

WATER NORTH TO SOUTH

Purpose: To learn the great water distribution systems of California.

Objectives: The student will understand the way in which natural water has been transferred from one area to another within the state and the pros and cons of this major cultural decision.

Method: In Three parts

I. Brief review of native water locations

II. Water Law

III. The California water projects. Private, state, federal and the future of water in the state.

I. Review of Native Water

A. Where is it? Mostly in the North.

B. Where is it needed? Mostly in the South. Review the reasons.

II. Water Law – pg. 112-113

A. Riparian Rights (Sharing)

1. From English common law.

2. Applies to surface waters

3. Owner of land bordering stream or lake to use water in amounts correlated with rights of other riparian owners to that stream or lake.

B. Prior Appropriation (1st. come 1st served)

1. From Spanish law

2. Gives no preference to landowners adjoining the water.

3. Water rights are recognized on basis of use.

4. Earliest water user has preference.

5. Use protected as long as it is continuous and "reasonable".

C. Correlative Rights

1. Applies to ground water.

2. Cal. = 40% of total water use.

3. Overlying landowners are entitled to ground water for "reasonable use". Rights are correlated with other land owners overlying the aquifer.

D. The California Doctrine Miller p. 113

1. Conflicts of ownership led to 1928 Amend. to Cal. Const. establishing a new water rights doctrine of "Most reasonable beneficial use".

2. A blend of appropriation and riparian rights.

3. Problem = Cal. geographically imbalanced water distribution. Plenty of water in the north, too many people in the south.

4. The new rules

a. Grandfather clause state recognized and honor water rights already in use.

b. state acknowledged that riparian rights did exist.

c. riparian rights of recent transfer would not be absolute, and prevents selling water above the amount required for the land alone.

d. water so important that it was declared to be used for the general welfare and for the public interest.= Subject to state control and regulation,

e. all water not used by riparian and appropriative was declared "excess water" subject to state control exercised by a state water rights board.

f. all water appropriated by the state would be deemed to be for "public uses" subject to state control.

5. The California Water Code

a. Highest priority for domestic use

b. next to irrigation

c. Applications by a municipality for use of water by its residents is given priority over most other competing uses.

d. Water Board determines allocations to serve public interests. Board must work within state water plans.

e. not everyone was happy - Owen's Valley problem.

III. The Great California Water Projects:

- A. Purpose to move water from source to people and areas in greater need.
- B. Method mainly reservoirs for storage then surface canals to effect movement, then more reservoirs to hold imported water until used.

C. History of the projects.

1. L.A. Aqueduct (DWP) Eastern Sierra. pg. 113

- a. L.A. appropriated water from Owens Valley, dried up Owen's Lake, and recently lowered the water level in Mono Lake since it tapped the eastern sierra surface water flow from Yosemite south.
- b. Without water L.A. = semi desert
- c. The battle is between city and country.
- d. Started by William Mulholland in 1908.
- e. Cost 25 million, length 250 miles, took 5 years.
- f. pipe and flume, tunnel and trench system.
- g. gravity feed, no pumping required.
- h. generates hydroelectric power.
- i. L.A. purchased riparian land, used appropriation rights (EARLIEST USER 1776) etc. to get away with taking the water, but ranchers fought back using dynamite and guns-- this was the only range war in Cal. history. See Miller pg. 113-115

2. S.F. Water the Hetch-Hetchey p. 115

- a. Water delivered from Western Sierras (Yosemite) to San Francisco. The great Muir controversy.
- b. Dept. of Interior Granted approval in 1913 to dam up the Hetch-Hetchey Valley. Project completed in 1931. Another example of city over country water privileges.
- c. Length 175 miles, O'Shawnasy Dam, powerhouse (still provides cheap power to S.F.) operated by P.G.&E.
- d. Two reservoirs 655,000 acre feet feed Hetch-Hetchey Aquaduct. Through Diablo Range to Crystal Spring Res. Palo-Alto.
- e. 95 mile East Bay Aquaduct. East Bay obtained water form Mokelumne R., at the Pardee Dam and Reservoir. Both systems provide about 1/3 of the Bay Area's water.

3. The Salton Sea pg. 61

- a. Man made by accident in 1905.
- b. Colorado River was undammed at the time. Col. carries much material to be dumped in Gulf of California.
- c. Early attempts to irrigate the Imperial Valley. Used the ancient overflow channel called the Alamo River. Started at Pilot Knob, just above the Mexican border, water diverted into Alamo for irrigation. 50 miles long, dips into Mexico, crosses border again & into the Salton Sink (-280' el.).
- d. 1905 Spring heavy spring runoff from Col.R. and the lack of proper control gates caused a flood that caused the Colorado R. to enter the Salton Sink rather than the Gulf of Cal.
- e. River spread to a width of 8 to 10 miles. S.P.R.R. had to move its tracks to higher ground 5 times that season, approximately 400 sq. miles of Imperial Valley were flooded.
- f. Flood continued for Two Years.
- g. the S.P.R.R. took over from the defunct irrigation company and went to work. River ultimately put back into its banks, but in two years the Colorado R. had created the Salton Sea from the Salton Sink.
- h. Salton Sea still recieves off flow from irrigation in the Imperial Valley, continues to become saltier.(evap.& salt)
- i. Hover Dam (1936) one of several, now controls flow of Colorado R. and stops the delivery of sediment to Yuma.
- j. Before dams Yuma recieved 200 million tons silt/yr.

4. Colorado River water - The Metropolitan Water District (M.W.D.)

- a. Established 1928 to bring water to L.A. and most of the rest of the southern parts of Cal.
- b. First delivery of water began in 1940
- c. The Colorado R. Aquaduct serves 12 million people.
- d. It delivered 1 billion gallons of water daily. Due to law suits brought by Arizona (1953) Colorado River water will continue to be less in the future, and the difference will be made up by water from the SWP.
- e. The 242 mile aquaduct, five pumping stations, to Lake Mathews near Riverside. (Another 80 mile long All-American Canal delives 3.0 million acre feet of water to Coachella and Imperial Valley. Other minor diversions around Blythe irrigate another 100,000 acres, finally Yuma Project irrigates 15,000 acres.

5. The Central Valley Project CVP

a. Recognizes water surplus in Sacramento Valley, deficit in San Joaquin Valley. Mainly Agricultural water.

b. Strengths -

1. water for ag., indust. & domestic use.
2. flood control
3. hydroelectric power
4. improved navigation on Sacramento R.
5. control stream flow to deter salt water intrusion in Delta.
6. fish & wildlife conservation
7. recreational facilities

c. **Key Facilities**

1. Shasta Dam - Dec. 1943 - near Redding 4th highest. behind Hoover, Oroville, Glenn Canyon (Az.)
2. Captures Pit, Mc Cloud, and Sacramento Rs. in 4.5 million ac.ft. reservoir. Cal. largest hydroelectric plant located at Lake Shasta.
3. Keswick Dam (9 mi. downstream) more hydroelectric, water flow regulation, fish trapping.
4. Tehama-Colusa Canal (40 mi. downstream) 122 mi. long. and Corning Canal (21 miles long) water to higher elevations in Tehama County.
5. Link between Sac. and San Joaquin Valleys = The Delta Cross Channel. Near Walnut Grove goes 50 miles to Tracy where it is pumped into the Delta-Mendota Canal for the S.J. Val. Pumps lift water 197 feet, then by gravity 113 miles southward. Supplies the San Luis Unit reservoirs & several irrigation districts along the way. Rest of water enters S.J. River at Mendota for return to the delta. This puts water back into the S.J. River because its headwaters are dammed by the Friant Dam in the foothills of the Sierra Nevada.
6. Friant Dam (20 mi. east of Madera) backs up Millerton Lake. Feeds two canals a) Madera Canal 36 mi. b) Friant-Kern canal 153 mi. to Kern R. near Bakersfield.

ALL OF THIS WAS COMPLETED BY JULY 1951 – After which:

7. Trinity Dam (Trinity River) - Clair Engle Lake.

LOCATED 25 miles due west of Shasta Dam in Klamath Mtns. Province. Two more dams Lewiston Dam 7 mi. down stream, and Whiskeytown Dam on Clear Creek are to hold excess water to be put back into Sacramento R. above Keswick Dam for Central Valley needs.

8. Folsom Dam & Lake (20 mi. n.e. of Sacramento and farther upstream is Auburn Dam. on American River. Job= water control and with Folsom South Canal 69 mi. for irrigation of eastern regions of Sac. and S. J. Valleys.

9. New Malones Dam on Stanislaus River 35 mi. northeast of Modesto. Completed in 1979. Reservoir = 2.4 million acre feet (same as Clair Engle or Folsom Lake. MUCH CONTROVERSEY as it destroyed 9 miles of scenic wild rapids on Stan. R., but the State of Cal. could not stop it because CVP is funded by Feds., administered by U.S. Bureau of Reclamation part of the U.S. Dept. of Interior. CVP delivers about 6 billion acre feet of water annually to its customers, even in 76-77 drought years.

END CVP

6. The State Water Project SWP

- a. Another project; follows the recommendations of the California Water Plan (1947-57)
- b. Water use: about 1/2 goes for irrigation rest for domestic consumption (esp. to make up for less Colorado R. water in 1985 to MWD.) compared to CVP which is mainly for irrigation.
- c. Multipurpose system like CVP
- d. Major feature = Oroville Dam on Feather R. 5.5. mi. upstream from Oroville. Comp. 1968. One of world's largest earth and rock fill dams (770 ft. high ; Hoover Dam = 726 ft. high. Lake is 3.5 million acre ft. 167 mi. shoreline.
- e. Water flows through natural beds of Feather & Sact. R. across delta lands to Tracy. Water lifted like in CVP - gravity flow to the Tehachapi Mtns. in the California Aqueduct.
- f. Pumped up 3500 ft. over Tehachapi Mtns. into southern Cal. to Lake Perris in Riverside Co., (requires 14 pumping plants & 3 power generating plants) Water is also delivered to places in Central Coast, San Joaquin and Antelope Valleys, additional supply for urban S.F. Bay area, the south central coast, and Los Angeles (via Lake Perris).
- g. Diversions.
 - a) Two are the N. and S. Bay Aq. which can deliver 255,000 ac.ft. industrial & domestic needs.
 - b) east of Tulare Lake diversion to deliver 100,000 ac.ft./yr. to San Luis Obispo and Santa Barbara Co. on the coast.
 - c) West Branch Aqueduct (352,000 ac.ft. into Pyramid and Castaic Lk. to serve San Fernando Valley & L.A. from the west.
- h. San Luis Unit. 60 mi. s. of Tracy. (Comp 1967) federal/state financed project funded 45/55 basis. San Luis Dam & Reservoir 2 million acre ft. Capacity, O'Neill Dam & Fore bay 56,000 ac.ft. Cap., and San Luis Canal carries water 102 miles south along west side of San Joaquin Valley where it connects with California Aqueduct at Kettleman City. They act as regulators and holding facilities being moved in the Delta-Mendota Canal and California Aqueduct. Pumps lift water about 50 ft. into O'Neill Fore bay, then 310 ft. into San Luis Reservoir as needed.
- i. Future project will be to bring 104 miles through the Pacheco Tunnel (10 miles) into Santa Clara and Pajaro Valleys. (293,000 ac.ft. annually).
- j. Peripheral Canal is part of the SWP. It was defeated in the 1982 elections, but will probably be back later. Object is to bring water more efficiently around the delta area, but detractors claim that the delta may be damaged during drought years if priority given to project consumers in the south. Delta damage would come from salt water intrusion.

SUMMARY OF WATER NORTH-SOUTH

1. Very complicated.
2. Calif. has the most advanced water delivery system in the world, and the most expensive.
3. The student will be expected to know about the various water plans in general only, and not be required to know such things as storage capacity of reservoirs, heights of dams etc.

END