Case Study: California

Quick Facts:

- California has the world's sixth largest economy
- San Francisco Bay is the largest landlocked harbour in the world
- California is the first state to become a trillion dollar economy in gross state of product

Threats:

Precipitation:

- Annual precipitation is between 200-500mm meaning that much of California is arid.
- 65% of precipitation is lost through evaporation and transpiration, while 13% flows out to sea. Only about 22% of run off is available for human use.
- 50% of precipitation falls between November and March leading to seasonal shortages.

Population:

- The population of California has grown from 2 million in 1900 to 10 million in 1950, and 37.7 million in 2007. Although the increase isn't huge, however over the past century the demand for water has grown.
- The population growth has caused a **spatial imbalance** with 3/4 of water demand coming from hugely populated areas such as Sacramento in the south, whilst 75% of the precipitation is falling in the north.
- The increasing demand of water is currently exceeding the natural supply.

The San Luis Reservoir in July 2007 reduced to 20.8% of its capacity and fell 62 meters from its normal levels. This reservoir supplies water for southern California, the Central Valley and Silicon Valley.

What affects water supply?

California is about twice the size of the UK and there are therefore variations in climate and relief of the state. As a result the availability of water is affected because:

- Mountain ranges run on the coast and therefore stop moist air reaching inland. The prevailing wind from the Pacific Ocean is forced upwards by the mountains causing it to cool and condense, forming relief rainfall which occurs at high altitude often as snowfall.
- The south and far east California (including Death Valley and the Mojave Desert) receive under 100mm of rain due the rainfall shadow effect that the Coastal Ranges and Sierra Nevada Mountains cause.
- The mountains also increase the surface run off as the gradient is greater. Further to this the surface is impermeable and baked hard in the hot sun. This means that river systems will have and increased amount of water in them during seasons when there is high precipitation.
- Some of the surface run off infiltrates through the hard, impermeable surface and percolates through to ground water supplies. Nearly 1/3 of California's water comes from aquifers.
- Most river systems are fed from snowmelt from the Sierra Nevada Mountains. The Sacramento River flows southwards meeting the north flowing San Joaquin River at San Francisco Bay. The huge volumes of water that these two rivers produces feeds the agriculture and urban population, however this can have reduced flow.

Weather Systems:

Weather systems can also affect the weather in California, some examples of this are:

- High pressure systems over the Pacific Ocean block moist currents of air from reaching southern California. Occasional shifts in the system allows storms with heavy rain to reach the area.
- El Nino events can bring above average levels of surface run off and flooding to the south-west while the La Nina events often bring drought to the area.
- In past years extended droughts have caused ground water and surface storage levels to decrease.

Problems caused by the water shortage:

The drought experienced between 2000 and 2007 in California forced many Californians to think about the issue of water supply. The building and development of California has been made at the expense of the environment, for example:

- Wetlands have been drained with natural habitats being altered and fish stocks being depleted. This was all done in order to secure water supplies.
- Additional problems such as polluted water supplies, overabstraction of ground water and increasing salinity of ground water supplies are all problems.
- The Bay-Delta region and Salton Sea have become environmental disasters, with the huge Colorado River being reduced to a trickle entering the Gulf of California. A system of dams and aqueducts that are used to supply 60% of water to southern California is the reason for this.

The Colorado River Basin under pressure:

The huge Colorado River basin drains 7% of the USA and covers an area 1.1 times the size of France. Throughout the 20th century countless numbers of treaties were required so that a 'fair share' of the water in the basin was shared between the 7 US states and Mexico that have access to it.

Future Supplies:

Conflicts over water have already arisen between cities, farmers and environmentalist. The taking of water from the Colorado is more than 20%, which is a a greater amount envisioned in 1963 when shortages were forecast for the future.