lake was a homogeneous body of water. Since then, [stratification](http://en.wikipedia.org/wiki/Stratification_(water)) has begun to redevelop.

The mineral content of the Dead Sea is very different from that of ocean water. The exact composition of the Dead Sea water varies mainly with season, depth and temperature. In the early 1980s, the concentration of ionic species (in g/kg) of Dead Sea surface water was Cl− (181.4), Br− (4.2), SO42− (0.4), HCO3− (0.2), Ca2+ (14.1), Na+ (32.5), K+ (6.2) and Mg2+ (35.2). The total salinity was 276 g/kg. These results show that the composition of the salt, as anhydrous chlorides on a weight percentage basis, was [calcium chloride](http://en.wikipedia.org/wiki/Calcium_chloride) (CaCl2) 14.4%, [potassium chloride](http://en.wikipedia.org/wiki/Potassium_chloride) (KCl) 4.4%, [magnesium chloride](http://en.wikipedia.org/wiki/Magnesium_chloride) (MgCl2) 50.8% and [sodium chloride](http://en.wikipedia.org/wiki/Sodium_chloride) (common salt, NaCl) 30.4%. In comparison, the salt in the water of most [oceans](http://en.wikipedia.org/wiki/Ocean) and [seas](http://en.wikipedia.org/wiki/Sea) is approximately 97% [sodium chloride](http://en.wikipedia.org/wiki/Sodium_chloride). The concentration of [sulfate](http://en.wikipedia.org/wiki/Sulfate) ions (SO42−) is very low, and the concentration of [bromide](http://en.wikipedia.org/wiki/Bromide) ions (Br−) is the highest of all waters on Earth.

The salt concentration of the Dead Sea fluctuates around 31.5%. This is unusually high and results in a nominal density of 1.24 kg/l. Anyone can easily float in the Dead Sea because of natural [buoyancy](http://en.wikipedia.org/wiki/Buoyancy). In this respect the Dead Sea is similar to the [Great Salt Lake](http://en.wikipedia.org/wiki/Great_Salt_Lake) in [Utah](http://en.wikipedia.org/wiki/Utah) in the [United States](http://en.wikipedia.org/wiki/United_States).

An unusual feature of the Dead Sea is its discharge of [asphalt](http://en.wikipedia.org/wiki/Asphalt). From deep [seeps](http://en.wikipedia.org/wiki/Petroleum_seep), the Dead Sea constantly spits up small pebbles and blocks of the black substance. Asphalt coated figurines and bitumen coated [Neolithic](http://en.wikipedia.org/wiki/Neolithic) skulls from [archaeological](http://en.wikipedia.org/wiki/Archaeological) sites have been found. [Egyptian](http://en.wikipedia.org/wiki/Ancient_Egypt) [mummification](http://en.wikipedia.org/wiki/Mummification) processes used asphalt imported from the Dead Sea region.

**Health effects and therapies**

The Dead Sea area has become a major center for [health](http://en.wikipedia.org/wiki/Health) [research](http://en.wikipedia.org/wiki/Research) and treatment for several reasons. The mineral content of the water, the very low content of [pollens](http://en.wikipedia.org/wiki/Pollen) and other [allergens](http://en.wikipedia.org/wiki/Allergen) in the [atmosphere](http://en.wikipedia.org/wiki/Earth%27s_atmosphere), the reduced [ultraviolet](http://en.wikipedia.org/wiki/Ultraviolet) component of [solar radiation](http://en.wikipedia.org/wiki/Sunlight), and the higher atmospheric pressure at this great depth each have specific [health effects](http://en.wikipedia.org/wiki/Health_effect). For example, persons experiencing reduced [respiratory](http://en.wikipedia.org/wiki/Respiration_(physiology)) function from [diseases](http://en.wikipedia.org/wiki/Disease) such as [cystic fibrosis](http://en.wikipedia.org/wiki/Cystic_fibrosis) seem to benefit from the increased atmospheric pressure.

The region's climate and low elevation have made it a popular center for several types of therapies:

* [Climatotherapy](http://en.wikipedia.org/wiki/Climatotherapy): Treatment which exploits local climatic features such as [temperature](http://en.wikipedia.org/wiki/Temperature), [humidity](http://en.wikipedia.org/wiki/Humidity), [sunshine](http://en.wikipedia.org/wiki/Sunlight), [barometric pressure](http://en.wikipedia.org/wiki/Atmospheric_pressure) and special atmospheric constituents
* [Heliotherapy](http://en.wikipedia.org/wiki/Light_therapy): Treatment that exploits the biological effects of the [sun](http://en.wikipedia.org/wiki/Sun)'s radiation
* [Thalassotherapy](http://en.wikipedia.org/wiki/Thalassotherapy): Treatment that exploits bathing in Dead Sea [water](http://en.wikipedia.org/wiki/Water)

**Treatment for psoriasis**

Climatotherapy at the Dead Sea is an effective therapy for patients with [psoriasis](http://en.wikipedia.org/wiki/Psoriasis), who benefit from sunbathing for long periods in the area due to its position below sea level and subsequent result that many of the sun's harmful UV rays are reduced.

**Treatment for rhinosinusitis**

[Rhinosinusitis](http://en.wikipedia.org/wiki/Rhinosinusitis) patients receiving Dead Sea saline [nasal irrigation](http://en.wikipedia.org/wiki/Nasal_irrigation) exhibited significantly better symptom relief compared to standard [hypertonic](http://en.wikipedia.org/wiki/Hypertonic) saline spray.

**Treatment for osteoarthritis**

Dead Sea mud pack therapy has been suggested to temporarily relieve pain in patients with [osteoarthritis](http://en.wikipedia.org/wiki/Osteoarthritis) of the knees. According to researchers of the [Ben Gurion University of the Negev](http://en.wikipedia.org/wiki/Ben_Gurion_University_of_the_Negev), treatment with mineral-rich mud compresses can be used to augment conventional medical therapy.



Panorama of the Dead Sea from the [Mövenpick](http://en.wikipedia.org/wiki/M%C3%B6venpick_Hotels_%26_Resorts) Resort, Jordan.

**Fauna and flora**



Dead Sea in the morning, seen from [Masada](http://en.wikipedia.org/wiki/Masada)

The sea is called "dead" because its high salinity prevents macroscopic aquatic organisms, such as fish and [aquatic plants](http://en.wikipedia.org/wiki/Aquatic_plant), from living in it, though minuscule quantities of bacteria and microbial fungi are present.

In times of flood, the salt content of the Dead Sea can drop from its usual 35% to 30% or lower. The Dead Sea temporarily comes to life in the wake of rainy winters. In 1980, after one such rainy winter, the normally dark blue Dead Sea turned red. Researchers from [Hebrew University of Jerusalem](http://en.wikipedia.org/wiki/Hebrew_University_of_Jerusalem) found the Dead Sea to be teeming with a type of [algae](http://en.wikipedia.org/wiki/Algae) called [*Dunaliella*](http://en.wikipedia.org/wiki/Dunaliella). The *Dunaliella* in turn nourished [carotenoid](http://en.wikipedia.org/wiki/Carotenoid)-containing (red-[pigmented](http://en.wikipedia.org/wiki/Pigment)) [halo bacteria](http://en.wikipedia.org/wiki/Halobacteria), whose presence caused the color change. Since 1980, the Dead Sea basin has been dry and the algae and the bacteria have not returned in measurable numbers.

Many animal species live in the mountains surrounding the Dead Sea. Hikers can see [camels](http://en.wikipedia.org/wiki/Camel), [ibex](http://en.wikipedia.org/wiki/Ibex), [hares](http://en.wikipedia.org/wiki/Hare), [hyraxes](http://en.wikipedia.org/wiki/Hyrax), [jackals](http://en.wikipedia.org/wiki/Jackal), [foxes](http://en.wikipedia.org/wiki/Fox), and even [leopards](http://en.wikipedia.org/wiki/Arabian_Leopard). Hundreds of [bird](http://en.wikipedia.org/wiki/Bird) species inhabit the zone as well. Both Jordan and Israel have established [nature reserves](http://en.wikipedia.org/wiki/Nature_reserve) around the Dead Sea.

The delta of the Jordan River was formerly a [jungle](http://en.wikipedia.org/wiki/Jungle) of [papyrus](http://en.wikipedia.org/wiki/Cyperus_papyrus) and [palm trees](http://en.wikipedia.org/wiki/Arecaceae). The Jewish historian [Flavius Josephus](http://en.wikipedia.org/wiki/Josephus) described [Jericho](http://en.wikipedia.org/wiki/Jericho) as "the most fertile spot in [Judea](http://en.wikipedia.org/wiki/Judea)". In [Roman](http://en.wikipedia.org/wiki/Ancient_Rome) and [Byzantine](http://en.wikipedia.org/wiki/Byzantine_Empire) times, [sugarcane](http://en.wikipedia.org/wiki/Sugarcane), [henna](http://en.wikipedia.org/wiki/Henna), and [sycamore fig](http://en.wikipedia.org/wiki/Ficus_sycomorus) all made the lower Jordan valley wealthy. One of the most valuable products produced by Jericho was the [sap](http://en.wikipedia.org/wiki/Balsam_of_Mecca) of the [balsam](http://en.wikipedia.org/wiki/Commiphora) tree, which could be made into [perfume](http://en.wikipedia.org/wiki/Perfume). By the 19th century, Jericho's fertility had disappeared.

**Human settlement**

There are several small communities near the Dead Sea. These include [Ein Gedi](http://en.wikipedia.org/wiki/Ein_Gedi), [Neve Zohar](http://en.wikipedia.org/wiki/Neve_Zohar) and the [Israeli settlements](http://en.wikipedia.org/wiki/Israeli_settlement) in the [Megilot Regional Council](http://en.wikipedia.org/wiki/Megilot_Regional_Council): [Kalya](http://en.wikipedia.org/wiki/Kalya), [Mitzpe Shalem](http://en.wikipedia.org/wiki/Mitzpe_Shalem) and [Avnat](http://en.wikipedia.org/wiki/Avnat). There is a nature preserve at Ein Gedi, and several Dead Sea hotels are located on the southwest end at [Ein Bokek](http://en.wikipedia.org/wiki/Ein_Bokek) near Neve Zohar. [Highway 90](http://en.wikipedia.org/wiki/Highway_90_(Israel)) runs north-south on the Israeli side for a total distance of 565 km from [Metula](http://en.wikipedia.org/wiki/Metula) on the Lebanese border in the north to its southern terminus at the Egyptian border near the [Red Sea](http://en.wikipedia.org/wiki/Red_Sea) port of [Eilat](http://en.wikipedia.org/wiki/Eilat).

[Potash City](http://en.wikipedia.org/wiki/Potash_City) is a small community on the Jordanian side of the Dead Sea. [Highway 65](http://en.wikipedia.org/wiki/Highway_65_(Jordan)) runs north-south on the Jordanian side.

**Hebrew Bible**

Just north of the Dead Sea is [Jericho](http://en.wikipedia.org/wiki/Jericho). Somewhere, perhaps on the southeastern shore, would be the cities mentioned in the [Book of Genesis](http://en.wikipedia.org/wiki/Book_of_Genesis) which were said to have been destroyed in the time of [Abraham](http://en.wikipedia.org/wiki/Abraham): [Sodom and Gomorra](http://en.wikipedia.org/wiki/Sodom_and_Gomorrah) (Genesis 18) and the three other "Cities of the Plain", [Admah](http://en.wikipedia.org/wiki/Admah), [Zeboim](http://en.wikipedia.org/wiki/Zeboim_(Hebrew_Bible)) and [Zoar](http://en.wikipedia.org/wiki/Zoara) (Deuteronomy 29:23). Zoar escaped destruction when Abraham's nephew [Lot](http://en.wikipedia.org/wiki/Lot_(Bible)) escaped to Zoar from Sodom (Genesis 19:21-22). Before the destruction, the Dead Sea was a valley full of natural [tar pits](http://en.wikipedia.org/wiki/Tar_pit), which was called the vale **of** Siddim. King David was said to have hidden from [Saul](http://en.wikipedia.org/wiki/Saul) at Ein Gedi nearby.

In [Ezekiel](http://en.wikipedia.org/wiki/Book_of_Ezekiel) [47:8-9](http://bibref.hebtools.com/?book=%20Ezekiel&verse=47:8-9&src=HE) there is a specific prophecy that the sea will ".. be healed *and* made fresh", becoming a normal lake capable of supporting [marine life](http://en.wikipedia.org/wiki/Marine_biology). A similar prophecy is stated in [Zechariah](http://en.wikipedia.org/wiki/Book_of_Zechariah) [14:8](http://bibref.hebtools.com/?book=%20Zechariah&verse=14:8&src=HE), which says that "Living waters will go out from [Jerusalem](http://en.wikipedia.org/wiki/Jerusalem), half of them to the eastern sea (likely the Dead Sea) and half to the western sea (the [Mediterranean](http://en.wikipedia.org/wiki/Mediterranean_Sea))..."

[Josephus](http://en.wikipedia.org/wiki/Josephus) identifies the Dead Sea in geographic proximity to the ancient Biblical city of [Sodom](http://en.wikipedia.org/wiki/Sodom_and_Gomorrah). However, he refers to the lake by its Greek name, Asphaltites.

**History**



[Mount Sodom](http://en.wikipedia.org/wiki/Mount_Sodom), Israel, showing the so-called "[Lot's Wife](http://en.wikipedia.org/wiki/Lot%27s_Wife)" pillar made of [halite](http://en.wikipedia.org/wiki/Halite) like the rest of the mountain.

**Second Temple period**

Dwelling in caves near the Dead Sea is recorded in the [Hebrew Bible](http://en.wikipedia.org/wiki/Hebrew_Bible) as having taken place before the Israelites came to Canaan, and extensively at the time of King David. Various sects of Jews settled in caves overlooking the Dead Sea. The best known of these are the [Essenes](http://en.wikipedia.org/wiki/Essenes) of [Qumran](http://en.wikipedia.org/wiki/Qumran), who left an extensive library known as the [Dead Sea Scrolls](http://en.wikipedia.org/wiki/Dead_Sea_Scrolls). The town of [Ein Gedi](http://en.wikipedia.org/wiki/Ein_Gedi), mentioned many times in the [Mishna](http://en.wikipedia.org/wiki/Mishna), produced [persimmon](http://en.wikipedia.org/wiki/Persimmon) for the temple's fragrance and for export, using a secret recipe. "Sodomite salt" was an essential mineral for the temple's holy incense, but was said to be dangerous for home use and could cause blindness. The Roman camps surrounding [Masada](http://en.wikipedia.org/wiki/Masada) were built by Jewish slaves receiving water from the towns around the lake. These towns had drinking water from the Ein Feshcha springs and other sweet water springs in the vicinity.

**Ancient times**

[Aristotle](http://en.wikipedia.org/wiki/Aristotle) wrote about the remarkable waters. The [Nabateans](http://en.wikipedia.org/wiki/Nabataeans) and others discovered the value of the globs of natural [asphalt](http://en.wikipedia.org/wiki/Asphalt) that constantly floated to the surface where they could be harvested with nets. The Egyptians were steady customers, as they used asphalt in the [embalming](http://en.wikipedia.org/wiki/Embalming) process that created [mummies](http://en.wikipedia.org/wiki/Mummy). The [Ancient Romans](http://en.wikipedia.org/wiki/Ancient_Rome) knew the Dead Sea as "*Palus Asphaltites*" (Asphalt Lake).

**Herodian period**

King [Herod the Great](http://en.wikipedia.org/wiki/Herod_the_Great) built or rebuilt several fortresses and palaces on the western bank of the Dead Sea. The most famous was [Masada](http://en.wikipedia.org/wiki/Masada), where, in 70–73 CE, a small group of Jewish [zealots](http://en.wikipedia.org/wiki/Zealotry) held out against the might of the [Roman legion](http://en.wikipedia.org/wiki/Roman_legion), and [Machaerus](http://en.wikipedia.org/wiki/Machaerus) where, according to Josephus, [John the Baptist](http://en.wikipedia.org/wiki/John_the_Baptist) was imprisoned by [Herod Antipas](http://en.wikipedia.org/wiki/Herod_Antipas) and died.

Also in Roman times, some [Essenes](http://en.wikipedia.org/wiki/Essenes) settled on the Dead Sea's western shore; [Pliny the Elder](http://en.wikipedia.org/wiki/Pliny_the_Elder) identifies their location with the words, "on the west side of the Dead Sea, away from the coast ... [above] the town of Engeda" (*Natural History*, Bk 5.73); and it is therefore a hugely popular but contested hypothesis today, that same Essenes are identical with the settlers at [Qumran](http://en.wikipedia.org/wiki/Qumran) and that "the [Dead Sea Scrolls](http://en.wikipedia.org/wiki/Dead_Sea_Scrolls)" discovered during the 20th century in the nearby caves had been their own library.

In the Bible, the Dead Sea is called the Salt Sea, the Sea of the Arabah, and the Eastern Sea. The designation "Dead Sea" is a modern name which never appears in the Bible. The Dead Sea basin is another part of the Great Rift Valley. It is here that the Upper Jordan River/Sea of Galilee/Lower Jordan River water system comes to an end. Intimately connected with the Judean wilderness to its northwest and west, the Dead Sea was a place of escape and refuge. The remoteness of the region attracted [Greek Orthodox](http://en.wikipedia.org/wiki/Greek_Orthodox_Church) [monks](http://en.wikipedia.org/wiki/Monk) since the [Byzantine](http://en.wikipedia.org/wiki/Byzantine_Empire) era. Their [monasteries](http://en.wikipedia.org/wiki/Monastery), such as [Saint George](http://en.wikipedia.org/wiki/Saint_George) in Wadi Kelt and [Mar Saba](http://en.wikipedia.org/wiki/Mar_Saba) in the [Judaean Desert](http://en.wikipedia.org/wiki/Judaean_Desert), are places of [pilgrimage](http://en.wikipedia.org/wiki/Pilgrimage).

**Modern times**



World's lowest (dry) point, [Jordan](http://en.wikipedia.org/wiki/Jordan), 1971

Explorers and scientists arrived in the area to analyze the minerals and research the unique climate. In the late 1940s and early 1950s, hundreds of religious documents dated between 150 BCE and 70 CE were found in caves near the ancient settlement of [Qumran](http://en.wikipedia.org/wiki/Qumran), about a mile inland from the northwestern shore of the Dead Sea (presently in the West Bank). They became known and famous as the [Dead Sea Scrolls](http://en.wikipedia.org/wiki/Dead_Sea_Scrolls). A [golf course](http://en.wikipedia.org/wiki/Golf_course) named for [Sodom and Gomorrah](http://en.wikipedia.org/wiki/Sodom_and_Gomorrah) was built by the British at [Kalia](http://en.wikipedia.org/wiki/Kalya) on the northern shore.

The world's lowest road, [Highway 90](http://en.wikipedia.org/wiki/Highway_90_(Israel)), runs along the Israeli and West Bank shores of the Dead Sea at 393 m (1,289 ft) below sea level.

The first major hotels were built in nearby [Arad](http://en.wikipedia.org/wiki/Arad,_Israel), and since the 1960s at the [Neve Zohar](http://en.wikipedia.org/wiki/Neve_Zohar) resort complex. On [Jordanian](http://en.wikipedia.org/wiki/Jordan) side, three international franchises have opened [seaside resort](http://en.wikipedia.org/wiki/Seaside_resort) [hotels](http://en.wikipedia.org/wiki/Hotel) near the [King Hussein Bin Talal Convention Center](http://en.wikipedia.org/wiki/King_Hussein_Bin_Talal_Convention_Center) along the eastern coast of the Dead Sea.

**Industry**



View of salt evaporation pans on the Dead Sea, taken in 1989 from the [Space Shuttle Columbia](http://en.wikipedia.org/wiki/Space_Shuttle_Columbia) ([STS-28](http://en.wikipedia.org/wiki/STS-28)). The southern half is separated from the northern half at what used to be the [Lisan Peninsula](http://en.wikipedia.org/wiki/Lisan_Peninsula) because of the fall in level of the Dead Sea.



View of the mineral evaporation ponds almost 12 years later ([STS-102](http://en.wikipedia.org/wiki/STS-102)). A northern and small southeastern extension were added and the large polygonal ponds subdivided.

In the early part of the 20th century, the Dead Sea began to attract interest from chemists who deduced the sea was a natural deposit of [potash](http://en.wikipedia.org/wiki/Potash) (potassium chloride) and [bromine](http://en.wikipedia.org/wiki/Bromine). The Palestine Potash Company was chartered in 1929, after its founder, Siberian Jewish engineer and pioneer of [Lake Baikal](http://en.wikipedia.org/wiki/Lake_Baikal) exploitation, [Moses Novomeysky](http://en.wikipedia.org/wiki/Moshe_Novomeysky), worked for the charter for over ten years. The first plant was on the north shore of the Dead Sea at [Kalya](http://en.wikipedia.org/wiki/Kalya) and produced potash by solar evaporation of the brine. Employing Arabs and Jews, it was an island of peace in turbulent times. The company quickly grew into the largest industrial site in the Middle East, and in 1934 built a second plant on the southwest shore, in the [Mount Sodom](http://en.wikipedia.org/wiki/Mount_Sodom) area, south of the ['Lashon' region](http://en.wikipedia.org/wiki/Lisan_Peninsula) of the Dead Sea. Palestine Potash Company supplied half of Britain's potash during [World War II](http://en.wikipedia.org/wiki/World_War_II), but ultimately became a casualty of the [1948 Arab–Israeli War](http://en.wikipedia.org/wiki/1948_Arab%E2%80%93Israeli_War). Its remnants were nationalized and [Dead Sea Works](http://en.wikipedia.org/wiki/Dead_Sea_Works) Ltd. was established in 1952 in its stead as a [state-owned company](http://en.wikipedia.org/wiki/Government-owned_corporation) to extract potash and other minerals from the Dead Sea.

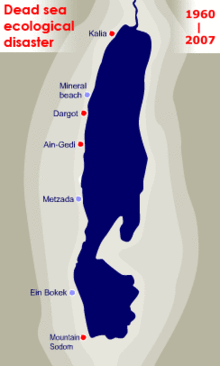
From the Dead Sea brine, Israel produces (2001) 1.77 million [tons](http://en.wikipedia.org/wiki/Ton) potash, 206,000 tons elemental bromine, 44,900 tons [caustic soda](http://en.wikipedia.org/wiki/Sodium_hydroxide), 25,000 tons [magnesium](http://en.wikipedia.org/wiki/Magnesium) metal, and sodium chloride. On the Jordanian side of the Dead Sea, [Arab Potash](http://en.wikipedia.org/wiki/Arab_Potash) (APC), formed in 1956, produces 2.0 million tons of potash annually, as well as sodium chloride and bromine. Both companies use extensive salt [evaporation pans](http://en.wikipedia.org/wiki/Pan_evaporation) that have essentially diked the entire southern end of the Dead Sea for the purpose of producing [carnallite](http://en.wikipedia.org/wiki/Carnallite), potassium magnesium chloride, which is then processed further to produce potassium chloride. The [ponds](http://en.wikipedia.org/wiki/Salt_evaporation_pond) are separated by a central dike that runs roughly north-south along the international border. The [power plant](http://en.wikipedia.org/wiki/Power_station) on the Israeli side allows production of magnesium metal (by a subsidiary, Dead Sea Magnesium Ltd.).

Due to the popularity of the sea's therapeutic and healing properties, several companies have also shown interest in the manufacturing and supplying of Dead Sea salts as raw materials for body and skin care products.



Dead Sea Works Ltd by night.

**Recession and environmental concerns**



The dwindling water level of the Dead Sea

In recent decades, the Dead Sea has been rapidly shrinking because of diversion of incoming water from the Jordan River to the north. The southern end is fed by a canal maintained by the Dead Sea Works, a company that converts the sea's raw materials. From a depression of 395 m (1,296 ft) below sea level in 1970 it fell 22 m (72 ft) to 418 m (1,371 ft) below sea level in 2006, reaching a drop rate of 1 m (3 ft) per year. As the water level decreases, the characteristics of the Sea and surrounding region may substantially change.

The Dead Sea level drop has been followed by a [groundwater](http://en.wikipedia.org/wiki/Groundwater) level drop, causing brines that used to occupy underground layers near the shoreline to be flushed out by freshwater. This is believed to be the cause of the recent appearance of large [sinkholes](http://en.wikipedia.org/wiki/Sinkhole) along the western shore—incoming freshwater dissolves salt layers, rapidly creating subsurface cavities that subsequently collapse to form these sinkholes.



Gully in unconsolidated Dead Sea sediments exposed by recession; it was excavated by floods from the [Judean Mountains](http://en.wikipedia.org/wiki/Judean_Mountains) in less than a year.

In May 2009 at the World Economic Forum, Jordan announced its plans to construct the "Jordan National Red Sea Development Project" (JRSP). This is a plan to convey seawater from the [Red Sea](http://en.wikipedia.org/wiki/Red_Sea) near Aqaba to the Dead Sea. Water would be desalinated along the route to provide fresh water to Jordan, with the brine discharge sent to the Dead Sea for replenishment. As of 2009, the project is in its early phases of planning, with developer and financier selection to be completed by year's end. The project is anticipated to begin detailed design in early 2010, with water delivery by 2017. Israel has expressed its support and will likely benefit from some of the water delivery to its Negev region. Some hydro-power will be collected near the Dead Sea from the dramatic change in elevation on the downhill side of the project. In October 2009, the Jordanians announced accelerated plans to extract around 300 million cubic meters of water per year from the Red Sea, desalinate it for use as fresh water and send the waste water to the Dead Sea by tunnel, despite concerns about inadequate time to assess the potential environmental impact.

At a regional conference in July 2009, officials expressed increased concerns that water levels are dropping. Some suggested various industrial activities around the Dead Sea might need to be reduced. Others advised a range of possible environmental measures to restore conditions. This might include increasing the volume of flow from the Jordan River to replenish the Dead Sea. Currently, only sewage and effluent from fish ponds run in the river's channel. Experts also asserted a need for strict conservation efforts. They also said agriculture should not be expanded, sustainable support capabilities should be incorporated into the area and pollution sources should be reduced.

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