Salton, A Sea of Controversy

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Finally, Karen and Ike and their kids were nearing the camping spot they had liked so much 10 years ago. It was a long trek to the Salton Sea for them, but they had fond memories of breakfasting on freshly caught fish and watching gorgeous sunsets from their camp by the shore. This time they were coming during their kids' spring break so they could see some of the migrating birds, an ideal place for that. And the kids were eager to swim.

But what was that smell? They didn't remember anything like that. It was putrid. The kids started complaining. And what was that on the water?

"Mom, look at all the fish. Dead fish. Yuck. Let's get outa here!"

"Pipe down. It is awful, but we'll camp farther down and the wind will take that stench away."

Up ahead they saw the road leading to their favorite site, but it was closed.

"Ike, wasn't it down there on the right side of the road? There's nothing there, just water. The whole campground is gone!"

Background

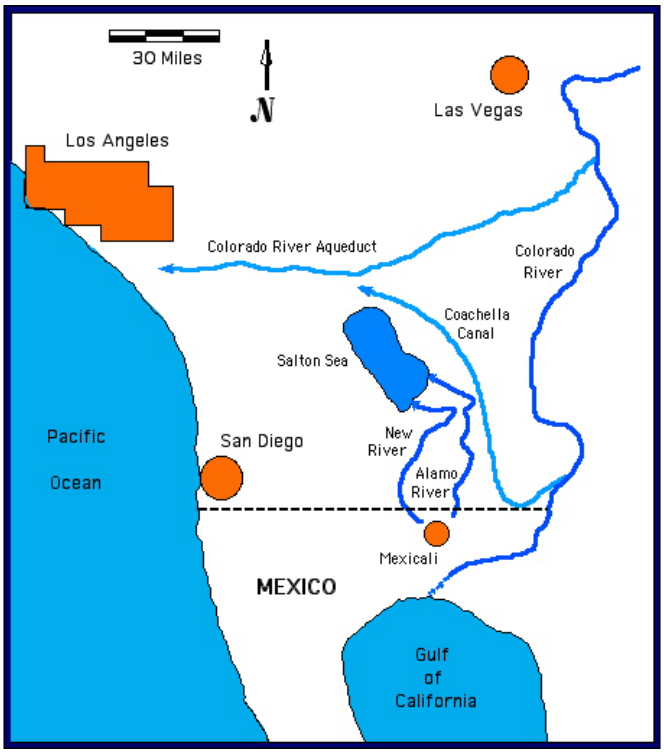
In one of the lowest, driest places in North America sits the Salton Sea, which is really a man-made lake, in a desert basin. It is California's largest body of water, approximately 35 miles north of the Mexican border and 130 miles east of San Diego, in what was once the northern extension of the Gulf of California (see map, next page). The Salton Sea's surface is approximately 227 feet below sea level. It covers 381 square miles and averages 31 feet deep (maximum depth is 51 feet). On three sides it is bordered by mountains. There is no outlet for its Water except for evaporation, which occurs at a high rate because of the hot and dry climate. Although freshwater feeds it, the sea is now 25 percent saltier than the ocean.

Water (dubbed Lake Cahuilla) had previously filled this basin at least three times in the past 1,000 years when the Colorado River changed course; each time the lake dried up when the river moved back. The present Salton Sea, however, was an accident. In 1905, the controls for some irrigation canals (dug in 1901 from the Colorado River to irrigate farmland in the Imperial Valley) were overwhelmed when the river breached its banks during a series of major floods. The waters of the Colorado River poured into the Salton sink for 18 months, destroying homes as well as the mainline of the Southern Pacific Railroad before workers managed to divert the river.

Both southern California cities and farms get water by way of a network of canals that divert it from the Colorado River, which forms the southeastern border of the state. The Colorado Aqueduct crosses almost the entire state, coming within about 10 miles of the northern end of the sea. The Coachella Canal parallels the sea's eastern side. The main inflow for the sea now is irrigation drainage, for which the federal government

designated it a sump. More than 75 percent of that water is from U.S. agricultural areas in three adjacent valleys. It often brings with it salt, fertilizers, pesticides, defoliants, and nutrients. The New River, coming in from Mexico, brings industrial pollutants and sewage from Mexicali.

The leading crops in the adjacent valleys are cotton, sugar beets, lettuce, and citrus fruits, some of which grace tables across the nation in winter. The northwest end of the lake is part of the Torres Martinez Indian Reservation. Human uses of the area are largely recreational. The Salton Sea State Recreation Area has more than a million visitors each year. In the 1950s the lake was stocked for sport-fishing and by 1985 was among the most productive fisheries in the state. Boating and camping are also popular there. Even more than people, birds use it—at an estimated rate of four million per day in the winter. Of course, the birds attract birdwatchers.



The Salton Sea National Wildlife Refuge was established in 1930. It contains salt and freshwater marshes, open water, and pasture. It provides habitat for waterfowl and shorebirds in winter and, during migration, it is a stopover on the Pacific Flyway. Other forms of wildlife rely on it year-round. Some endangered species are protected there, including the Yuma clapper rail, the brown pelican, and the desert pupfish. Its importance has grown as the Colorado River delta has shrunk due to the diversion of the water for irrigation and the associated loss of wetlands (more than 91% of California's wetlands have disappeared).

Problems

In the 1980s problems were becoming apparent. Both the elevation and the salinity of the lake were rising, the fishery began to decline, periodic algal blooms occurred, and die-offs of both fish and birds began. In 1990, selenium and organochlorines were reported to be in the eggs of egrets and night herons at higher concentrations along the Salton Sea than at other nearby sites (Ohlendorf and Marois). In 1992, a paper (Matsui et al.) detailed defects in developing nervous systems of fish embryos. The water contained abundant algae, pathogens, and parasites. The nutrients flowing in caused eutrophication of the lake, enhancing its productivity but resulting in a loss of oxygen when masses of algae decayed (a possible cause of episodic fish kills). On August 4, 1999, an estimated 7.6 million fish died in one day, the largest die-off ever in the sea. Soon thereafter the number of dead brown pelicans (an endangered species) increased to about 35 per day; the relationship between these phenomena is uncertain. The fish kills appear to involve high salt and high temperature, which in combination can reduce the oxygen content of the water to the point where fish suffocate (*Los Angeles Times*, 12 August 1999).

The increasing salt content has begun to affect reproduction in fish: corvina and croaker don't reproduce in waters with more than 45 parts per thousand (ppt) salt. The current level in the Salton Sea is approximately 44 ppt; in the ocean it is approximately 34 ppt. Tilapia, a hardy fish from South Africa, can tolerate salt up to 60 ppt, so it will probably be the last game fish remaining in the sea.

Bird die-offs have affected at least one-fifth of the 380 species that frequent the area. While in some cases the cause of death is unknown, in others botulism, cholera, and Newcastle disease have been identified as the cause of death. Hundreds of thousands of birds have died in the 1990s. The Salton Sea provides a crowded substitute for the once extensive wetlands in the area, but for many it has become a death-trap instead of a safe haven.

Among the serious contaminants in the sea documented by the U.S. Department of the Interior and the Bureau of Reclamation (USBR) are boron and organochloride pesticide residues. Selenium is an essential element, but is known to negatively affect wildlife when it bioaccumulates in animals higher up in a food chain or web. As seen in other irrigated parts of the West, it can be fatal or cause defective development in wildlife. In the Salton Sea it is present in the irrigation water at a low level—1 part per billion (ppb)—but it is much higher in some animals and sediment. Like the high salinity, it may be contributing to physiological stress, weakening animals' immune systems.

Another concern is the ever-increasing demand for water from the cities that draw from the Colorado River. California has long used more than its share, but that will change as other water districts and states upriver withdraw more water. A year of negotiations among California's three largest water agencies drawing from the Colorado produced an agreement just before the deadline in August, 1999 to reduce the amount of water the state takes from the river. On the first day of 2003, however, three of the eight pumps that diverted Colorado River water to southern California were turned off by order of the U.S. Department of the Interior. A federal deadline set two years earlier for an agreement about reducing the amount of water taken and transferring some water from farms to cities had not been met (*The New York Times*, 5 January 2003). According to Antonio Rossmann, who teaches land use and water law at the University of California at Berkeley, "officials at Imperial [Irrigation District] could not agree to the transfer because it would have meant choosing one of two equally unacceptable alternatives: letting productive farmland lie fallow to sustain the sea or destroying one of the nation's largest avian habitats and creating a regional air-quality hazard from the particles that would be emitted if the shoreline of the Salton Sea receded" (*The New York Times*, 17 January 2003).

The Interior Department had also failed, however, by neither producing a good restoration plan for the Salton Sea nor protecting the endangered species that live there, which had been mandated by Congress (*The New York Times*, 5 January 2003). In fact, more draw-down is under consideration. In October 1999, the United States and Mexico agreed to study building a joint aqueduct that would bring more Colorado River water to the area because both Tijuana and San Diego will need more water within the next 5 to 10 years (*San Diego Union Tribune*, 15 October 1999).

Additionally, the quality of the Colorado River water itself is now poor. According to a report by the World Commission on Water for the 21st Century released in November 1999, the river is badly polluted by agriculture and there is so little left by the end of its run that the area has become salty marshes (*Bowling Green Sentinel Tribune*, 30 November 1999).

Efficient water use has become a priority as water becomes scarcer. Phillip Pace, chairman of the Metropolitan Water District of Southern California, the biggest urban one in the west, said: "Urban Southern California should not be responsible for meeting the water-supply needs of agriculture" (*San Diego Union Tribune*, 19 March 1999). As farmers develop better methods of water conservation, the amount of freshwater flowing into the Salton Sea will likely diminish, which will mean less dilution of the salt. Desalination and removal of Salton water are being seriously considered. A December 27, 2002 report by 14 scientists critiques the desalination proposal from a U.S. company: "… restoration of the Salton Sea to a

healthier state is not an objective of the project … written in ignorance of basic ecological knowledge…. The residual Sea would be nothing more than a brine waste pit" (Salton Sea Ecosystem Research Group, Center for Inland Waters, San Diego State University, **http://www.sci.sdsu.edu/salton/USFilterSSPropEval.html)**.

Thus pressure from the increasing human population seems poised to undermine attempts to restore the Sea, putting all the other species that depend on it in jeopardy. The local human economy is also suffering: some of the once-thriving resorts around the lake have been declining along with the water quality in the sea, and the rising water level has flooded buildings.

Possible Solutions

In 1993 California set up a Salton Sea Authority (SSA) to work on maintaining beneficial uses of the sea. It reviewed suggestions for restoring the sea and found them to consist mainly of: (1) building pipelines and canals to discharge some of the Salton Sea to the ocean, or (2) controlling salinity with diked empoundments that would act as artificial outlets and evaporation ponds. The first approach is deemed much more expensive than the second.

Previous efforts to address the problems had faltered—usually due to lack of both money and public demand. However, the sea's increasing ecological deterioration and visible bird and fish kills have provoked public outcry and media attention.

The Salton Sea Task Force was formed in the U.S. Congress in 1997, and Bruce Babbitt, Secretary of the Interior, set out to review options for the sea. He appointed Dr. Milton Friend to head up the Salton Sea Science Subcommittee because: "He understands the role that science must play in resolving the complex and often competing issues of the Salton Sea."

In 1998 the U.S. Congress passed the Salton Sea Reclamation Act which required the Interior Department to report on its study of the sea and propose a plan for it by January 1, 2000. Thus there was a sudden increase in scientific work at the site and scientists were urged to hurry up with their data and recommendations.

Most restoration options being considered would take water out of the sea and replace it with less salty water from rivers and irrigation runoff. An Israeli technique uses shower towers: water would be pumped into two 100-foot towers from which it would be misted out and would evaporate in the desert heat, while the salt would fall to the ground and be collected. Likewise, evaporation ponds would allow the salt to be harvested. A different attack on the sea's problems would increase commercial fishing to reduce the fish population (and thus the drastic effects of the fish kills); some of the harvest might be used as fertilizer on farms.

The goals are to preserve the sea to hold agricultural drainage, enhance its value for wildlife and recreation, and increase the area's economic potential. To do this, the agencies want to keep the sea at 232 feet below sea level and reduce its salinity to 40 ppt, then deal with other problems later.

Criticism of the preservation effort came from an independent think tank in California—the Pacific Institute (see Cohen et al., 1999). From a long-term, public interest perspective, it suggested four reasons why such a stepwise approach won't work:

1. It is just an engineering solution that doesn't consider the effects on environmental conditions and so doesn't reflect the public interest.
2. The timelines are unrealistic and political rather than based on scientific evidence, which has just begun to be gathered.

3. The main problems may not be related to salinity.
4. The sea needs to be addressed as a complex agricultural-ecological system that is impacted by human-caused as well as natural factors.

In sum, the Pacific Institute believes the project needs to be seen as part of a bigger picture—and that any eventual solution would have to include restoring the Colorado River delta.

The Dilemma

"There's talk of diverting fresh water from the Colorado River to replenish the sea, and then somehow pumping out the salty water or diverting the overflow. That's crazy. Every drop of the Colorado River is spoken for by agriculture and urban water agencies. Will San Diego, Los Angeles, Arizona, or the Imperial Valley simply give up millions of acre-feet of water to flush out the Salton Sea? Not without depopulating the cities or allowing valuable farmland to return to desert," according to Jim Gogek of the *San Diego Union Tribune* (18 December 1998).

Differences of opinion abound, even among scientists and environmentalists. Ivan Colburn of California State University was reported as saying: "It's dead, keep it that way" (*Los Angeles Times*, 18 June 1998), to which Stuart Hurlbert of San Diego State University responded on June 19, 1998: "It's alive and kicking—save it."

Some think the natural cycle of evaporation should be allowed to proceed as in the past, through a stage similar to that undergone by the Great Salt Lake in Utah (which is full of brine shrimp and capable of supporting other life) before completely drying up. Others argue that given the huge loss of wetlands in the state there is no choice but to maintain it as habitat.

The dilemma, then, is how to deal with the Salton Sea: Save it or let it die? If the former, how?

Questions

1. What do you think is the main cause of the problems in the Salton Sea?
2. What differences do you see between the Salton Sea and the Lake Cahuilla that preceded it?
3. Do you perceive bias in the title given to the 1998 Act of Congress?
4. Do you consider the Salton Sea an adequate substitute for the wetlands that have been lost?
5. How would you balance the need for water inflow between the Salton Sea and the cities that also use the Colorado River?
6. What kinds of data do you think are needed before a sound decision can be reached?
7. How can the different interests of all the stakeholders be taken into account?
8. How would you explain the difference of opinion among environmentalists about the fate of the Salton Sea?

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For maps of the area, in "Feature Name" field, type in "Salton Sea." Last Accessed: 03/25/06.

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http://www.sci.sdsu.edu/salton/SaltonSeaHomePage.html
A page of numerous links. Last Accessed: 03/25/06.

The Salton Sea
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The Salton Sea
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