

Landsat5, 1986-06-06 (top) and Sentinel-2, 2020-07-05 (bottom)

Desert city with water issues

Las Vegas was founded in 1905, when the construction of a railway connection between Los Angeles and Salt Lake City crossed the area. The city is located in the Mojave Desert in Nevada, United States.

While it remained a small village in the beginning, the development of Las Vegas gained speed with the construction of the nearby Hoover Dam, which started in 1931. This dam on the Colorado River supported the growth of the city, as it helped solve problems with the supply of water and energy in the desert climate. Annual rainfalls reach about 110 mm only.

Additional support for the development of Las Vegas came from the growing tourism sector, which is based mostly on the increasingly important casinos and the vicinity of the famous national parks around the Grand Canyon.

The consequence was a rapid population increase, the population almost quadrupled within the 40 years between 1980 and 2020. This population increase is reflected in the time series of satellite images showing the growth of the area covered by Las Vegas.

However, this growth has led to problems. A massive increase of water use was due both to the increasing number of people and to the increasing wealth of the inhabitants, which goes hand in hand with large water consumption per capita.

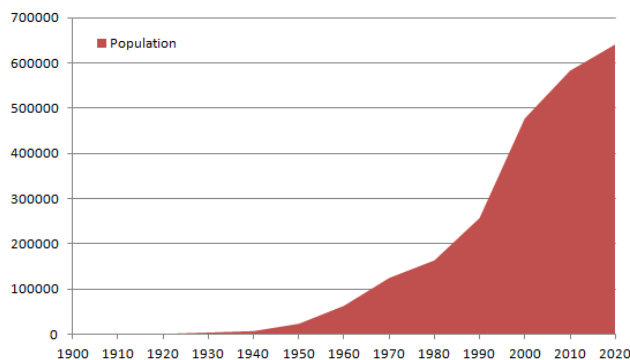
In combination with the growing water consumption, a series of years with little rainfall between 2015 and 2021 has led to a low water level of Lake Mead. This low water level threatens not only the water supply of Las Vegas, but also the energy production by the Hoover Dam, for which a minimum water flow is required.

Countermeasures: reduce per capita water use (-47% between 2002 and 2020), e.g. by prohibiting watering lawns and by re-using water (treated water returned to Lake Mead)

Exercises

- Looking at the satellite image maps, estimate the area of the city in 1986 and in 2020, respectively.
- By which factor has the area increased?
- How does this relate with the population increase during this time span?
- Green areas in the satellite images are covered with vegetation. What types of vegetated areas do you expect in this environment (e.g. pastures, urban green, golf courses, crop fields, ...)?
- Think about the role of water for our society. What is it needed for? Where does the water for your home town come from?

Additional Material



Year	Population
1950	24,600
1980	164,700
1990	258,300
2000	478,400
2010	583,800
2020	641,900

Las Vegas, population development since 1900.

Links and Sources

- https://www.esa.int/ESA_Multimedia/Images/2021/11/Las_Vegas_USA - video showing the development of Las Vegas between 1985 and 2015
- https://www.nasa.gov/mission_pages/station/multimedia/gallery/iss026e006255.html (Las Vegas at night, ISS image from 2010; city raster structure)
- <https://earthobservatory.nasa.gov/images/37228/25-years-of-growth-in-las-vegas> - growth of the city in satellite images
- <https://svs.gsfc.nasa.gov/10715> - satellite images showing water issues of Las Vegas