

Dead Sea

The **Dead Sea** (Hebrew: יָם הַמֶּלַח‬ Yām ha-Melaḥ lit. 'Sea of Salt'; Arabic: البحر الميت‬ *Al-Bahr al-Mayyit*^[5]) is a salt lake bordered by Jordan to the east and Israel and Palestine to the west. Its surface and shores are 430.5 metres (1,412 ft) below sea level^{[4][6]} Earth's lowest elevation on land. The Dead Sea is 304 m (997 ft) deep, the deepest hypersaline lake in the world. With a salinity of 342 g/kg, or 34.2%, (in 2011), it is 9.6 times as salty as the ocean and one of the world's saltiest bodies of water.^[7] This salinity makes for a harsh environment in which plants and animals cannot flourish, hence its name. The Dead Sea is 50 kilometres (31 mi) long and 15 kilometres (9 mi) wide at its widest point.^[1] It lies in the Jordan Rift Valley, and its main tributary is the Jordan River.

The Dead Sea has attracted visitors from around the Mediterranean basin for thousands of years. It was one of the world's first health resorts (for Herod the Great), and it has been the supplier of a wide variety of products, from asphalt for Egyptian mummification to potash for fertilisers. People also use the salt and the minerals from the Dead Sea to create cosmetics and herbal sachets.

The Dead Seawater has a density of 1.24 kg/litre, which makes swimming similar to floating^{[8][9]}

The Dead Sea is receding at an alarming rate. Multiple canals and pipelines were proposed to reduce its recession, which had begun causing many problems. The Red Sea–Dead Sea Water Conveyance project, carried out by Jordan, will provide water to neighbouring countries, while the brine will be carried to the Dead Sea to help stabilise its levels. The first phase of the project is scheduled to begin in 2018 and be completed in 2024.^[0]

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Dead Sea יָם הַמֶּלַח (in Hebrew) البحر الميت (in Arabic)	
 A view of the sea from the Israeli shore	
Location	 Israel Jordan Palestine
Coordinates	31°30′N 35°30′E
Lake type	Endorheic Hypersaline
Primary inflows	Jordan River
Primary outflows	<i>None</i>
Catchment area	41,650 km ² (16,080 sq mi)
Basin countries	 Israel Jordan Palestine
Max. length	50 km (31 mi) ^{[1]} (northern basin only)
Max. width	15 km (9.3 mi) ^{[1]}
Surface area	605 km ² (234 sq mi) (2016) ^{[2]}
Average depth	199 m (653 ft) ^{[3]}
Max. depth	298 m (978 ft) (elevation of deepest point, 728 m BSL [below sea level], minus current surface elevation)
Water volume	114 km ³ (27 cu mi) ^{[3]}
Shore length ¹	135 km (84 mi)
Surface elevation	−430.5 m (−1,412 ft) (2016) ^{[4]}
References	[3][4]
¹ Shore length is not a well-defined measure .	

Etymology and toponymy

In Hebrew, the Dead Sea is יָם הַמֶּלַח‬ (*Yām ha-Melaḥ*), meaning "sea of salt" (Genesis 14:3). The Bible uses this term alongside two others: the Sea of the Arabah (*Yām ha-ʿĀrāvā* יָם הָעֲרָבָה‬), and the Eastern Sea (*Yām ha-Mizraḥî* יָם הַמִּזְרָחִי‬). The designation "Dead Sea" never appears in the Bible.

In prose sometimes the term *Yām ha-Māvet* (ים המוות, "sea of death") is used, due to the scarcity of aquatic life there.^[11] In Arabic the Dead Sea is called ‏*al-Bahr al-Mayyit*^[5] ("the Dead Sea"), or less commonly *baḥr al-lūt* (بحر لوط, "the Sea of Lot"). Another historic name in Arabic was the "Sea of Zo'ar", after a nearby town in biblical times. The Greeks called it *Lake Asphaltites* (Attic Greek ἡ Θάλαττα ἄσφαλτιτις, *hē Thálatta asphaltītēs*, "the Asphaltite^[12] sea").

Geography

The Dead Sea is an endorheic lake located in the Jordan Rift Valley, a geographic feature formed by the Dead Sea Transform (DST). This left lateral-moving transform fault lies along the tectonic plate boundary between the African Plate and the Arabian Plate. It runs between the East Anatolian Fault zone in Turkey and the northern end of the Red Sea Rift offshore of the southern tip of Sinai. It is here that the Upper Jordan River/Sea of Galilee/Lower Jordan River water system comes to an end.

The 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 pits along the edges.^[13] There are no outlet streams.

The Mujib River, biblical Arnon, is one the larger water sources of the Dead Sea other than the Jordan.^[14] The Wadi Mujib valley, 420 m below the sea level in the southern of Jordan valley, is a biosphere reserve, with an area of 212 km² (82 sq mi).^[15] Other more substantial sources are Wadi Darajeh (Arabic)/Nahal Dragot (Hebrew), and Nahal Arugot.^[14] Wadi Hasa (biblical Zered) is another wadi flowing into the Dead Sea.

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.^[16] The Dead Sea zone's aridity is due to the rainshadow effect of the 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 mountains 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) talhalite formation called "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 the Dead Sea lies in a true rift zone, an extension of the Red Sea Rift, or even of the Great Rift Valley of eastern 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 3.7 million years ago, what is now the valley of the Jordan River, Dead Sea, and the northern Wadi Arabah was repeatedly inundated by waters from the Mediterranean Sea. The waters formed in a narrow, crooked bay that is called by geologists the Sedom Lagoon, which was connected to the sea through what is now the ezreel Valley. The floods of the valley came and went depending on long-scale climate change. The Sedom Lagoon^[17] deposited beds of salt that eventually became 2.5 km (1.55 mi) thick.

Approximately two million years ago, the land between the Rift Valley and the Mediterranean Sea rose to such an extent that the ocean could no longer flood the area. Thus, the long lagoon became a landlocked lake. The Sedom Lagoon extended at its maximum from the Sea of Galilee in the north to somewhere around 50 km (30 mi) south of the current southern end of the Dead Sea, and the subsequent lakes obviously never surpassed this expanse. The Hula Depression was never part of any of these water bodies due to its higher elevation and the high threshold of the Korazim block separating it from the Sea of Galilee basin.^[18]

The first prehistoric lake to follow the Sedom Lagoon is named Lake Amora, followed by Lake Lisan and finally by the Dead Sea.^[17] The water levels and salinity of these lakes have either risen or fallen as an effect of the tectonic dropping of the valley bottom, and due to climate variation. As the climate became more arid, Lake Lisan finally shrank and became saltier, leaving the Dead Sea as its last remainder.^{[17][18]}

In prehistoric times, 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 and 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 bucket. 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).

From 70,000 to 12,000 years ago, the lake's level was 100 m (330 ft) to 250 m (820 ft) higher than its current level. This lake, Lake Lisan, fluctuated dramatically, rising to its highest level around 26,000 years ago, indicating a very wet climate in the Near East.^[19] Around 10,000 years ago, the lake's level dropped dramatically, probably to even lower than today's. 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; therefore, it may have been a seismic event.

Climate



Play media
Short video about the Dead Sea from the Israeli News Company



Satellite photograph showing the location of the Dead Sea east of the Mediterranean Sea



Pebbles cemented with halite on the western shore of the Dead Sea near Ein Gedi.

The Dead Sea's climate offers year-round sunny skies and dry air. It has less than 50 millimetres (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 weaker ultraviolet radiation, particularly the UVB (erythrogenic rays). Given the higher atmospheric pressure, the air has a slightly higher oxygen content (3.3% in summer to 4.8% in winter) as compared to oxygen concentration at sea level.^{[20][21]} Barometric pressures at the Dead Sea were measured between 1061 and 1065 hPa and clinically compared with health effects at higher altitude.^[22] (This barometric measure is about 5% higher than sea level standard atmospheric pressure of 1013.25 hPa, which is the global ocean mean or ATM.) The Dead 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. On average, there are 192 days above 30C (86F) annually.^[23]

Climate data for Dead Sea, Sedom (390 m below sea level)													
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)
Daily mean °C (°F)	16.6 (61.9)	17.7 (63.9)	20.8 (69.4)	25.4 (77.7)	29.4 (84.9)	32.6 (90.7)	34.7 (94.5)	34.5 (94.1)	32.4 (90.3)	28.6 (83.5)	23.1 (73.6)	17.9 (64.2)	26.1 (79)
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)
Average precipitation 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)
Average 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
Average relative humidity (%)	41	38	33	27	24	23	24	27	31	33	36	41	31.5
Source: Israel Meteorological Service ^[24]													

Chemistry

With 34.2% salinity (in 2011), it is one of the world's saltiest bodies of water, though Lake Vanda in Antarctica (35%), Lake Assal in Djibouti (34.8%), Lagoon Garabogazköl in the Caspian Sea (up to 35%) and some hypersaline ponds and lakes of the McMurdo Dry Valleys in Antarctica (such as Don Juan Pond (44%)) have reported higher salinities.

Until the winter of 1978–79, when a major mixing event took place,^[25] the Dead Sea was composed of two stratified layers of water that differed in temperature, density, age, and salinity. The topmost 35 meters (115 ft) or so of the Dead Sea had an average salinity of 342 parts per thousand (in 2002), 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 (NaCl). Since the water near the bottom is saturated, the salt precipitates out of solution onto the sea floor.

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 has begun to redevelop^[25]

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), SO₄^{2−} (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.^[26] These results show that the composition of the salt, as anhydrous chlorides on a weight percentage basis, was calcium chloride (CaCl₂) 14.4%, potassium chloride (KCl) 4.4%, magnesium chloride (MgCl₂) 50.8% and sodium chloride (NaCl) 30.4%. In comparison, the salt in the water of most oceans and seas is approximately 85% sodium chloride. The concentration of sulfate ions (SO₄^{2−}) is very low, and the concentration of 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. In this respect the Dead Sea is similar to the Great Salt Lake in Utah in the United States.



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



Beach pebbles made of halite; western Dead Sea coast.

An unusual feature of the Dead Sea is its discharge of asphalt. From deep seeps, the Dead Sea constantly spits up small pebbles and blocks of the black substance.^[27] Asphalt-coated figurines and bitumen-coated Neolithic skulls from archaeological sites have been found. Egyptian mummification processes used asphalt imported from the Dead Sea region.^{[28][29]}

Putative therapies

The Dead Sea area has become a location for health research and potential treatment for several reasons. The mineral content of the water, the low content of pollens and other allergens in the atmosphere, the reduced ultraviolet component of solar radiation, and the higher atmospheric pressure at this great depth each may have specific health effects. For example, persons experiencing reduced respiratory function from diseases such as cystic fibrosis seem to benefit from the increased atmospheric pressure.^[30]

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

- Climatotherapy: Treatment which exploits local climatic features such as temperature, humidity, sunshine, barometric pressure and special atmospheric constituents
- Heliotherapy: Treatment that exploits the biological effects of the sun's radiation
- Thalassotherapy: Treatment that exploits bathing in Dead Sea water

Psoriasis

Climatotherapy at the Dead Sea may be a therapy for psoriasis^[31] by sunbathing for long periods in the area due to its position below sea level and subsequent result that UV rays are partially blocked by the increased cloud cover over the Dead Sea!^[32]

Rhinosinusitis

Rhinosinusitis patients receiving Dead Sea saline nasal irrigation exhibited improved symptom relief compared to standard hypertonic saline spray in one study.^[33]

Osteoarthritis

Dead Sea mud pack therapy has been suggested to temporarily relieve pain in patients with osteoarthritis of the knees. According to researchers of the Ben Gurion University of the Negev, treatment with mineral-rich mud compresses can be used to augment conventional medical therapy.^[34]



Panorama of the Dead Sea from the Mövenpick Resort, Jordan.

Fauna and flora

The sea is called "dead" because its high salinity prevents macroscopic aquatic organisms, such as fish and aquatic plants, 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 found the Dead Sea to be teeming with a type of alga called *Dunaliella*. *Dunaliella* in turn nourished carotenoid-containing (red-pigmented) 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.

In 2011 a group of scientists from Be'er Sheva, Israel and Germany discovered fissures in the floor of the Dead Sea by scuba diving and observing the surface. These fissures allow fresh and brackish water to enter the Dead Sea. They sampled biofilms surrounding the fissures and discovered numerous species of bacteria and archaea.^[35]

Many animal species live in the mountains surrounding the Dead Sea. Hikers can see ibex, hares, hyraxes, jackals, foxes, and even leopards. Hundreds of bird species inhabit the zone as well. Both Jordan and Israel have established nature reserves around the Dead Sea.

The delta of the Jordan River was formerly a jungle of papyrus and palm trees. The Jewish historian Flavius Josephus described Jericho as "the most fertile spot in Judea". In Roman and Byzantine times, sugarcane, henna, and sycamore fig all made the lower Jordan valley wealthy. One of the most valuable products produced by Jericho was the sap of the balsam tree, which could be made into perfume. By the 19th century Jericho's fertility had disappeared.



Dead Sea in the morning, seen from Masada

Human settlement

There are several small communities near the Dead Sea. These include [Ein Gedi](#), [Neve Zohar](#) and the [Israeli settlements in the Megilot Regional Council](#): [Kalya](#), [Mitzpe Shalem](#) and [Avnat](#). There is a nature preserve at Ein Gedi, and several Dead Sea hotels are located on the southwest end at [Ein Bokek](#) near Neve Zohar. [Highway 90](#) runs north-south on the Israeli side for a total distance of 565 km (351 mi) from [Metula](#) on the [Lebanese](#) border in the north to its southern terminus at the [Egyptian](#) border near the Red Sea port of [Eilat](#).

[Potash City](#) is a small community on the Jordanian side of the Dead Sea, and others including Suweima. [Highway 65](#) runs north-south on the Jordanian side from near Jordan's northern tip down past the Dead Sea to the port of [Aqaba](#).

Human history

Biblical period

Dwelling in caves near the Dead Sea is recorded in the [Hebrew Bible](#) as having taken place before the [Israelites](#) came to [Canaan](#), and extensively at the time of King [David](#).

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

In [Ezekiel 47:8-9](#) there is a specific prophecy that the sea will "be healed and made fresh", becoming a normal lake capable of supporting [marine life](#). A similar prophecy is stated in [Zechariah 14:8](#), which says that "living waters will go out from [Jerusalem](#), half of them to the eastern sea [likely the Dead Sea] and half to the western sea [[the Mediterranean](#)]."

Greek and Roman period

[Aristotle](#) wrote about the remarkable waters. The [Nabateans](#) and others discovered the value of the globs of natural [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](#) process that created [mummies](#). The [Ancient Romans](#) knew the Dead Sea as "*Palus Asphaltites*"^[36] (Asphalt Lake).

King [Herod the Great](#) built or rebuilt several fortresses and palaces on the western bank of the Dead Sea. The most famous was [Masada](#), where in 70 CE a small group of Jewish [zealots](#) fled after the fall of the destruction of the [Second Temple](#). The zealots survived until 73 CE, when a siege by the [X Legion](#) ended in the deaths by suicide of its 960 inhabitants. Another historically important fortress was [Machaerus](#) (מכור), on the eastern bank, where, according to [Josephus](#), [John the Baptist](#) was imprisoned by [Herod Antipas](#) and died.^[37]

Also in Roman times, some [Essenes](#) settled on the Dead Sea's western shore; [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](#) and that "the [Dead Sea Scrolls](#)" discovered during the 20th century in the nearby caves had been their own library

[Josephus](#) identified the Dead Sea in geographic proximity to the ancient Biblical city of [Sodom](#). However, he referred to the lake by its Greek name, [Asphaltites](#).^[38]

Various sects of Jews settled in caves overlooking the Dead Sea. The best known of these are the [Essenes of Qumran](#), who left an extensive library known as the [Dead Sea Scrolls](#).^[39] The town of [Ein Gedi](#), mentioned many times in the [Mishna](#), produced [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.^[40] The Roman camps surrounding [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 sweetwater springs in the vicinity.^[41]

Byzantine period

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 monks](#) since the [Byzantine era](#). Their [monasteries](#), such as [Saint George](#) in Wadi Kelt and [Mar Saba](#) in the [Judean Desert](#), are places of [pilgrimage](#).

Modern times

In the 19th century the River Jordan and the Dead Sea were explored by boat primarily by [Christopher Costigan](#) in 1835, [Thomas Howard Molyneux](#) in 1847, [William Francis Lynch](#) in 1848, and [John MacGregor](#) in 1869.^[42] The full text of W. F. Lynch's 1949 book *Narrative of the United States' Expedition to the River Jordan and the Dead Sea* is available online. [Charles Leonard Irby](#) and [James Mangley](#) travelled along the shores of the Dead Sea already in 1817-18, but didn't navigate on its waters.^[43]

Explorers and scientists arrived in the area to analyze the minerals and research the unique climate.

After the find of the "[Moabite Stone](#)" in 1868 on the plateau east of the Dead Sea, [Moses Wilhelm Shapira](#) and his partner [Salim al-Khouri](#) forged and sold a whole range of presumed "Moabite" antiquities, and in 1883 Shapira presented what is now known as the "[Shapira Strips](#)", a supposedly ancient scroll written on leather strips which he claimed had been found near the Dead Sea. The strips were declared to be [forges](#) and Shapira took his own life in disgrace.



Mount Sodom, Israel, showing the so-called "Lot's Wife" pillar (made of halite like the rest of the mountain)



A cargo boat on the Dead Sea as seen on the Madaba Map, from the 6th century AD

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, about one mile (1.6 kilometres) inland from the northwestern shore of the Dead Sea (presently in the West Bank). They became known and famous as the Dead Sea Scrolls.

The world's lowest roads, Highway 90, run along the Israeli and West Bank shores of the Dead Sea, along with Highway 65 on the Jordanian side, at 393 m (1,289 ft) below sea level.

Tourism and leisure

British Mandate period

A golf course named for Sodom and Gomorrah was built by the British at Kalia on the northern shore.

Israel

The first major Israeli hotels were built in nearby Arad, and since the 1960s at the Ein Bokek resort complex.

Israel has 15 hotels along the Dead Sea shore, generating total revenues of \$291 million in 2012. Most Israeli hotels and resorts on the Dead Sea are on a six-kilometre (3.7-mile) stretch of the southern shore.^[44]

Jordan

On the Jordanian side, nine international franchises have opened seaside resort hotels near the King Hussein Bin Talal Convention Center, along with resort apartments, on the eastern shore of the Dead Sea. The 9 hotels have boosted the Jordanian side's capacity to 2,800 rooms.^[45]

On November 22, 2015, the Dead Sea panorama road was included along with 40 archaeological locations in Jordan, to become live on Google Street View.^[46]

West Bank

The Palestinian Dead Sea Coast is about 40 kilometres (25 miles) long. The World Bank estimates that a Palestinian Dead Sea tourism industry could generate \$290 million of revenues per year and 2,900 jobs.^[44] However, Palestinians have been unable to obtain construction permits for tourism-related investments on the Dead Sea.^[44] According to the World Bank, Officials in the Palestinian Ministry of Tourism and Antiquities state that the only way to apply for such permits is through the Joint Committees established under the Oslo Agreement, but the relevant committee has not met with any degree of regularity since 2000.^[44]

Chemical industry

British Mandate period

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 (potassium chloride) and bromine. The Palestine Potash Company was chartered in 1929, after its founder, Siberian Jewish engineer and pioneer of Lake Baikal exploitation, Moses Novomeysky, worked for the charter for over ten years. The first plant was on the north shore of the Dead Sea at Kalya and produced potash by solar evaporation of the brine. Employing Arabs and Jews, it was an island of peace in turbulent times.^[47] 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 area, south of the 'Lashon' region of the Dead Sea. Palestine Potash Company supplied half of Britain's potash during World War II. Both plants were destroyed by the Jordanians in the 1948 Arab–Israeli War.^[48]

Israel

The Dead Sea Works was founded in 1952 as a state-owned enterprise based on the remnants of the Palestine Potash Company.^[49] In 1995, the company was privatized and it is now owned by Israel Chemicals. From the Dead Sea brine, Israel produces (2001) 1.77 million tons potash, 206,000 tons elemental bromine, 44,900 tons caustic soda, 25,000 tons magnesium metal, and sodium chloride. Israeli companies generate around US\$3 billion annually from the sale of Dead Sea minerals (primarily potash and bromine), and from other products that are derived from Dead Sea Minerals.^[44]

Jordan

On the Jordanian side of the Dead Sea, Arab Potash (APC), formed in 1956, produces 2.0 million tons of potash annually, as well as sodium chloride and bromine. The plant is located at Safi, South Aghwar Department, in the Karak Governorate.

Jordanian Dead Sea mineral industries generate about \$1.2 billion in sales (equivalent to 4 percent of Jordan's GDP).

West Bank



World's lowest (dry) point, Jordan, 1971



Ein Bokek, a resort on the Israeli shore



Kempinski Hotel, one of the many hotels on the Jordanian shore



The southern basin of the Dead Sea as of 1817-18, with the Lisan Peninsula and its ford (now named Lynch Strait). North is to the right.

The Palestinian Dead Sea Coast is about 40 kilometres (25 miles) long. The Palestinian economy is unable to benefit from Dead Sea chemicals due to restricted access, permit issues and the uncertainties of the investment climate.^[44] The World Bank estimates that a Palestinian Dead Sea chemicals industry could generate \$918m incremental value added per year, "almost equivalent to the contribution of the entire manufacturing sector of Palestinian territories today".^[44]

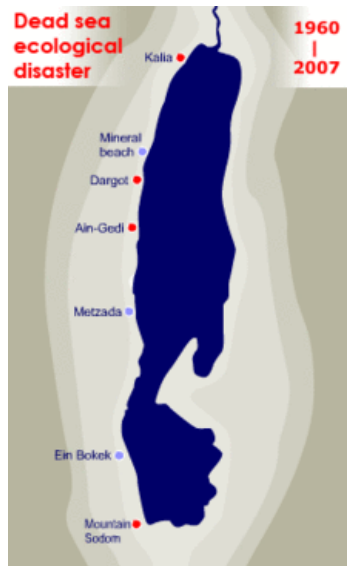
Extraction

Both companies, Dead Sea Works Ltd. and Arab Potash, use extensive salt evaporation pans that have essentially diked the entire southern end of the Dead Sea for the purpose of producing carallite, potassium magnesium chloride, which is then processed further to produce potassium chloride. The ponds are separated by a central dike that runs roughly north-south along the international border. The power plant 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.

Recession and environmental concerns

Since 1930, when its surface was 1,050 km² (410 sq mi) and its level was 390 m (1,280 ft) below sea level, the Dead Sea has been monitored continuously.^[50] 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 water surface of 395 m (1,296 ft) below sea level in 1970^[51] 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 dwindling water level of the Dead Sea

2017. Israel 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.

At a regional conference in July 2009, officials expressed concern about the declining water levels. Some suggested industrial activities around the Dead Sea might need to be reduced. Others advised environmental measures to restore conditions such as 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 stressed the need for strict conservation efforts. They said agriculture should not be expanded, sustainable support capabilities should be incorporated into the area and pollution sources should be reduced.^[58]

Year	Water level (m)	Surface (km ²)
1930	−390	1050
1980	−400	680
1992	−407	675
1997	−411	670
2004	−417	662
2010	−423	655
2016	−430.5	605

Sources: Israel Oceanographic and Limnological Research,^[4] *Haaretz*,^[2] Jewish Virtual Library,^{[54][55]} Jordan Valley Authority.^[56]

In October 2009, the Jordanians announced accelerated plans to extract around 300 million cubic metres (11 billion cubic feet) 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. According to Jordan's minister for water, General Maysoun Zu'bi, this project could be considered as the first phase of the Red Sea–Dead Sea Water Conveyance.^[57]



View of salt evaporation pans on the Dead Sea, taken in 1989 from the Space Shuttle Columbia(STS-28). The southern half is separated from the northern half at what used to be the Lisan Peninsula because of the fall in level of the Dead Sea.



View of the mineral evaporation ponds almost 12 years later (STS-102). A northern and small southeastern extension were added and the large polygonal ponds subdivided.



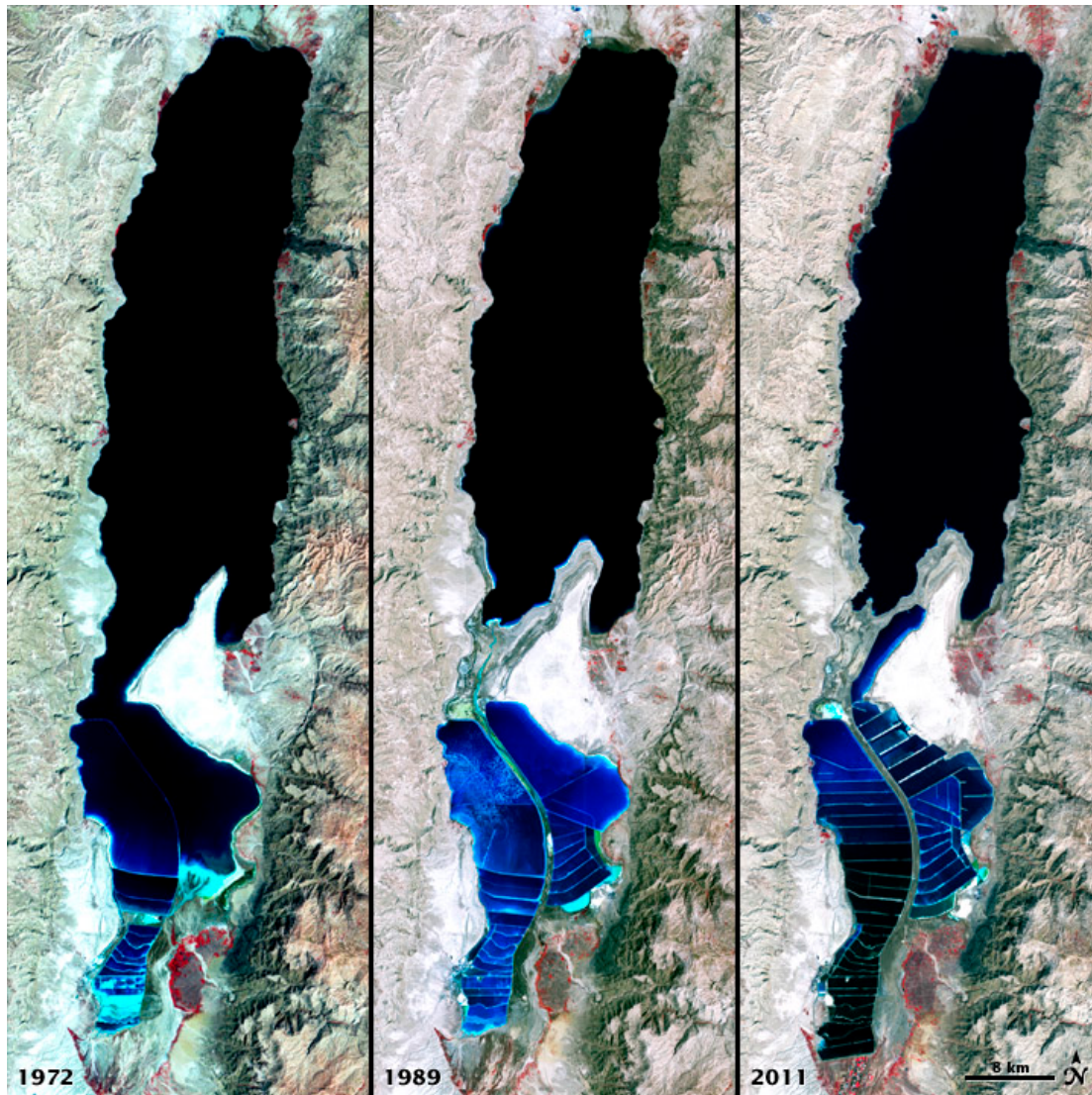
The planned Red Sea–Dead Sea Water Conveyance, whose first phase will begin construction in 2018, will work towards stabilizing the falling levels of the Dead Sea.

In December 2013, Israel, Jordan and the Palestinian Authority signed an agreement for laying a water pipeline to link the Red Sea with the Dead Sea. The pipeline will be 180 km (110 mi) long and is estimated to take up to five years to complete.^[58] In January 2015 it was reported that the level of water is now dropping by 1 m (3 ft) a year.^[59]

On 27 November 2016, it was announced that the Jordanian government is shortlisting five consortiums to implement the project. Jordan's ministry of Water and Irrigation said that the \$100 million first phase of the project will begin construction in the first quarter of 2018, and will be completed by 2021.^[10]



Gully in unconsolidated Dead Sea sediments exposed by recession of water levels. It was excavated by floods from the Judean Mountains in less than a year



Views in 1972, 1989, and 2011 compared^[60]

See also

- Red Sea–Dead Sea Water Conveyance
- Aral Sea
- Dead Sea Works
- Great Salt Lake
- List of drying lakes
- List of places on land with elevations below sea level
- Mediterranean–Dead Sea Canal
- Benjamin Elazari Volcani
- World Discoveries III: Dead Sea

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